# Draft Environmental Impact Statement on Issuance of an Incidental Take Permit and Implementation of a Habitat Conservation Plan for the R-Project Transmission Line

May 2017

U.S. FISH & WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR

# DRAFT ENVIRONMENTAL IMPACT STATEMENT ON ISSUANCE OF AN INCIDENTAL TAKE PERMIT AND IMPLEMENTATION OF A HABITAT CONSERVATION PLAN FOR THE R-PROJECT TRANSMISSION LINE

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| **Responsible Federal Agency:** | U.S. Fish and Wildlife Service |
| **Incidental Take Permit Applicant:** | Nebraska Public Power District |
| **Cooperating Agencies:** | Nebraska Game and Parks Commission and Nebraska State Historical Society |
| **Title:** | Draft Environmental Impact Statement on Issuance of an Incidental Take Permit and Implementation of a Habitat Conservation Plan for the R-Project Transmission Line |
| **Location:** | Central Nebraska |
| **NEPA Contractor:** | Louis Berger |
| **U.S. Fish and Wildlife Service Contact:** | Eliza B. Hines<br>Nebraska Field Supervisor<br>U.S. Fish & Wildlife Service<br>Nebraska Field Office<br>9325 South Alda Road<br>Wood River, Nebraska 68883<br>(308) 382-6468, ext. 204<br>Eliza_Hines@fws.gov |

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# ABSTRACT

The U.S. Department of the Interior, Fish and Wildlife Service (Service), has received an application for an incidental take permit (permit), pursuant to Section 10(a)(1)(B) of the Endangered Species Act, from the Nebraska Public Power District (NPPD) for its proposed new transmission line and substations (known as the R-Project) in central Nebraska. The permit would authorize the incidental take of the Federally endangered American burying beetle (*Nicrophorus americanus*) (beetle). In support of its application for a permit, NPPD has prepared a draft Habitat Conservation Plan (HCP) that outlines actions that would be taken to avoid, minimize, and mitigate impacts on the beetle. On October 30, 2014, the Service published a Notice of Intent in the *Federal Register* (79 Federal Register 64619) to inform the public of its intent to prepare a draft environmental impact statement (DEIS) for the R-Project HCP that assesses the impacts on the natural and human environment from the proposed issuance of a permit and implementation of the HCP.

The DEIS is divided into six chapters. Chapter 1, *Purpose and Need*, provides background information on the R-Project and defines the Federal action and the decision to be made by the Service. Chapter 2, *Alternatives* presents three alternatives—two action alternatives and the No-action Alternative and discusses alternatives considered but eliminated, including alternative transmission line routes for the R-Project developed by the Service. Chapter 3, *Affected Environment and Environmental Consequences*, describes the existing conditions of 17 resource topics including physical, natural, and human environmental resources and the projected impacts to those resources from the three alternatives evaluated. Chapter 4, *Cumulative Impacts*, describes how the two action alternatives will contribute to cumulative impacts of past, present and reasonably foreseeable actions within the vicinity of the R-Project. Chapter 5, *Comparison of Alternatives*, presents a summary table of the environmental effects on each resource topic analyzed in the R-Project HCP DEIS that would occur under each alternative and describes the process used by the Service to select its Preferred Alternative. Finally, Chapter 6, *Compliance with Other Environmental Laws*, describes how NPPD has complied or will comply with other laws prior to implementing the R-Project.

The three alternatives considered in this R-Project HCP DEIS include: No-action Alternative, as required by the National Environmental Policy Act and is based on the Service not issuing a permit for construction and operation of the R-Project; Alternative A, which would involve using both steel lattice tower structures and tubular steel monopole structures for the Project transmission line; and Alternative B, which would entail using only tubular steel monopole structures for the Project transmission along the entire length of NPPD's final route.

The R-Project HCP DEIS evaluates the direct, indirect, and cumulative impacts of each alternative. Based on these projected impacts, the ability of each alternative to meet the R-Project's purpose and need and NPPD's conservation measures to avoid, minimize, and mitigate for take of the beetle, the Service has identified Alternative A as its Preferred Alternative.

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| APE | Area of Potential Effects |
| APLIC | Avian Power Line Interaction Committee |
| ATV | All-terrain Vehicle |
| beetle or ABB | American Burying Beetle |
| BGEPA | Bald and Golden Eagle Protection Act |
| BMP | Best Management Practice |
| BUL | Biologically Unique Landscape |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| CREP | Conservation Reserve Enhancement Program |
| CRP | Conservation Reserve Program |
| CSP | Conservation Stewardship Program |
| CWA | Clean Water Act |
| dB | Decibel |
| dBA | A-weighted Decibel |
| DEIS | Draft Environmental Impact Statement |
| DTO | Designated Transmission Owner |
| EMF | Electromagnetic Field |
| ESA | Endangered Species Act |
| °F | degrees Fahrenheit |
| FAA | Federal Aviation Administration |
| FEMA | Federal Emergency Management Agency |
| FERC | Federal Energy Regulatory Commission |
| FHWA | Federal Highway Administration |
| FR | Federal Register |
| FSA | Farm Service Agency |

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|---|---|
| GGS | Gerald Gentleman Station |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| HCP | Habitat Conservation Plan |
| I | Interstate |
| IBA | Important Bird Area |
| ICNIRP | International Commission on Non-ionizing Radiation Protection |
| KOP | Key Observation Point |
| kV | Kilovolt |
| L1 | Lacustrine Limnetic Wetlands |
| L2 | Lacustrine Littoral Wetlands |
| Leq | Equivalent Level of a Constant Sound over a Specific Period |
| Lx | Exceedance Sound Level |
| $\mu$T | Microtesla |
| MBCP | Migratory Bird Conservation Plan |
| mG | Milligauss |
| MW | Megawatt |
| NAAQS | National Ambient Air Quality Standards |
| NBELF | Nebraska Board of Educational Lands and Funds |
| NDEQ | Nebraska Department of Environmental Quality |
| NDOR | Nebraska Department of Roads |
| Nebraska SHPO | Nebraska State Historic Preservation Office |
| NEPA | National Environmental Policy Act |
| NERC | North American Electric Reliability Corporation |
| NESC | National Electrical Safety Code |
| NESCA | Nebraska Nongame and Endangered Species Conservation Act |
| NGO | Non-governmental Organization |
| NGPC | Nebraska Game and Parks Commission |
| NHPA | National Historic Preservation Act |
| NIEHS | National Institute of Environmental Health Sciences |
| NNHP | Nebraska Natural Heritage Program |

| | |
|---|---|
| $N_2O$ | Nitrous Oxide |
| $NO_2$ | Nitrogen Dioxide |
| NOx | Nitrogen Oxides |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| NPPD | Nebraska Public Power District |
| NPS | National Park Service |
| NRCS | U.S. Department of Agriculture, Natural Resources Conservation Service |
| NRD | Natural Resources District |
| NRHP | National Register of Historic Places |
| NRI | Nationwide Rivers Inventory |
| NSHS | Nebraska State Historical Society |
| NWI | National Wetlands Inventory |
| NWR | National Wildlife Refuge |
| $O_3$ | Ozone |
| OHV | Off-highway Vehicle |
| OPGW | Optical Ground Wire |
| ORV | Outstandingly Remarkable Value |
| OSHA | Occupational Safety and Health Administration |
| PAB | Palustrine Aquatic Bed Wetlands |
| PCB | Polychlorinated Biphenyl |
| PEM | Palustrine Emergent Wetlands |
| permit | Incidental Take Permit |
| PFO | Palustrine Forested Wetlands |
| $PM_{2.5}$ | Particulate Matter with a Diameter Less than or Equal to a Nominal 2.5 Micrometers |
| $PM_{10}$ | Particulate Matter with a Diameter Less than or Equal to a Nominal 10 Micrometers |
| ppm | Parts per Million |
| Project | R-Project |
| PSS | Palustrine Scrub-shrub Wetlands |

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|---|---|
| PUB | Palustrine Unconsolidated Bottom Wetlands |
| RCRA | Resource Conservation and Recovery Act |
| Reclamation | U.S. Department of the Interior, Bureau of Reclamation |
| R2 | Riverine, Lower Perennial Wetlands |
| R4 | Riverine, Intermittent Wetlands |
| ROD | Record of Decision |
| ROW | Right-of-Way |
| SCADA | Supervisory Control and Data Acquisition |
| Service or USFWS | U.S. Department of the Interior, Fish and Wildlife Service |
| $SF_6$ | Sulfur Hexafluoride |
| $SO_2$ | Sulfur Dioxide |
| SPCC | Spill Prevention, Control, and Countermeasure |
| SPP | Southwest Power Pool |
| SRA | State Recreation Area |
| TCP | Traditional Cultural Property |
| TMDL | Total Maximum Daily Load |
| TVMP | Transmission Vegetation Management Program |
| USACE | U.S. Army Corps of Engineers |
| U.S.C. | United States Code |
| USDA | U.S. Department of Agriculture |
| USEPA | U.S. Environmental Protection Agency |
| USFS | U.S. Department of Agriculture, Forest Service |
| USGS | U.S. Geological Survey |
| VLU | Visual Landscape Unit |
| VOC | Volatile Organic Compound |
| Western | Western Area Power Administration |
| WMA | Wildlife Management Area |

# GLOSSARY

**Abiotic factor**—A nonliving condition or thing, such as climate, that influences or affects an ecosystem and the organisms in it.

**Aeolian noise**—Sound produced by wind as it passes over or through objects, such as conductors.

**Alluvial aquifer**—An aquifer comprising unconsolidated material deposited by water, typically occurring adjacent to river and in buried channels.

**Aquifer**—An underground layer of water-bearing permeable rock, rock fractures, or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted.

**Area of potential effects (APE)**—The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist; it is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking 36 Code of Federal Regulations 800.16(d).

**Background (visual analysis)**—The distance zone, between 1.5 miles and 3.0 miles from a viewpoint location, where Project features would not likely be perceived by moderate-sensitivity casual viewers and where high-sensitivity viewers would be affected only where the strongest contrasts would occur, such as in skylining conditions where no transmission lines currently exist.

**Biologically Unique Landscapes**—A set of priority landscapes designated by the Nebraska Natural Legacy Project that, if properly managed, would conserve the majority of Nebraska's biological diversity.

**Biotic factor**—A living organism, such as a plant, animal, or microbe, that influences or affects an ecosystem and the organisms in it.

**Blowout**—Sandy areas where rapid wind erosion blows out a hole in the surface of the landscape.

**Clean Water Act (CWA)**—The Act that establishes the basic structure for regulating discharge of pollutants into the waters of the United States and regulating water quality standards for surface waters.

**Conservation easement**—A voluntary legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land to protect its conservation values.

**Conservation Reserve Enhancement Program (CREP)**—A voluntary land retirement program administered by the Farm Service Agency that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water.

**Conservation Reserve Program (CRP)**—A voluntary conservation program administered by the Farm Service Agency that provides participants with an annual per-acre rent plus half the cost of establishing a permanent land cover (usually grass or trees) in exchange for retiring highly erodible or environmentally sensitive cropland from farm production for 10 to 15 years.

**Conservation Stewardship Program (CSP)**—A voluntary conservation program administered by the U.S. Department of Agriculture, Natural Resources Conservation Service, that provides annual land use payments to participants who undertake conservation activities and improve, maintain, and manage existing conservation activities.

**Consulting party**—Any entity that has a consultative role in the Section 106 process, including State and Tribal Historic Preservation Officers, Indian Tribes, representatives of local governments, the public, and certain individuals and organizations with a demonstrated interest in the undertaking due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties.

**Corona noise**—A common noise associated with transmission lines which is heard as a crackling or hissing sound and comes from a breakdown of air into charged particles caused by the electrical field at the surface of conductors.

**Cultural resources**—Expressions of human culture and the physical remains of human activities (including locations that were used, built, or modified by people; archaeological and historic sites; buildings; structures; objects; and landscapes); natural features and biota considered important to human communities; and aspects of the physical environment that are a part of traditional lifeways and practices and are associated with community values and institutions.

**A-weighted decibel (dBA)**—an expression of the relative loudness of sounds in air as perceived by the human ear (in the A-weighted system, the decibel values of sounds at low frequencies are reduced, compared with unweighted decibels, in which no correction is made for audio frequency).

**Decomposer**—An organism, often a bacterium, fungus or insect that feeds on and breaks down dead plant or animal matter, facilitating decomposition.

**De minimis emission levels**—The minimum threshold for which an analysis must be performed to meet the conformity requirements of the Clean Air Act.

**Direct jobs**—Jobs created to work on a project.

**Disproportionately high and adverse effects**—In an environmental justice analysis, significant and adverse ecological, cultural, human health, economic, or social impacts of a proposed action on a minority population, low-income population, or Indian tribe that would likely be appreciably greater than such effects on the general population or other appropriate comparison group.

**Ecoregion**—A large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions and also having a general similarity and in the type, quality, and quantity of environmental resources.

**Ecosystem services**—The services people receive from the environment, including, but are not limited to, clean drinking water, timber, pollination, decomposition, erosion control, carbon storage, nutrient cycling, and spiritual enrichment.

**Fen**—Groundwater-fed wetlands with saturated, nutrient-rich peat or muck soils, typically with meadow-like vegetation.

**Flood Insurance Risk Zone A**—Areas subject to inundation by the 1-percent-annual-chance flood event, but where no base flood elevation or depths are available.

**Floodplain**—An area of land adjacent to a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge.

**Flyway**—A migratory route used by birds, often spanning continents of oceans.

**Foreground**—The “high visibility” distance zone, between 1,500 feet and 0.5 mile from a viewpoint location, within which Project features could potentially be dominant, depending on the viewing conditions, and where high- and moderate-sensitivity viewers could be substantially affected.

**Geologic formation**—A rock unit that is distinctive enough in appearance that it can be distinguished from the surrounding rock layers that is extensive enough to plot on a map.

**Glacial till**—Unsorted glacial sediment that is derived from the erosion and entrainment of material by the moving ice of a glacier.

**Global warming potential**—A measure of how much energy the emissions of 1 ton of a gas will absorb over a given period relative to the emissions of 1 ton of carbon dioxide.

**Grassland**—An area in which the natural vegetation consists largely of perennial grasses, often used for livestock grazing or pasture.

**Groundwater**—The water present beneath the soil surface in the soil pore spaces and in the fractures of rock formations.

**Hazardous material**—Any item or agent (biological, chemical, radiological, and/or physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

**Hazardous waste**—A waste, which is generated from sources ranging from industrial manufacturing process wastes to batteries and comes in many forms, including liquids, solids gases, and sludges, with the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

**Hibernacula**—Sheltering habitats, such as caves, occupied by animals during periods of hibernation in winter months.

**Historic property**—Any prehistoric or historic district, site, building, structure, or object that is either listed in, or eligible for listing in the National Register of Historic Places.

**Hydric soils**—Soils formed under saturation, flooding, or ponding for a sufficient period to develop anaerobic characteristics in the upper soil horizon.

**Hydrophytic vegetation**—Plants that occur in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

**Immediate foreground**—The “very high visibility” distance zone, extending 1,500 feet from a viewpoint location, within which Project features would be dominant and where high- and moderate-sensitivity viewers would likely be significantly affected.

**Implosive splicing**—A transmission line installation procedure that uses a small amount of explosive designed to connect two lengths of conductor or shield wire together upon detonation.

**Indirect jobs**—Jobs created to supply goods and services for a project.

**Induced jobs**—Jobs created in the broader economy from spending by direct and indirect workers.

**Intactness**—An attribute of visual quality that describes whether the visual character of the landscape has been interrupted by elements that contrast with its general visual character or has been modified in a way that reduces its visual quality.

**Key Observation Point (KOP)**—A location that communicates the character of a Visual Landscape Unit and that provides a basis for determining visual impacts.

**K Factor**—The index used to measure a soil’s potential to erode and also the rate of runoff as measured compared to a standard condition.

**Lacustrine wetland**—Includes permanently flooded lakes and reservoirs, intermittent lakes, and tidal lakes with ocean-derived salinities below 0.5 percent.

**Land jurisdiction**—The geographic area within which a landowner or land manager has authority to make decisions regarding land uses, for example, easements, leases, and other land use agreements grant usage rights without transferring ownership, but jurisdiction does not necessarily reflect ownership.

**$L_{EQ}$**—The equivalent level of a constant sound over a specific period that has the same sound energy as the actual sound over the same period; sometimes known as the average sound level.

**Loess**—A light-colored fine-grained accumulation of clay and silt particles that have been deposited by the wind.

**Marsh**—An area of low-lying habitat that is flooded in wet seasons and typically remains inundated at all times.

**Middleground**—The distance zone, between 0.5 mile and 1.5 miles from a viewpoint location, where the potential effects on high-sensitivity viewers begin to diminish and Project features would become co-dominant or sub-dominant in the landscape, depending on the viewing conditions and setting.

**Mineral resources**—Mineral deposits that are potentially valuable, and for which reasonable prospects exist for eventual economic extraction.

**Minority population**—In an environmental justice analysis, a group of individuals within which persons identifying as racial or ethnic minorities exceed 50 percent of the total population or where the minority population is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison.

**National Historic Preservation Act (NHPA)**—Legislation intended to preserve historical and archaeological sites in the United States of America (Public Law 89-665; 16 United States Code 470 et seq.) and that created the National Register of Historic Places, the list of National Historic Landmarks, and the State Historic Preservation Offices.

**National Historic Trails**—Routes, administered by the National Park Service, that recognize prominent past routes of exploration, migration, and military action.

**National Priorities List Superfund Site**—List of hazardous waste sites in the United States eligible for long-term remedial action (cleanup) financed under the federal Superfund program.

**National Register of Historic Places (NRHP)**—The official list of the Nation's historic places worthy of preservation, as authorized by the National Historic Preservation Act of 1966, and part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

**Nationwide Rivers Inventory (NRI)**—A register, compiled and maintained by the National Park Service, of rivers that may be eligible for inclusion in the National Wild and Scenic Rivers System; federal agencies are required to consult with the National Park Service's Rivers, Trails, and Conservation Assistance Program before taking an action that could affect the potential for an NRI river to be designated as a National Wild and Scenic River.

**Noise**—Unwanted sound that interferes with normal activities, such as speech, concentration, or sleep.

**Noise sensitive site**—Any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit.

**Nonattainment area**—An air quality jurisdiction which has formally been recognized by the U.S. Environmental Protection Agency as violating a national ambient air quality standard.

**Noxious weed**—A weed that has been designated by a Federal, state, or county government or an agricultural authority as one that is harmful to agricultural or horticultural crops, natural habitats or ecosystems, human health, property, recreation, wildlife, or livestock.

**Old field**—Land formerly cultivated or grazed but later abandoned.

**Palustrine wetland**—Any nontidal wetland that lacks flowing water and is dominated by trees, shrubs, or persistent emergent vegetation.

**Passerine**—Any bird of the order Passeriformes, which includes more than half of all known bird species, generally characterized by its small size, vocalizations, and perching behavior; frequently referred to as songbirds.

**Per Capita Personal Income**—Average income per person in a particular group, derived by dividing the aggregate income of a particular group by the total population in that group (adults and children).

**Plumage**—The layers of feathers coving the body of a bird.

**Pollinator**—An organism, such as an insect, that transfers pollen to female parts of a flowering plant.

**Population**—The number of all the organisms of the same group or species that live in a particular geographical area and have the capability of interbreeding.

**Poverty area**—A census tract or other area where at least 20 percent of residents are below the annual statistical poverty thresholds established by the U.S. Census Bureau; used to identify low-income populations for environmental justice analysis.

**Prime farmland**—A designation assigned by the U.S. Department of Agriculture defining land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these land uses.

**Riparian**—The interface between land and a river or stream.

**Riverine wetland**—All wetlands and deepwater habitats contained within a channel where water is usually flowing.

**Salt flat**—A flat expanse of ground covered with salt and other minerals.

**Scenic/historic byways**—Highway corridors, designated by the Nebraska Department of Roads, that possess unusual, exceptional, or distinctive scenic, historic, recreational, cultural, or archaeological features.

**Section 303(d) impaired waters**—Waters identified by states that are impaired or in danger of becoming impaired and that states calculate and allocate pollutant reduction levels necessary to meet approved water quality standards.

**Shelterbelt**—A row of trees, shrubs, and other vegetation planted to provide protection for fields, livestock, and/or residences from winter weather, including wind.

**Shorebird**—A bird that frequents the shores of coastal or inland waters, such as a sandpipers, plovers, or snipes.

**Shrubland**—An area in which the natural vegetation consists largely of shrubs, but may also include grasses and herbs; also referred to as scrubland, scrub, or brush.

**Skylining**—A situation in which transmission facilities would be prominent in views and would extend above the horizon line.

**Soil restoration potential**—The ability of the soil to recover from degradation (i.e. the ability to restore functional and structural integrity after a disturbance).

**State Historic Preservation Office or Officer (SHPO)**—Established by the National Historic Preservation Act of 1966 as an agency within each state government charged with advising and assisting Federal agencies in carrying out Section 106 responsibilities and cooperating with such agencies, local governments and organizations and individuals to ensure that historic properties are taken into consideration at all levels of planning and development.

**Superfund**—Also known as Comprehensive Environmental Response, Compensation, and Liability Act (or CERCLA) and enacted by Congress on December 11, 1980 to impose a tax on the chemical and petroleum industries and to provide broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

**Surficial geology**—Landforms and the unconsolidated sediments that lie beneath them.

**Swamp Buster Provisions of the Food Security Act**—Farmers and ranchers who participate in the Farm Program cannot drain or fill wetlands and continue to remain in the Farm Program and third party conversions are prohibited.

**T Factor**—An indicator of soil loss tolerance, or the amount of soil loss that can be tolerated for a soil to remain productive.

**Tidal flat**—A type of coastal wetland characterized by low relief, muddy substrates, and lack of vegetation that is formed by mud deposited by tides or rivers.

**Total maximum daily load**—A regulatory term in the Clean Water Act, describing, a value of maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

**Traditional Cultural Properties (TCP**)—A property that is eligible for inclusion in the National Register of Historic Places based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community and that is rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community.

**Undertaking**—A project, activity or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; and those requiring a federal permit, license, or approval.

**Unity**—An attribute of visual quality that evaluates how well composed and harmonious the visual characteristics of the landscape are.

**Viewer sensitivity**—A qualitative assessment of the sensitivity of viewers to changes in the visual environment, based on factors such as the number of viewers, probable viewer expectations, activities, viewing duration, and orientation. In general, viewers are expected to have higher sensitivity to visual quality if they are engaged in an activity that is enhanced by high visual quality (for example, sightseeing or looking out a window for aesthetic benefit), or if their views of the resource are more frequent or extended.

**Viewshed**—The area within which the Project would be visible. The viewshed defines the practical limits of the affected environment for the analysis of Visual Resources.

**Visual character**—Colors, shapes, typical patterning, and other types of compositional elements that are characteristic of natural and built features in a landscape setting. Visual character is based on the physical characteristics of the landscape setting, without consideration of aesthetic value or viewer perception.

**Visual Landscape Unit (VLU)**—A landscape type with a relatively homogeneous visual character.

**Visual quality**—An assessment of how the public would likely value the visual character of a project setting. The visual assessment methodology used by the Federal Highways Administration defines visual quality as having three attributes— vividness, intactness, and unity.

**Vividness**—An attribute of visual quality that describes how memorable and distinctive the visual character of the landscape is.

**Waterfowl**—Large birds such as ducks, geese, and swans that are associated with aquatic habitats and frequently regarded as game species.

**Watershed**—An area or ridge of land that separates water flowing to different rivers, basins, or seas.

**Water table**—The surface where the water pressure head is equal to the atmospheric pressure.

**Wet meadow**—A type of wetland with soils that are saturated for part or all of the growing season that commonly occurs in poorly drained areas such as shallow lake basins, low-lying farmland, and the land between shallow marshes and upland area.

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# EXECUTIVE SUMMARY

The U.S. Department of the Interior, Fish and Wildlife Service (Service), received an application for an incidental take permit (permit), pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) (16 United States Code § 1539(a)(1)(B)), from the Nebraska Public Power District (NPPD) for its proposed new transmission line and substations (known as the R-Project or Project) in Nebraska. The permit would authorize the incidental take of the Federally endangered American burying beetle (*Nicrophorus americanus*) (beetle). In support of its application for a permit, NPPD has prepared a draft Habitat Conservation Plan (HCP) that outlines actions that would be taken to avoid, minimize, and mitigate impacts on the beetle. This draft environmental impact statement (DEIS) analyzes the potential impacts associated with the issuance of the permit and implementation of the HCP, including a range of alternatives.

## Project Introduction and Overview of R-Project HCP

NPPD proposes to construct, operate, and maintain a new, approximately 225-mile-long, 345 kilovolt (kV) transmission line (Proposed Action). The transmission line would extend from NPPD's Gerald Gentleman Station (GGS) Substation near Sutherland, Nebraska, to NPPD's existing substation east of Thedford, Nebraska, which would be expanded. The transmission line would then proceed east and connect to a new substation that would be sited in Holt County. The R-Project transmission line traverses a large portion of the Nebraska Sandhills grassland. To site the R-Project, NPPD began with a study area, which was identified early in its Project development phase, and narrowed down the study area to corridors and ultimately to a final route selected in January 2015.

NPPD's Project area includes habitat for and supports populations of the beetle. The American Burying beetle, listed as endangered under the ESA in 1989 (54 Federal Register [FR] 29652), is considered to be extirpated throughout most of its historical range, of which it is currently believed to occupy less than 10 percent. The beetle occurs across a wide range of habitat types, including the Nebraska Sandhills, and is largely restricted to areas mostly undisturbed by human activity. The R-Project study area includes portions of two separate geographically isolated populations of the beetle—the Loess Hills population, located mostly south of the Platte River to the southeast of NPPD's study area, and the larger Nebraska Sandhills population, which occurs throughout a large portion of the study area.

NPPD has concluded that the proposed R-Project construction, operation, and maintenance (including emergency repairs) may harass, harm, or kill (i.e., "take") the beetle. NPPD has also concluded that complete avoidance of the species and its habitat is not likely. Therefore, NPPD has prepared a draft HCP and is seeking a permit pursuant to Section 10 of the ESA to authorize incidental take of the beetle within a defined permit area for covered activities occurring during construction and operation of the R-Project. The application for a permit and development of an HCP are voluntary steps that NPPD has undertaken to obtain authorization from the Service for the incidental take of the beetle resulting from the otherwise lawful construction and operation of the Project (including emergency repairs). NPPD is requesting a permit with a 50-year duration for the construction and operation of the R-Project.

Activities potentially covered under the permit for the R-Project are referred to in this DEIS as covered activities. Only those activities likely to result in take of the beetle are included as covered activities; however, this DEIS analyzes the impacts of all activities required for the construction, operation, and maintenance (including emergency repairs) of the R-Project and implementation of the HCP. The list of covered activities was developed as a collaborative effort between NPPD, the Service, and the Nebraska Game and Parks Commission.

The permit area for the HCP is defined as the geographical area within which incidental take resulting from covered activities is expected to occur. The permit area begins where the R-Project crosses Nebraska Highway 92 at the town of Stapleton, Nebraska, and continues north to the Thedford Substation and then east to the new Holt County Substation. The permit area from Stapleton to the Thedford Substation includes 1 mile on either side of the R-Project centerline (2 miles wide total), while the permit area from the Thedford Substation to the Holt County Substation includes 4 miles on either side of the R-Project centerline (8 miles wide total). The varying permit area width incorporates all potential impacts occurring outside the transmission line right-of-way (ROW), including construction access and construction yards (i.e., temporary work areas, staging sites, or other areas of disturbance associated with Project construction and maintenance).

## Purpose

The purpose of the Proposed Action of approving an HCP and issuing an incidental take permit is to authorize take of the American burying beetle incidental to the construction, operation, and maintenance of the R-Project transmission line, while ensuring conservation of the species by minimizing and mitigating the impacts from the anticipated take to the maximum extent practicable. Issuance of such a permit will allow NPPD to proceed with the R-project while complying with the ESA. It also will provide regulatory assurances to NPPD that the Service would not impose any further restrictions or requirements for the beetle as long as NPPD is properly implementing the HCP, and the existence of any listed species would not be jeopardized. To achieve these purposes, the HCP must satisfy the issuance criteria for incidental take coverage that are outlined in Section 10(a)(2)(B) of the ESA (detailed in Section 1.9.1 of this DEIS). The purpose of NPPD’s proposed HCP is to implement a conservation strategy for the beetle that will minimize impacts onsite from the transmission line and offset its impacts by ensuring protection and management of offsite habitat in perpetuity.

## Need

The need for the Service’s Proposed Action is to respond to NPPD’s application for an incidental take permit and determine whether permit issuance is appropriate. Before making a permit issuance decision, the Service must analyze the impacts of implementation of the proposed HCP and issuance of the permit to the human environment, disclose those analyses to the public, and consider public feedback. The Service must also conduct intra-Service Section 7 consultation to ensure that the permit issuance criterion for not jeopardizing the continued existence of listed species is met. The Service must also conduct analyses to determine that all other Section 10(a)(2)(B) permit issuance criteria are met.

The need for the R-Project is to enhance the reliability of NPPD's electric transmission system, relieve congestion from existing lines, and provide opportunities for development of renewable energy projects, including wind power, in Nebraska.

## Scope of the Analysis

The development of an HCP and application for a permit is the only way for NPPD to obtain ESA compliance for the R-Project. Consequently, the Service determined the DEIS needed to address the effects for all aspects of constructing, operating, and maintaining (including emergency repairs) of the Project as well as the implementation of the HCP. Additionally, the Service identified and evaluated other potential means to implement the Project that would minimize the impact on, and take of, the beetle, while still meeting NPPD's stated need for the R-Project. As part of the scope of this DEIS, the Service examined and evaluated other routing options to avoid and minimize take of the beetle. These other transmission routes were evaluated but ultimately eliminated from further consideration in the DEIS.

## Public Scoping

On October 30, 2014, the Service published a Notice of Intent (NOI) in the *Federal Register* to inform the public of its intent to prepare an EIS that assesses the impacts on the human environment from the proposed issuance of a permit to authorize the incidental take of the Federally endangered American burying beetle and implementation of an HCP (79 FR 64619). The NOI initiated a 60-day comment period for public review and comment on any of the topics to be addressed in the DEIS. The NOI also announced that the Service would hold three public scoping meetings. Fifty-three comments were received, and the content of these comments was categorized into 28 categories in the Scoping Summary Report. Most comments pertained to transmission line routing and alternatives, the uniqueness/sensitivity of the landscape, whooping cranes, and migratory birds. A common theme was the need for the Service to consider alternative routes for the R-Project to avoid ecologically sensitive habitats and preserve the undeveloped Sandhills landscape. A commonly expressed concern was that the Sandhills grassland represents one of the last remaining intact temperate grasslands in the world and that disturbance could detrimentally affect its sensitive soils. All public comments were considered in the development of this DEIS.

## Decision to Be Made

The decision to be made by the Service is whether to issue a permit to NPPD for the R-Project. The decision whether to issue a permit will be based on the statutory and regulatory issuance criteria for a Section 10(a)(1)(B) permit, and the final decision will be presented in a Record of Decision. The Service's decision-maker will evaluate each analysis of adverse or beneficial effects on the human and natural environment presented in this DEIS to make a final decision on whether a permit will be issued.

## DEIS Alternatives

The DEIS evaluates three alternatives, the no-active and two action alternatives, which are described below.

### *No-action Alternative*

Under the No-action Alternative, a permit would not be issued and NPPD would not construct the R-Project as proposed. Under the No-action Alternative, the need for the R-Project (i.e., enhancing reliability, relieving congestion, and providing opportunities for renewable energy projects) would remain unmet, and reliability issues and congestion may become exacerbated over the next 50 years. Identifying another solution to meet the Project need would require NPPD or another electrical utility to initiate a new project planning process; however, future projects that do not include construction of an R-Project transmission line are too speculative to predict and adequately describe for a no-action condition; therefore, the No-action Alternative assumes that no Project would be constructed.

### *Alternative A: Tubular Steel Monopoles and Steel Lattice Towers*

The R-Project would involve constructing a 225-mile-long, 345 kV transmission line in two segments. The 100-mile north/south segment would begin at the GGS Substation located south of Sutherland, Nebraska, and would extend north of Sutherland then east to U.S. Highway 83. The R-Project would then travel north following U.S. Highway 83 to connect to NPPD’s existing substation east of Thedford, Nebraska, which would be expanded. The 125-mile east/west segment would begin at the Thedford Substation, then proceed east connecting to a new substation in Holt County, where it would connect to the Western Area Power Administration’s Fort Thompson to Grand Island transmission line. The width of the ROW would be 200 feet (100 feet each side of centerline) for the entire transmission line, unless otherwise specified.

Two types of structures would be used for the R-Project transmission line—tubular steel monopoles and steel lattice towers. Tubular steel monopoles require large equipment for installation and would be used along NPPD’s final route where there is relatively good access and where established roads exist (e.g., along U.S. Highway 83 or in cultivated fields). Tubular steel monopole structures would be placed approximately 1,350 feet apart (average ruling span) and have an average height of 150 feet. Steel lattice towers would be used in areas of the Sandhills where existing access routes are limited or do not exist. Lattice towers can be constructed with less overall effect on the surrounding area because smaller equipment and helicopters can be used during construction. Span lengths between lattice towers would be the same as monopoles, and the towers would have an average height of 130 feet.

The GGS Substation, located in Lincoln County, just south of Sutherland Reservoir State Recreation Area and north of West Power Road, would be expanded within its existing footprint and would include installation of a 345 kV breaker, 345 kV reactor, and 345 kV dead-end structure. The Thedford Substation expansion site is located in Thomas County, east of Thedford, east of the existing Thedford 115 kV Substation, and north of State Highway 2. The new Holt County Substation would be located in Holt County on the northwest corner of the intersection of 846th Road and 510th Avenue. The major components of the Thedford and Holt County substations would include 345 kV breakers and associated disconnect switches, 345 kV reactors, 345 kV dead-end structures, 345 kV bus and associated support structures, fencing, grounding, and a control building.

Following construction, temporary work areas and access routes would be removed and the area restored to its original condition. NPPD would stabilize and revegetate all temporarily disturbed areas. NPPD would also develop a Restoration Management Plan, which would be finalized and submitted to the Service prior to the start of construction. The Restoration Management Plan would include stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet these stipulations.

In addition to the avoidance and minimization measures identified in the draft HCP, NPPD would provide compensatory mitigation lands to conserve beetle habitat and offset temporary and permanent impacts resulting from construction and operation of the R-Project and for unanticipated emergency repairs required after storms. NPPD would secure at least 500 acres of occupied beetle habitat and would secure mitigation lands with the approval of the Service. NPPD would secure sufficient mitigation lands to offset the R-Project’s impacts through one of two methods: 1) NPPD would secure and manage the land or 2) NPPD would work with a third party to identify, procure, and manage the land.

To ensure restoration of disturbed beetle habitat, NPPD would also establish an escrow account to ensure the implementation and success of restoration efforts. NPPD prepared and submitted to the Service an escrow agreement for review that will be finalized prior to the start of construction activities.

### *Alternative B: Tubular Steel Monopole Construction Only*

During the public-involvement process, NPPD documented that the public prefers steel monopole structures to lattice structures to reduce impacts on visual and agricultural resources. For this reason, the DEIS considers as an alternative for detailed analysis the use of tubular steel monopole construction for the entire length of NPPD’s final route.

Alternative B would involve the use of tubular steel monopole structures along the entire length of the R-Project transmission line unlike the Proposed Action (Alternative A), which would use both steel lattice towers and monopole structures. Tubular steel monopoles require concrete foundations and access roads because erecting the monopoles does not include use of helicopters. Access routes must support the heavy equipment (e.g., concrete trucks and cranes) necessary to pour concrete foundations and erect the structures. Where roads do not exist, temporary access routes must be constructed to access each structure. Additional work areas and temporary access routes, greater restoration requirements, and increased construction costs under this alternative would result in greater temporary disturbance. Because of the increased area of ground disturbance more acres of suitable beetle habitat would be affected, resulting in a greater level of take of the beetle. Under Alternative B, NPPD would provide 660 acres of compensatory mitigation lands to conserve beetle habitat and offset temporary and permanent impacts.

### Preferred Alternative

The primary criterion used in the DEIS to select the preferred alternative is the amount of projected incidental take of the beetle. Because NPPD would use a combination of steel lattice towers and tubular monopole structures under Alternative A, less ground disturbance would occur and consequently less take of the beetle would occur than under Alternative B. Alternative A is the preferred alternative and is consistent with the expressed NPPD need for the R-Project

### Potential Environmental Impacts

Potential direct and indirect impacts were identified and evaluated for each aspect of the natural and human environments potentially affected by the R-Project. Impact duration was considered to be either short term or long term, and impact intensity was ranked on a scale of low to high. Specific criteria for determination of impact duration and intensity were developed for each resource analyzed and are described in Chapter 3. The potential impacts of the two action alternatives and the No-action Alternative are summarized below in Table ES-1. A significance determination is made for those environmental resources that would be severely affected by implementation of either action alternative (see Chapters 3 and 5).

Avoidance, minimization, and mitigation measures have been incorporated into the development of the proposed Project (applicable to both action alternatives) to protect environmental and human resources. These measures are varied and may be intended to address specific resource concerns, be more general in nature, or address multiple areas of concern for different resources. To date, avoidance, minimization, and mitigation measures identified to be implemented by NPPD under either action alternative are discussed at the conclusion of each resource category in Chapter 3.

**Table ES-1. Overview of Impacts by Resource Area**

| Environmental Resource | Potential Impacts from Implementation of Either R-Project Action Alternative |
|---|---|
| Geology and Soils | Permanent loss of soils; temporary disturbance of prime farmlands, soil with high erosion potential, and/or soils with low soil restoration potential would occur. Temporary displacement of surface geology and access restrictions to mineral resources would occur during construction and maintenance activities. |
| Water Resources | Surface waters and most floodplain areas would be spanned; thus negligible long-term effects on water resources are anticipated. The drainage patterns of surface waters might be altered, and streamflow and channel instability could occur during construction and maintenance activities. Temporary increases in sediment loads, turbidity, and degradation of surface and groundwater could occur during construction. |

| Environmental Resource | Potential Impacts from Implementation of Either R-Project Action Alternative |
|---|---|
| Wetlands | Permanent loss of wetlands, hydrologic changes, change in vegetation composition and diversity would occur. Temporary disturbances including soil compaction, reduced habitat suitability and water quality degradation would occur during construction and maintenance activities. |
| Vegetation | Permanent loss or degradation of vegetation, permanent conversion of woody vegetation, soil compaction, and habitat fragmentation would occur due to project construction. Additional temporary disturbance of vegetation, increased erosion, and potential spread of invasive and noxious vegetation would occur during construction and maintenance activities. |
| Wildlife | Operation of the transmission line would create a permanent collision hazard for migratory birds. Permanent and temporary loss or disturbance of wildlife habitat would occur due to project construction and maintenance activities. |
| Special Status Species | The project would result in take of the endangered beetle. Operation of the transmission line would create a permanent collision hazard for migratory birds including the whooping crane. Permanent and temporary loss or disturbance of suitable habitat for special status species would occur due to project construction and maintenance activities. |
| Land Use | Construction of substation facilities would necessitate land ownership changes in Thomas and Holt counties. The transmission line would cross one conservation easement and border another. Construction and maintenance activities would temporarily disturb ranching and farming activities. At least 500 acres of land would be purchased and/or leased for placement in the public domain to mitigate adverse effects on the beetle. |
| Recreation and Tourism | The presence of transmission facilities within or near recreation areas would create permanent visual disturbances that affect user experience. Increased noise, fugitive dust, and traffic congestion would occur in nearby recreational areas during construction and access to some public use areas may be temporarily restricted. |
| Cultural Resources | Construction of the project would result in permanent visual impacts to historic properties. Identification of historic properties and determinations of effects are ongoing, and measures to avoid, minimize, or mitigate potential adverse effects would be developed in consultation with the Nebraska State Historic Preservation Office and other consulting parties. |
| Transportation | Temporary road closures may interfere with regular traffic flow and local emergency response activities during construction and maintenance activities, but no substantial disruptions of traffic flow on roads or railways are expected. No permanent impacts to transportation are expected. |
| Visual Resources and Aesthetics | Visual quality of communities and residences, recreation and historic sites, river crossings, and highways and scenic byways would be permanently degraded. The presence of vehicles and equipment, and possibly fugitive dust, would create temporary visual disturbances during project construction and maintenance. |
| Air Quality | Fugitive dust and emissions, including greenhouse gas emissions, would occur as a result of the use of construction vehicles and equipment during project construction and maintenance. |

| Environmental Resource | Potential Impacts from Implementation of Either R-Project Action Alternative |
|---|---|
| Noise | The transmission line would produce corona noise and Aeolian noise, and the substation transformers would make humming sounds over the life of the project. Temporary impacts would include noise from construction vehicles, including helicopters, crews, and implosive splicing devices during stringing operations of the transmission line. |
| Hazardous Materials | Hazardous materials and/or hazardous waste may be encountered and/or generated during construction. Groundwater and wetlands could be contaminated from the use of hazardous materials over the long-term. |
| Public Health and Safety | Permanent and temporary impacts could include risk of wildfire, electric shock through conductance, and tower collapse. |
| Socioeconomics | The project would result in permanent and temporary adverse and beneficial impacts. Potential economic benefits would include temporary increases in local tax revenue and permanently increased electrical capacity and reliability. Adverse economic effects may include potential increases in electricity rates, as well as loss or disturbance of ranching and farming operations. |
| Environmental Justice | No disproportionate and adverse impacts on environmental justice populations are anticipated. |

Note: Impacts would be similar under both action alternatives.

# 1.0 PURPOSE AND NEED

## 1.1 Introduction

The U.S. Department of the Interior, Fish and Wildlife Service (Service or USFWS), received an application for an incidental take permit (ITP), pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) (16 United States Code [U.S.C.] § 1539(a)(1)(B)), from the Nebraska Public Power District (NPPD) for its proposed new transmission line and substations (known as the R-Project or Project) in Nebraska. The permit would authorize the incidental take of the federally endangered American burying beetle (*Nicrophorus americanus*) (beetle or ABB). In support of its application for a permit, NPPD has prepared a draft Habitat Conservation Plan (HCP) that outlines actions that will be taken to avoid, minimize, and mitigate impacts on the beetle (NPPD 2016a). This draft environmental impact statement (DEIS) analyzes the potential impacts associated with the issuance of the permit and implementation of the HCP, including a range of alternatives.

*Established within the Executive Office of the President by Congress as part of NEPA, CEQ oversees federal agency implementation of the environmental impact assessment process and ensures that federal agencies meet their obligations under NEPA.*

This DEIS has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and 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 Part 46). The purpose of this DEIS is to inform federal decision makers and the public of the potential environmental impacts from implementing the R-Project and its alternatives and to identify the agency's Preferred Alternative. The DEIS will be used by the responsible federal officials to make informed decisions.

This chapter provides background information about the R-Project and the beetle, describes the purpose of and need for the R-Project (issuance of a permit), describes the public and agency involvement process for this DEIS, and documents the decisions to be made.

## 1.2 Project Background

NPPD proposes to construct, operate, and maintain (including emergency repairs) a new, approximately 225-mile-long, 345 kilovolt (kV) transmission line (Alternative A). The transmission line would extend from NPPD's Gerald Gentleman Station (GGS) Substation near Sutherland, Nebraska, to NPPD's existing substation east of Thedford, Nebraska, which would be expanded. The R-Project transmission line would then proceed east and connect to a new substation to be sited in Holt County (Figure 1-1). The R-Project transmission line traverses a large portion of the Nebraska Sandhills grassland. To site the R-Project, NPPD began with a study area, which was identified early in the Project development phase; the study area was narrowed down to corridors and ultimately to a final route that NPPD selected in January 2015 (Figure 1-1). A more detailed discussion of NPPD's route selection process is presented in Section 2.2.

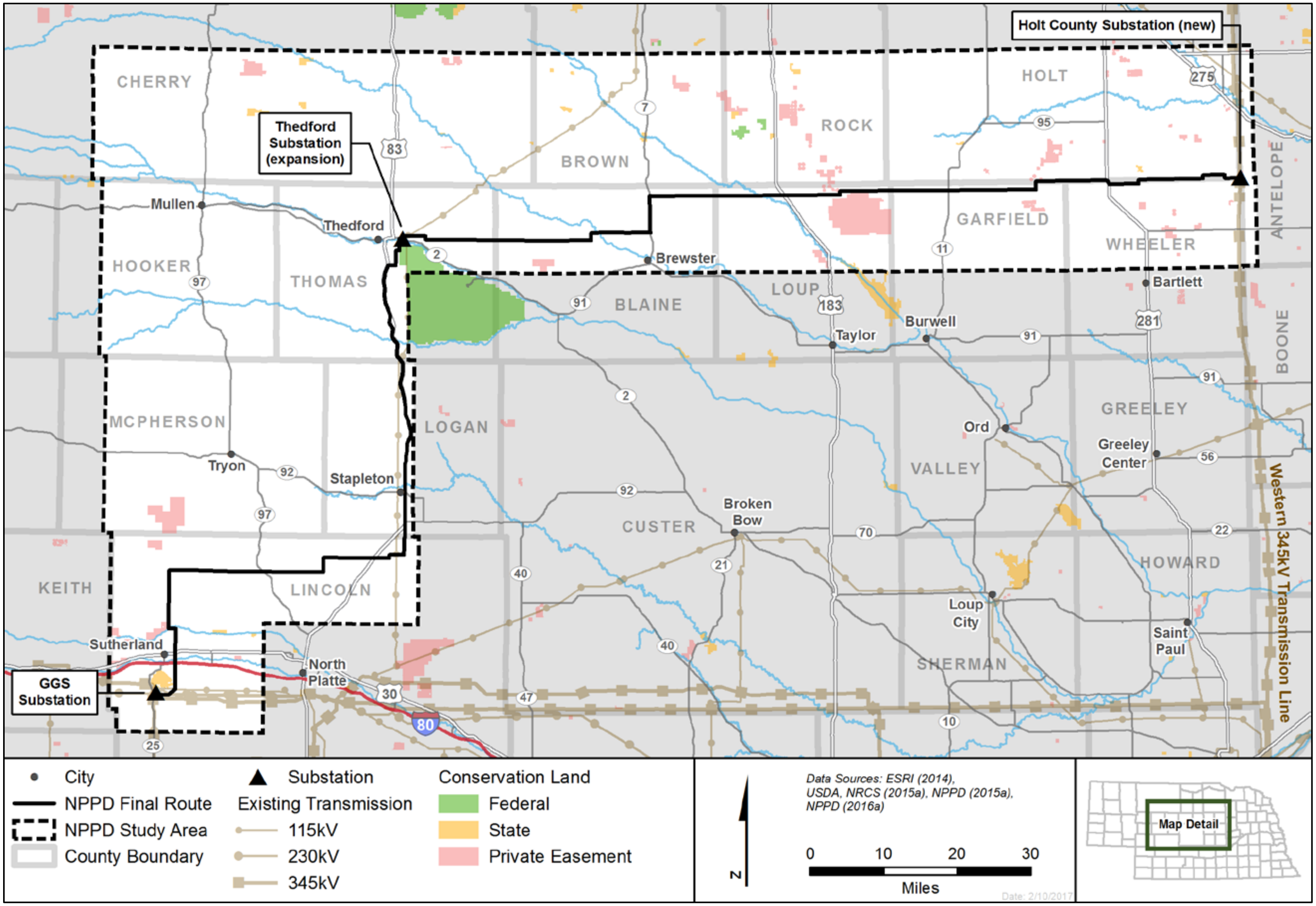
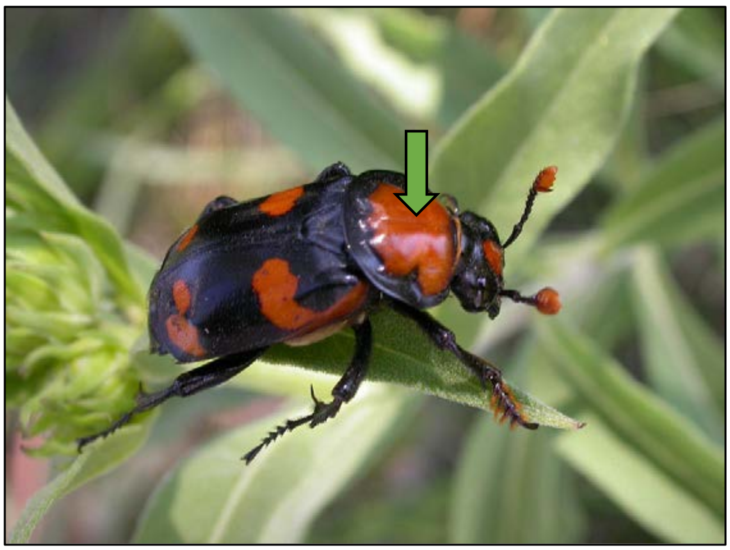



**Figure 1-1. Nebraska Public Power District's R-Project Study Area and Final Route**

NPPD's study area includes habitat for and supports remaining populations of the Federally endangered beetle. The beetle has an approximate 1- to 2-inch-long, black body with distinct orange markings. The beetle, active only at night, is the largest carrion beetle in the United States. The beetle is easily identified because it is the only carrion beetle that has a large orange shield on its pronotum (see arrow in photo below). The beetle uses the carrion of small birds and mammals for a food source and brood rearing. This highly seasonal species is active from May through October in Nebraska and buries into the ground where it remains dormant during the winter (Ratcliffe 1996; USFWS 2013a). This species is intolerant to human disturbance and its existence in any given area depends on several biotic and abiotic factors, including soil conditions, composition of vegetative community, availability of carrion (Holloway and Schnell 1997), and precipitation and temperature levels (Jorgensen et al. 2014).



Source: USFWS

*American Burying Beetle (Nicrophorus americanus) during Active Summer Season*

The American burying beetle, listed as endangered under the ESA in 1989 (54 Federal Register [FR] 29652), is considered to be extirpated throughout most of its historical range, of which it is currently believed to occupy less than 10 percent (NatureServe 2015a; USFWS 2008a). The beetle occurs across a wide range of habitat types, including the Nebraska Sandhills and is largely restricted to areas mostly undisturbed by human activity (Lomolino et al. 1995; Panella 2013; USFWS 1991). The R-Project study area overlaps portions of two separate geographically isolated populations of the beetle—the Loess Hills population, located south of the Platte River to the southeast of the study area, and the larger Nebraska Sandhills population, which occurs throughout a large portion of the study area (Figure 1-2). Field surveys, conducted as recently as 2016, along NPPD's final route for the R-Project confirm the presence of this species in the study area (NPPD 2016b; Hoback 2015). However, the portion of the study area within the boundary identified for the Loess Hills population does not present suitable habitat for the beetle, and no beetles occur in the area. Additional information about the beetle, including documented occurrences in the study area, is provided in Section 3.7, *Special Status Species,* and in the draft HCP.

NPPD has concluded that construction, operation, and maintenance (including emergency repairs) of the proposed R-Project may harass, harm, or kill (i.e., "take") the beetle. NPPD has also concluded that complete avoidance of take of the species and its habitat is not likely (Figure 1-2); therefore, NPPD has prepared a draft HCP and is seeking a permit pursuant to Section 10 of the ESA to authorize incidental take of the beetle within a defined permit area for covered

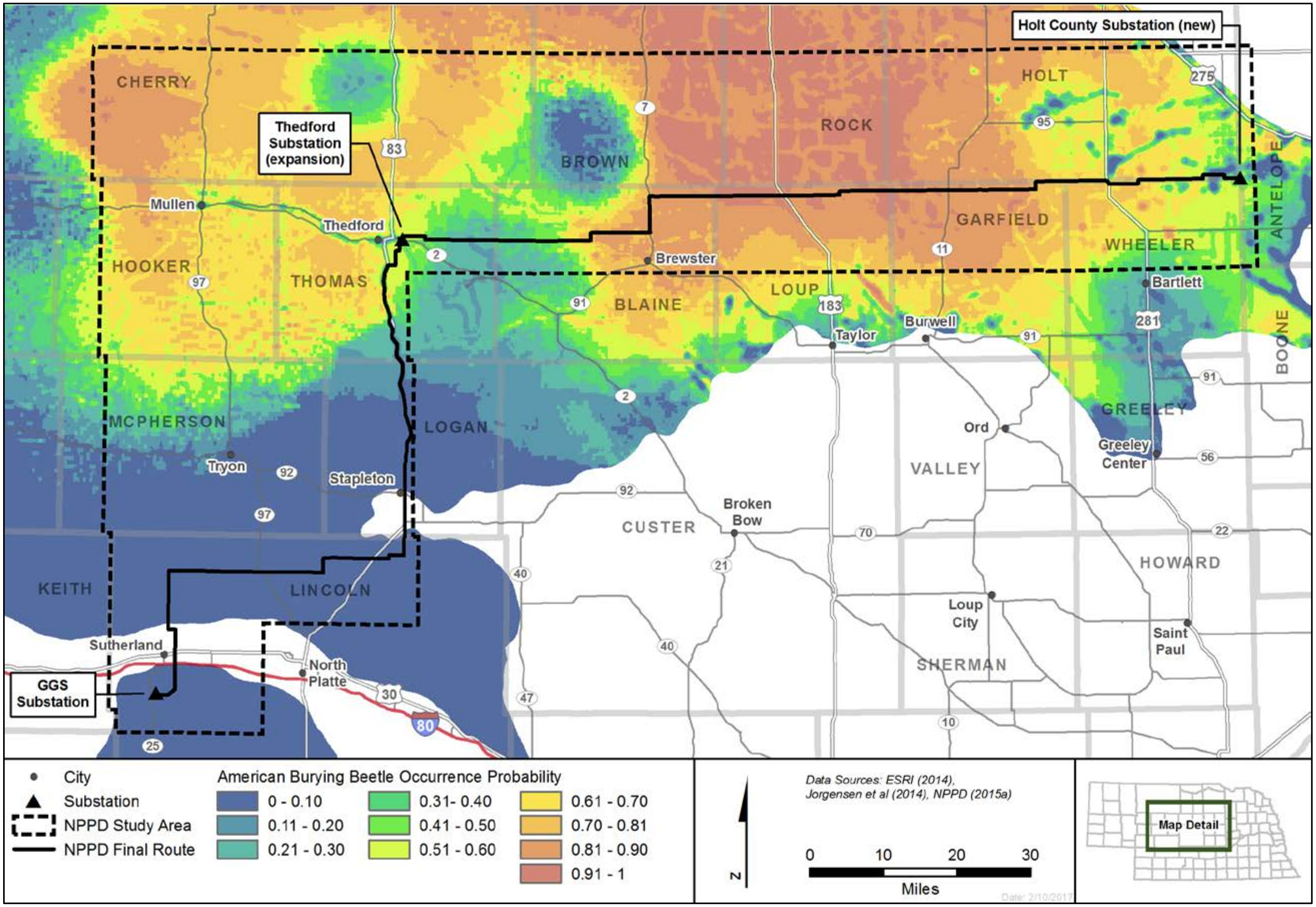



**Figure 1-2. American Burying Beetle Predicted Probability of Occurrence in Nebraska Sandhills Ecoregion**

activities occurring during R-Project construction and operation (including emergency repairs). The application for a permit and development of an HCP are voluntary steps that NPPD has undertaken to obtain authorization for the incidental take of the beetle resulting from the otherwise lawful construction and operation of the Project. NPPD is requesting a permit with a 50-year duration for the construction and operation of the R-Project (i.e., transmission line, substations, permanent access roads, and emergency repairs).

The permit area for the HCP is defined as the geographical area within which incidental take resulting from covered activities is expected to occur (Figure 1-3). The permit area begins where the R-Project crosses Nebraska Highway 92 at the town of Stapleton, Nebraska, and continues north to the Thedford Substation and then east to the new Holt County Substation (approximately 162 miles of the total 225-mile route). The permit area from Stapleton to the Thedford Substation includes 1 mile on either side of the R-Project centerline (a total of 2 miles wide) for 38.4 miles and a total area of 49,450 acres, while the permit area from the Thedford Substation to the Holt County Substation includes 4 miles on either side of the R-Project centerline (a total of 8 miles wide) for 123.6 miles and a total area of 623,317 acres. The varying width of the permit area incorporates all potential impacts occurring outside the transmission line right-of-way (ROW) including construction access and construction yards (i.e., temporary work areas, staging sites, fly yards, or other areas of disturbance associated with Project construction and maintenance). The permit area is narrow between Stapleton and the Thedford Substation because the R-Project largely follows existing highways along this segment and all temporary disturbances would be within 1 mile of the transmission line. Conversely, from the Thedford Substation to the new Holt County Substation, existing access is limited, and the permit area must be wider to encompass all construction access.

## 1.3 Species Covered by Incidental Take Permit and Habitat Conservation Plan

The American burying beetle, a Federally listed endangered species under the ESA, is the only species covered by the draft HCP.

## 1.4 Purpose

The purpose of the Proposed Action of approving an HCP and issuing an incidental take permit is to authorize take of the American burying beetle incidental to the construction, operation, and maintenance of the R-Project transmission line, while ensuring conservation of the species by minimizing and mitigating the impacts from the anticipated take to the maximum extent practicable. Issuance of such a permit will allow NPPD to proceed with the R-project while complying with the ESA. It also will provide regulatory assurances to NPPD that the Service would not impose any further restrictions or requirements for the beetle as long as NPPD is properly implementing the HCP, and the existence of any listed species would not be jeopardized.

***Purpose of this DEIS***

…is to authorize take of the American burying beetle incidental to the construction, operation, and maintenance of the R-Project transmission line, while ensuring conservation of the species by minimizing and mitigating the impacts…

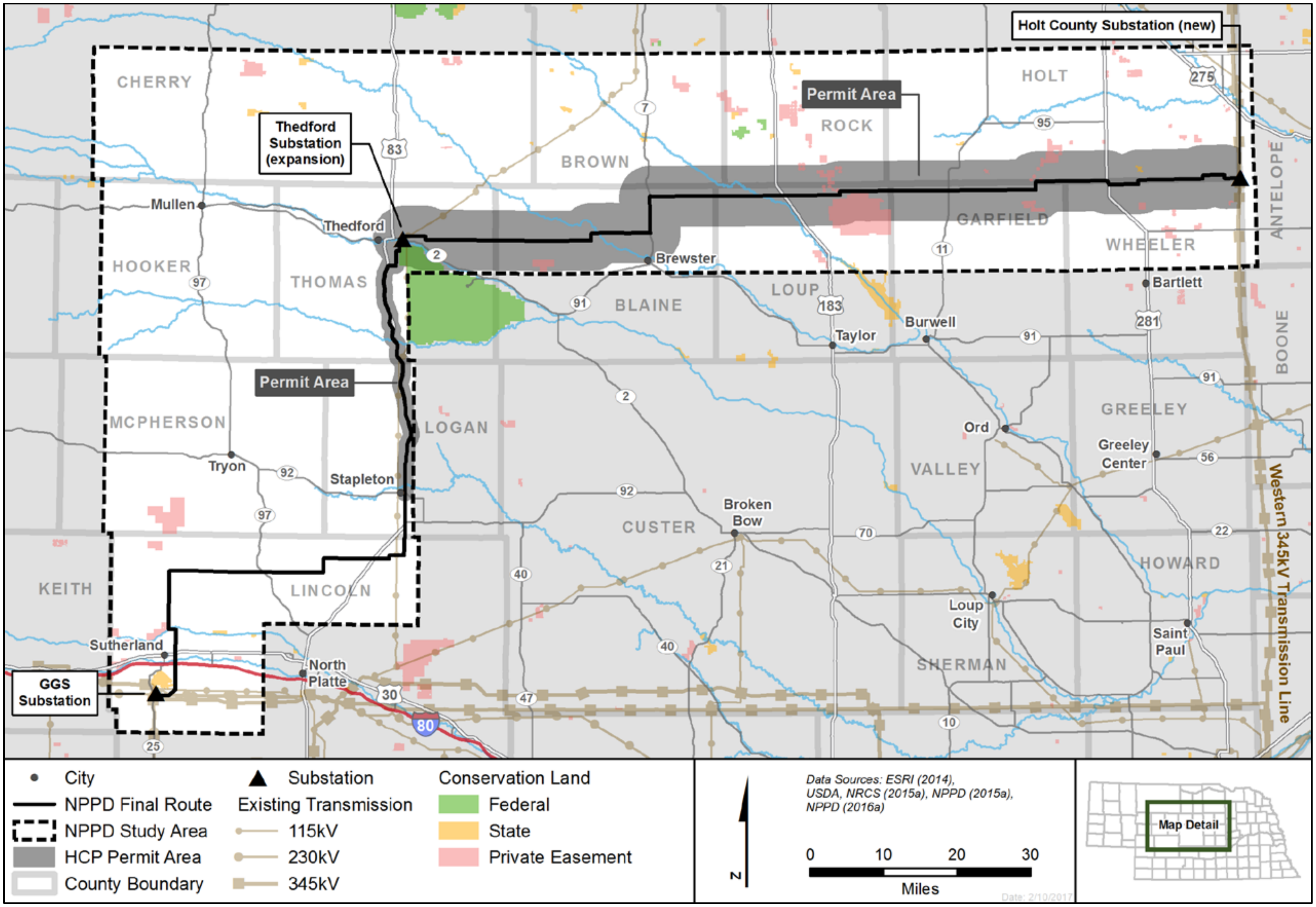



**Figure 1-3. Proposed Habitat Conservation Plan Permit Area**

To achieve these purposes, the HCP must satisfy the issuance criteria for incidental take coverage that are outlined in Section 10(a)(2)(B) of the ESA (detailed in Section 1.9.2 of this DEIS). The purpose of NPPD's proposed HCP is to implement a conservation strategy for the beetle that will minimize impacts onsite from the transmission line and offset its impacts by ensuring protection and management of offsite habitat in perpetuity.

## 1.5 Need

The need for the Service's Proposed Action is to respond to NPPD's application for an incidental take permit and determine whether permit issuance is appropriate. Before making a permit issuance decision, the Service must analyze the impacts of implementation of the proposed HCP and issuance of the permit to the human environment, disclose those analyses to the public, and consider public feedback. The Service must also conduct intra-Service Section 7 consultation to ensure that the permit issuance criterion for not jeopardizing the continued existence of listed species is met. The Service must also conduct analyses to determine that all other Section 10(a)(2)(B) permit issuance criteria are met.

The need for the R-Project is to enhance the reliability of NPPD's electric transmission system, relieve congestion from existing lines, and provide opportunities for development of renewable energy projects, including wind power, in Nebraska.

## 1.6 Proposed Action

The Proposed Action is issuance by the Service of a Section 10(a)(1)(B) ITP for the beetle and for the covered activities proposed in the draft HCP (NPPD 2016a). The draft HCP describes in detail what constitutes covered activities during construction and operation of NPPD's R-Project. The draft HCP outlines specific measures to avoid and minimize impacts on the beetle along with mitigation measures to offset the impacts from take that cannot be avoided or minimized. The draft HCP also describes the monitoring and, if necessary, use of adaptive management that would occur to ensure that permitted take is not exceeded and mitigation is successful. This DEIS analyzes the direct, indirect, and cumulative effects on the human and natural environment of issuing a permit and implementing the HCP.

Additionally, some NPPD activities associated with the R-Project are authorized by other Federal, state, and local agencies (e.g., the U.S. Army Corps of Engineers [USACE], State of Nebraska, and municipalities) primarily through certifications and permitting (see Chapter 6, *Regulatory and Permit Requirements*).

## 1.7 NPPD's Need for the R-Project

The need for the R-Project was identified by the Southwest Power Pool (SPP), a Federal Energy Regulatory Commission (FERC) approved Regional Transmission Organization that is responsible for ensuring a reliable electrical grid for a region encompassing all or parts of 14 states. NPPD is a member of the SPP and is the largest electrical utility in Nebraska, providing wholesale or retail service to 86 of Nebraska's 93 counties. NPPD provides generation and sale of wholesale power to 50 towns and 25 rural public power districts and cooperatives. In addition, it owns and operates more than 5,200 miles of high-voltage transmission lines (115 kV, 230 kV, and 345 kV) and sub-transmission lines (34.5 kV and 69 kV).

NPPD is also a member of the Midwest Reliability Organization, one of the eight regional entities of the North American Electric Reliability Corporation (NERC). NERC is a not-for-profit, international regulatory authority whose mission is to ensure the reliability of the bulk power system in North America by developing and enforcing reliability standards. NERC is subject to oversight by FERC. NERC works with SPP and the Midwest Reliability Organization to improve the reliability of the bulk power system. In 2007, SPP became a FERC approved Regional Entity, serving as the reliability coordinator for the NERC region and overseeing compliance with reliability standards.

In administering its charge to ensure that reliable electrical power capacity exists within its region, SPP conducts planning studies to ensure that the grid will continue to meet the standards set by NERC, meet the needs of its member utilities and their customers, operate in an efficient and reliable manner, and provide transmission access to meet current and future needs in the state. Through this planning process, SPP identifies when and where new transmission lines are needed and where upgrades to the current electrical system must be conducted, looking at 10- and 20-year planning horizons. SPP identifies projects that are needed during the 10-year planning horizon in its *Integrated Transmission Plan 10-Year Assessment Report* (SPP 2012). When SPP identifies a need for new transmission infrastructure, it directs a Designated Transmission Owner (DTO) to construct the needed infrastructure. This directive is known as a Notice to Construct. Once a DTO receives a Notice to Construct, it then completes the required routing studies, environmental studies, permitting, engineering design, ROW acquisition, construction, and construction management of the Project.

Based on requirements identified in SPP's 2012 *Integrated Transmission Plan 10-Year Assessment Report*, NPPD, as the DTO, received a conditional Notice to Construct from SPP on April 9, 2012, for a new 345 kV transmission line that would extend from NPPD's GGS Substation north to a new 345 kV substation to be located in or near Cherry County, and then extend eastward to another new 345 kV substation to be located in Holt County, which is to interconnect with the Western Area Power Administration's (Western) existing Fort Thompson to Grand Island 345 kV line that is located on the eastern border of Holt County. NPPD received a final Notice to Construct from SPP in March 20132013. On May 19, 2014, as a result of SPP's *High Priority Incremental Load Stud*y, SPP issued another Notice to Construct to NPPD that required the installation of a new 345/115 kV transformer at the Thedford Substation. The issuance of this 2014 Notice to Construct resulted in the selection of the Thedford Substation as the intermediate terminal point between GGS Substation and the interconnection with the new substation located in Holt County.

The R-Project is intended to: 1) provide for significant reliability benefits to the existing western Nebraska area transmission system by increasing the west-east power transfer capability across the NPPD system, 2) reduce significant congestion issues by providing an additional outlet path from GGS Substation, and 3) provide transmission access to renewable energy resources (i.e., wind projects) in an area of Nebraska with wind resources. These goals are discussed further in the following two subsections.

### 1.7.1 Reliability Improvements and Congestion Relief

The R-Project would offer significant reliability benefits to the existing western Nebraska area transmission system by addressing the worst-case stability issues and increasing west-to-east power transfer capability across the NPPD system. The Nebraska high-voltage transmission network is divided into two distinct reliability regions—the eastern region and the western region—with an electrical boundary in the Grand Island/Hastings area. The eastern transmission region is stable because 80 percent of the entire state of Nebraska's load typically resides east of the electrical boundary. The bulk 345 kV transmission network of the eastern region has sufficient redundancy, and system power fluctuations from regional disturbances are controlled because of the strong electrical ties between the generation resources and the major load centers.

The western region has different operational characteristics. The system has no alternating current ties to the west, and the large generation resources in this area are not surrounded by major load centers. The western region thus has a substantial mismatch between generation and load and must rely on the bulk transmission system to deliver power to the state's load centers in eastern Nebraska. The GGS Substation is NPPD's largest and least-cost generation resource. Laramie River Substation is another large, low-cost, coal-fired generating station in the western region, and three direct current ties can inject power into the western Nebraska region. A total of 2,500 megawatts (MW) of resources interconnects to the western Nebraska transmission region.

Because of the minimal amount of load and the limited capacity of the existing transmission system in the region west of GGS Substation, all interconnected resources in this area affect the GGS Substation area; therefore, the bulk transmission facilities east and south of GGS Substation are critical for maintaining the stability and reliability of the western region. NERC has identified the GGS Substation as a Stability Flowgate, meaning the flow of power through the facility is constrained by operational concerns and the facility is being monitored for overloads. The stability of the Gerald Gentleman Flowgate is limited by transient stability, transient voltage, and post-contingent thermal overloads. Transmission contingencies involving the 345 kV and 230 kV transmission elements from GGS Substation south into western Kansas and from GGS Substation east into the Grand Island/Hastings area can have detrimental effects on the delivery of the western Nebraska baseload resources.

Established Flowgate limits must always be maintained to meet the NERC standards and maintain the reliability of the western Nebraska region. If these limits are not maintained, the reliability of the entire western Nebraska region is at risk. For example, if the GGS Substation stability limit is exceeded and a fault (e.g., a short circuit, broken wire, or an intermittent connection, such as may be caused by lightning or damage from wind, tornado, or ice) occurs on one of the critical transmission elements east or south of GGS Substation, then instability and cascading failure can affect this region.

One result of the GGS Substation Stability Flowgate limits is congestion in the western Nebraska areas. To maintain these Flowgate limits, under certain system conditions, the GGS Substation and Laramie River Substation are required to reduce generation to maintain the established reliability limits. In addition, the transmission capacity in western Nebraska is fully subscribed because of the stability limits defined by the GGS Substation Stability Flowgate. No available existing transmission capacity exists to interconnect any new generating resources in western Nebraska without exceeding the GGS Substation Stability Flowgate limits.

To allow new generation interconnections in this region, additional transmission facilities must be constructed. The R-Project would allow for significant new generation in this area and would maintain the required stability margins and reliability criteria. The R-Project would also address thermal and voltage issues in the Gentleman – Grand Island/Hastings corridor directly related to new wind power injection external to the Nebraska area. Power flow studies conducted by NPPD and SPP have shown that under contingency events for 345 kV lines in this area, thermal overloads occur on the parallel transmission elements. The R-Project's new 345 kV line would parallel the existing Gentleman – Grand Island/Hastings transmission corridor and would address these contingency overloads on the existing transmission system. The R-Project would also reduce congestion because it would provide an additional outlet path from GGS Substation to the east.

**NERC Terms**

***Flowgate:*** *A mathematical construct, composed of one or more monitored transmission facilities and optionally one or more contingency facilities, used to analyze the impact of power flows upon the bulk electric system.*

***Contingency:*** *An unexpected failure or outage of a system component, such as a generator, transmission line, circuit breaker, switch, or other electrical element.*

*See Glossary of Terms used in NERC Reliability Standards (NERC 2016).*

**Other Terms**

***Load:*** *The electrical energy consumed by a component, circuit, device, piece of equipment, or system that is connected to a source of electric power, in order to perform its functions. Also called electric load.*

***Cascading failure:*** *A failure in a system of interconnected parts in which the failure of a part can trigger the failure of successive parts. Such a failure may happen in many types of systems, including power transmission systems.*

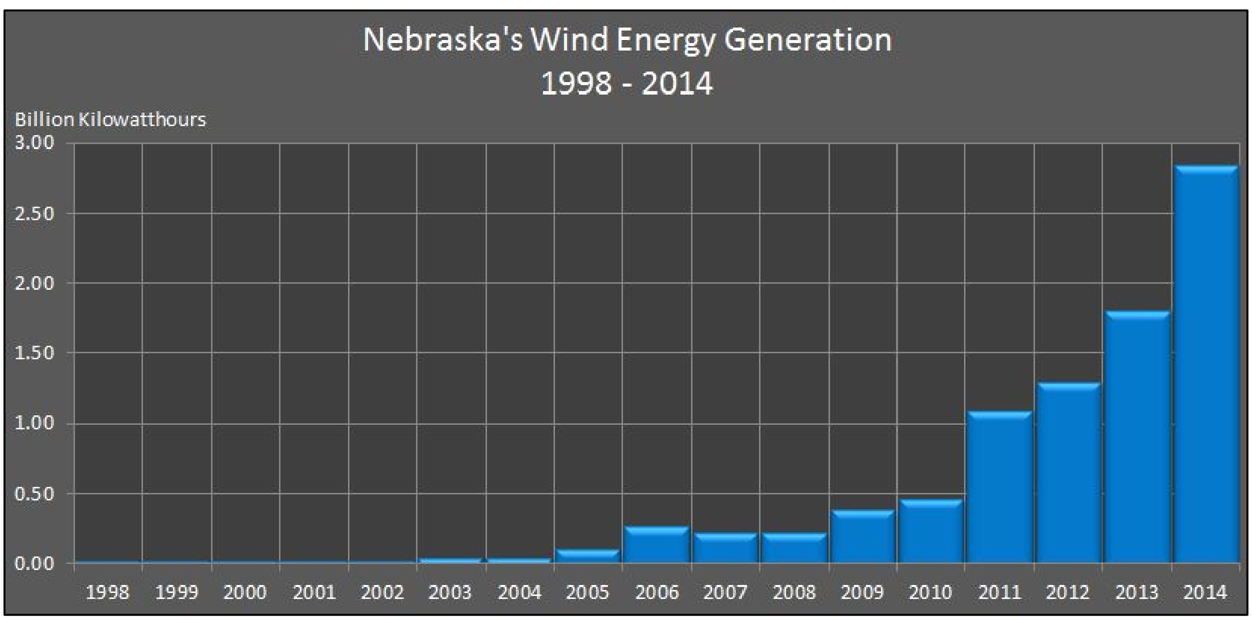
### 1.7.2 Renewable Energy Resources

Several states have enacted specific renewable energy portfolio standards as part of their electric utility regulatory system. The utilities are required to meet these regulatory standards to set targets for the amount of renewable generation resources (e.g., wind, solar, hydroelectric, and geothermal) in their generation portfolio. Nebraska's major public utilities have also set renewable resources policies for the amount of renewable generation. NPPD's policy is to have 10 percent of its generation resources come from renewable resources by the year 2020. As of 2015, 12.1 percent of NPPD's generation capacity came from renewable resources.

Legislative Bill 1048, signed into law on April 12, 2010, was designed to enable Nebraska to achieve its wind energy potential, participate in the clean energy economy, and provide meaningful employment and educational opportunities to Nebraskans. The legislation provides a means to develop and export renewable energy for Nebraska's wind resources and to protect the state's public power system.

As indicated in the *Integrated Transmission Plan 10-Year Assessment Report*, Nebraska has a significant ability to develop wind energy to meet the needs of the state, export energy into the SPP region, and provide transmission access to meet the intent of Legislative Bill 1048. SPP's *Integrated Transmission Plan 10-Year Assessment Report* evaluated the availability of transmission lines in relationship to wind resources in Nebraska. Currently, wind development in Nebraska is curtailed by approximately 15 percent because of the lack of transmission lines. The R-Project would likely reduce this curtailment to 3 percent or less.

Renewable resources have the potential to transform Nebraska's energy supply. Currently about three-fifths (60 percent) of Nebraska's power is generated by coal and another one-fourth (25 percent) comes from nuclear energy (U.S. EIA 2016). As a state, Nebraska has the fifth-largest wind resource in the country, but in 2015 ranked twentieth in wind energy generation capacity. The state's installed capacity in 2015 was 926 MW, which equates to an annual output that can power approximately 289,000 homes (AWEA 2016a; U.S. EIA 2016). To put this in perspective, Texas is the state with the greatest amount of wind power development at 17,911 MW of power, which is enough to power approximately 4.1 million homes (AWEA, 2016b). However, as can be gleaned from Figure 1-4, Nebraska is ramping up quickly.




Source: NEO (2016)

**Figure 1-4. Wind Energy Generation in Nebraska**

## 1.8 Public and Agency Involvement

### 1.8.1 Scoping Process

On October 30, 2014, the Service published a Notice of Intent (NOI) in the *Federal Register* to inform the public of its intent to prepare an EIS that assesses the impacts on the human environment from the proposed issuance of a permit to authorize the take of the Federally endangered beetle and implementation of an HCP (79 FR 64,619). The NOI initiated a 60-day comment period for public review and comment on any of the topics to be addressed in the DEIS. The NOI also announced that the Service would hold three public scoping meetings on November 18, 19, and 20, 2014, in Burwell, Sutherland, and Thedford, Nebraska, respectively (Table 1-1). The purposes of the public scoping meetings were to provide the public with information, answer questions regarding the proposed Federal action and the NEPA process, and provide information about the proposed HCP, permit area, covered activities, and the covered species. Additionally, the public scoping meetings provided an opportunity for the public to identify important issues and alternatives related to NPPD's proposed Project.

**Table 1-1. Public Scoping Meetings for R-Project HCP DEIS**

| Date | Time | Location | Attendance |
|---|---|---|---|
| November 18, 2014 | 4:00 p.m. to 7:00 p.m. | American Legion, 657 G St., Burwell, NE 68823 | 23 |
| November 19, 2014 | 4:00 p.m. to 7:00 p.m. | Village Municipal Offices, 1200 First St., Sutherland, NE 69165 | 28 |
| November 20, 2014 | 4:00 p.m. to 7:00 p.m. | Thomas County Fairgrounds, 83861 Hwy. 83 Thedford, NE 69166 | 16 |

Source: Louis Berger Team

*Nebraska Sandhills Grassland*

Source: USFWS

*Whooping Crane (Grus americana)*

A total of 53 comments was received and categorized into 28 unique categories in the Scoping Summary Report (Appendix A). Of those, the majority of comments related to transmission line routing and alternatives, the uniqueness/ sensitivity of the landscape, whooping cranes, and migratory birds. A common theme of the comments received during the public scoping process was the need for the Service to consider alternative routes for the R-Project to avoid ecologically sensitive habitats and preserve the undeveloped Sandhills landscape. A commonly expressed concern was that the Sandhills grassland represents one of the last remaining intact temperate grasslands in the world and that disturbance could detrimentally affect its sensitive soils. Commenters also noted that the R-Project study area traverses the Central Flyway through Nebraska, which is known to contain areas with high concentrations of migratory birds. Of greatest concern to commenters, based on the number of comments received, was the potential for increased mortality of whooping cranes and other migratory birds from collision with R-Project transmission lines, particularly in and around Birdwood Creek. While all scoping comments were ultimately determined to be within the scope of the DEIS and were considered during its development, these represent the primary issues raised by commenters.

### 1.8.2 Public Review of the DEIS

A 60-day public comment period will be provided from the publication date of the notice of availability. During the public comment period, three public hearings will be held in communities within the study area to inform interested parties and receive public input.

### 1.8.3 Agency Coordination

The Service has engaged in the following agency coordination activities:

- Initial teleconference—was held on May 24, 2012, among staff from NPPD, the Service's Nebraska Field Office, and the Nebraska Game and Parks Commission (NGPC) to discuss the study process associated with the SPP's *Integrated Transmission Plan 10-year Assessment Report*, which included the R-Project.
- First Project coordination meeting—with NPPD, the Service's Nebraska Field Office, and NGPC was convened on December 12, 2012, in Lincoln, Nebraska.
- Regular technical meetings—the first of which was held on March 25, 2014, with the Service, NPPD, NGPC, and POWER Engineers (consultant to NPPD) to discuss permit location, duration, and beetle survey results. Conference calls between these parties regarding technical issues were also held in August and September 2013.

- Project NEPA kickoff meeting—was held on August 4, 2014, in Columbus, Nebraska, with the Service, NPPD, NGPC, POWER Engineers, and the Louis Berger Team (the third-party contractor preparing this DEIS).
- Monthly coordination teleconferences—began in September 2014 among the Service, NPPD, NGPC, POWER Engineers, and the Louis Berger Team to discuss the status of the draft HCP and DEIS.
- Project coordination meeting—during a meeting convened on May 8, 2015, NPPD formally stated the R-Project could not be constructed without issuance of a permit; FWS provided technical direction to the NEPA contractor to evaluate all aspects of the R-Project, including a wider array of alternatives, during preparation of the DEIS.
- Site visits—were conducted on October 26, 2015, and September 20, 2016, to assess historical and archaeological resources in collaboration with the Nebraska State Historic Preservation Office (Nebraska SHPO).
- Other coordination activities—were conducted throughout preparation of the draft HCP and DEIS, including email correspondence, teleconferences, and in-person meetings at the Service's and NPPD's regional offices. These activities focused on specific issues, such as the No-action Alternative, pre-construction surveys, content of the draft HCP, and the routing and siting process. The Service held a meeting with the National Park Service (NPS) and the Nebraska SHPO on September 21, 2016, at the Nebraska SHPO office in Lincoln, Nebraska to discuss impacts to cultural resources.

  The Service sent letters to more than 50 interested agencies/organizations between February 23 and March 1, 2016, to facilitate interagency coordination and solicit input on the development of the DEIS. The letter described the R-Project, including the purpose and need, and summarized public comments received in response to the publication of the NOI in the *Federal Register* on October 30, 2014. The letter provided each recipient the opportunity to participate as a cooperating agency in the preparation of the DEIS.

The Service received responses from the following agencies and organizations during March and April 2016:

- U.S. Environmental Protection Agency
- National Park Service
- U.S. Army Corps of Engineers
- Nebraska Game and Parks Commission
- Nebraska State Historical Society
- North Platte/Lincoln County Visitors Bureau
- Ducks Unlimited

Three responders—NGPC, Nebraska State Historical Society (NSHS), and North Platte/Lincoln County Visitors Bureau—requested to participate as cooperating agencies. With the exception of USACE and NGPC, all of the responding agencies and organizations recommended selecting an alternative route to minimize impacts on environmental and cultural resources. Agency and organization concerns associated with the R-Project included potential loss of the Nebraska Sandhills status as a designated Natural National Landmark, impacts on migratory birds and other sensitive wildlife species, and impacts on cultural resources, including portions of the Mormon Pioneer, California, Oregon, and Pony Express National Historic Trails that the R-Project would cross. The U.S. Environmental Protection Agency (USEPA) emphasized the need for a comprehensive list of avoidance, minimization, and mitigation measures to compensate for environmental impacts and recommended the implementation of a formal adaptive management plan to evaluate and monitor affected resources and ensure the successful implementation of mitigation measures.

The Service also sent coordination letters to 30 Tribal governments on October 17, 2014, and one response was received from the Northern Arapaho Tribe from St. Stephens, Wyoming, on December 1, 2014. The tribe requested to be contacted if there are any inadvertent discoveries, such as human remains, found during ground-disturbing activities related to the Project. Additional letters were sent to the tribes on February 24, 2016. One response was received from the Ponca Tribe of Nebraska. The response, received on February 29, 2016, requested that the Service keep the Tribe informed of work being done in Knox, Antelope, Holt, and Garfield counties.

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

**_Decision to be Made_**

*Whether the Service should issue an ITP to NPPD for the R-Project.*

The decision to be made by the Service is whether to issue a permit to NPPD for the R-Project, and this decision will be based on the statutory and regulatory issuance criteria for a Section 10(a)(1)(B) permit (described below), and the final decision and rationale for selection will be presented in a Record of Decision (ROD).

The decision maker for the Service will evaluate each analysis of adverse or beneficial effects on the human and natural environment presented in this DEIS to make a final decision. The decision maker's options are to: 1) not issue a permit or 2) issue a permit for one of the two action alternatives described in Chapter 2 if the issuance criteria identified in Section 10(a)(2)(B) of the ESA are met. The determination as to whether and how the criteria have been achieved will be described in the Service's decision documents with the issuance of the permit. Chapter 6 presents a summary of the permits, regulations, consultations, and other required actions that would be necessary for the Project to proceed as planned.

### 1.9.1 Incidental Take Permit Application and Habitat Conversation Plan Submission Criteria

An applicant must prepare and submit to the Service for approval an HCP containing the mandatory elements of Section 10(a)(2)(A) and 50 CFR §§ 17.22(b)(1) (for endangered species) and 17.32(b)(1) (for threatened species) before a permit can be issued. As such, the HCP must specify:

- The impact that will likely result from the taking
- What steps the applicant will take to monitor, minimize, and mitigate such impacts; the funding available to implement such steps; and the procedures to be used to deal with unforeseen circumstances
- What alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be used
- Other measures that the Service may require as being necessary or appropriate for the purposes of the plan

### 1.9.2 Incidental Take Permit Issuance Criteria

The Service cannot issue a permit if any of the following general permit issuance requirements apply (50 CFR § 13.21(b)) (USFWS 1996a):

- The applicant has been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed, if such assessment or conviction evidences a lack of responsibility.
- The applicant has failed to disclose material information or has made false statements as to any material fact in connection with the application.
- The applicant has failed to demonstrate a valid justification for the permit and a showing of responsibility.
- The FWS finds through further inquiry or investigation, or otherwise, that the applicant is not qualified to conduct the proposed activities.

The Service shall issue a permit if the criteria contained in Section 10(a)(2)(B) of the ESA and the implementing regulations for the ESA (50 CFR §§ 17.22(b)(2) and 17.32(b)(2)) are met by the applicant. These issuance criteria are as follows:

- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the HCP and procedures to deal with changed circumstances, including adequate funding to address such changes, will be provided.
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.

- The applicant will ensure that other measures that the Service may require as being necessary or appropriate will be provided.
- The Service has received such other assurances as may be required that the HCP will be implemented.

Further, the Service's regulations require: "[i]n making his or her decision, the Director shall also consider the anticipated duration and geographic scope of the applicant's planned activities, including the amount of listed species habitat that is involved and the degree to which listed species and their habitats are affected" (50 CFR § 17.22(b)(2)(ii)). NPPD has worked with the Service to develop an HCP that covers an array of electrical transmission activities related to the proposed R-Project, provides avoidance and minimization measures to reduce the level of impact and the take of the beetle, and presents mitigation measures to offset the impacts of the remaining take, including lost and degraded habitat.

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# 2.0 ALTERNATIVES

NEPA Section 102(2)(E) requires Federal agencies to develop, study, and describe alternatives for any proposal with the potential to affect the human environment. This chapter describes the process that the Service used to determine the scope of alternatives considered in this DEIS, describes the alternatives that will be evaluated in detail, including the No-action Alternative and action alternatives, and explains other alternatives considered but eliminated from further study in the DEIS.

## 2.1 Approach to Alternatives

**_Action Alternative_**

Each action alternative analyzed must fulfill the requirements of the agency's purpose and need for the action.

Regulations for implementing NEPA require that Federal agencies rigorously explore and objectively evaluate all reasonable alternatives to a proposed action, including no action. In addition, agencies must identify any alternatives eliminated from detailed study and discuss the reasons for eliminating them (40 CFR § 1502.14). Reasonable alternatives include those that are practical or feasible from a technical, economic, and environmental standpoint and employ common sense, rather than simply being desirable from the standpoint of an applicant (46 FR 18027). In addition to being technically and economically practical or feasible, a reasonable alternative must meet the purpose and the need for the agency action (43 CFR § 46.420(b)). The agency must also consider the needs and goals of the applicant (43 CFR § 46.420(a)). Chapter 1 presents the purpose and need for the Service's action and NPPD's need for the R-Project. An agency's document must devote substantial treatment to each alternative considered so that reviewers may evaluate the comparative merit of each alternative (40 CFR § 1502.14). In determining reasonable alternatives, the Service is required to consider a number of factors that may include, but are not limited to, the R-Project's size and scope, state of the technology, economic considerations, legal considerations, socioeconomic concerns, availability of resources, and the time frame in which the identified need for the transmission line must be fulfilled.

**_40 CFR § 1502.14_**

…regulations for implementing NEPA require that federal agencies rigorously explore and objectively evaluate all reasonable alternatives to a proposed action.

Potential alternatives considered in this DEIS that were found to be not reasonable or not technically feasible were eliminated from further detailed analysis. Alternatives were eliminated from detailed analysis because the alternative 1) did not meet the requirements regarding need for the Project; 2) could not, or can no longer, be technically implemented; or 3) was determined to be unreasonable to implement because of social, economic, cultural, or political realities.

As discussed in Section 1.6, *Public and Agency Involvement*, the Service reviewed and incorporated information gathered during earlier public scoping and consultations to help identify potential public and agency interdisciplinary concerns, potential environmental effects, relevant effects of past actions in the study area, and possible alternative actions deserving of study in this DEIS (Appendix A). The Service also considered alternatives that were put forth by the public, potential Project transmission line alternatives proposed by the Service (Appendix B), and alternatives discussed in the draft HCP.

The only appropriate mechanism for obtaining take authorization under the ESA for the construction and operation of the R-Project is through the Section 10(a)(1)(B) process. Without a permit, NPPD could not construct the R-Project because the take of the American burying beetle could not be avoided because of its high probability of occurrence along NPPD's final route.

***For Purposes of Analysis***

*…*in the DEIS, USFWS considered other ways of implementing the Project that might minimize the impact on, and take of, the American burying beetle.

For purposes of analysis in the DEIS, the Service considered other ways of implementing the Project that might minimize the impact on and take of the beetle and still meet NPPD's R-Project need. One option to minimize the take of the beetle would be to construct the transmission line using a different route. While the Service acknowledges that it has no authority over routing of the R-Project, it does have jurisdiction over permitting incidental take of the beetle; therefore, analysis of alternatives in the DEIS include examination of reasonable alternative routes for the R-Project that reduce take of the beetle. However, alternative route(s) must also meet NPPD's need for the R-Project as specified by the SPP and NPPD. The Service did examine other potential routing options but eliminated these from detailed consideration as explained in Section 2.6 below.

## 2.2 NPPD Process for Selecting Its Final Route[1]

NPPD's process for selecting its final route began in September 2012 and was iterative, beginning with the delineation of a wide study area. Next, NPPD narrowed the study area to corridors and subsequently selected alternate routes and substation sites. Then, NPPD used the alternate routes and substation sites to select its preferred route and substation sites. Finally, NPPD used preferred route and substation sites to select its 225-mile-long final route and substation sites (Figure 1-1). The public was involved during all phases of the routing and siting process, and NPPD received and evaluated more than 2,500 public comments during this process. A final route for the R-Project was selected in January 2015.

***Public Comments***

NPPD received and evaluated more than 2,500 public comments during its route selection process.

### 2.2.1 NPPD Study Area Delineation

NPPD initially established the Project study area by evaluating the transmission line termination points that need to be connected. These termination points were consistent with SPP's Notice to Construct, which indicated that the new 345 kV line must begin at the GGS Substation located south of Sutherland, travel north to connect with a new 345 kV substation to be located in or near Cherry County, and then extend eastward and connect to a new 345 kV substation to be located

1 Information presented in this section originated from NPPD (2015a), unless otherwise noted.

in Holt County, which is to interconnect with Western's existing Fort Thompson to Grand Island 345 kV line that is located on the eastern border of Holt County.

The R-Project study area encompassed approximately 7,039 square miles of predominately private lands with some Federal lands managed by the Service and the U.S. Department of Agriculture (USDA), Forest Service (USFS), and state lands managed by NGPC and the Nebraska Board of Educational Lands and Funds (NBELF). The R-Project study area lies in Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, Blaine, Rock, Loup, Holt, Garfield, Antelope, and Wheeler counties (Figure 2-1). Incorporated villages and unincorporated communities in the R-Project study area include Sutherland, Hershey, Tryon, Stapleton, Mullen, Seneca, Thedford, Brownlee, Brewster, Chambers, and Ewing.

These 11 villages and communities, as well as individual farm and ranch residences, are scattered throughout the R-Project study area. Exclusion areas (National Wildlife Refuges [NWRs], Wildlife Management Areas [WMAs], State Recreation Areas [SRAs], Wetland Reserve Program areas, and Farm and Ranch Protection Program properties) are those areas that NPPD elected for the R-Project to avoid. These are primarily located in the east-west portion of the study area. River and stream crossings are scattered throughout the study area. The highest concentrations of National Wetlands Inventory (NWI) wetlands are located primarily in the northern portion of the east-west study area. The most southern and eastern portions of the study area have a relatively high concentration of farms using center-pivot irrigation.

### 2.2.2 Corridor Development

Based on siting opportunities and constraints, NPPD narrowed the R-Project study area to corridors (Figure 2-1). NPPD selected corridors to minimize conflicts and avoid population densities, residential communities, residences, impacts on farm and ranch operations, designated exclusion areas, river and stream crossings, and environmentally sensitive properties. Nebraska Statute 76-710.03 requires routing transmission lines on section and half section lines in agricultural areas to pursue the right of eminent domain to acquire ROWs. Thus, the grouping of section and half section lines with minimal constraints facilitated the development of initial corridors. NPPD also acquired high-resolution aerial photography of the entire study area (December 2012) and then field-verified information from initial public input and public domain data sources. NPPD recorded field observations about potential constraint and opportunity areas and identified potential river and stream crossings.

Corridors identified by NPPD were established in the southern portion of the study area because of the increased prevalence of wetlands and potentially better habitat for the beetle, whooping cranes, and other sensitive species in the northern parts of the study area (see Figure 2-1).

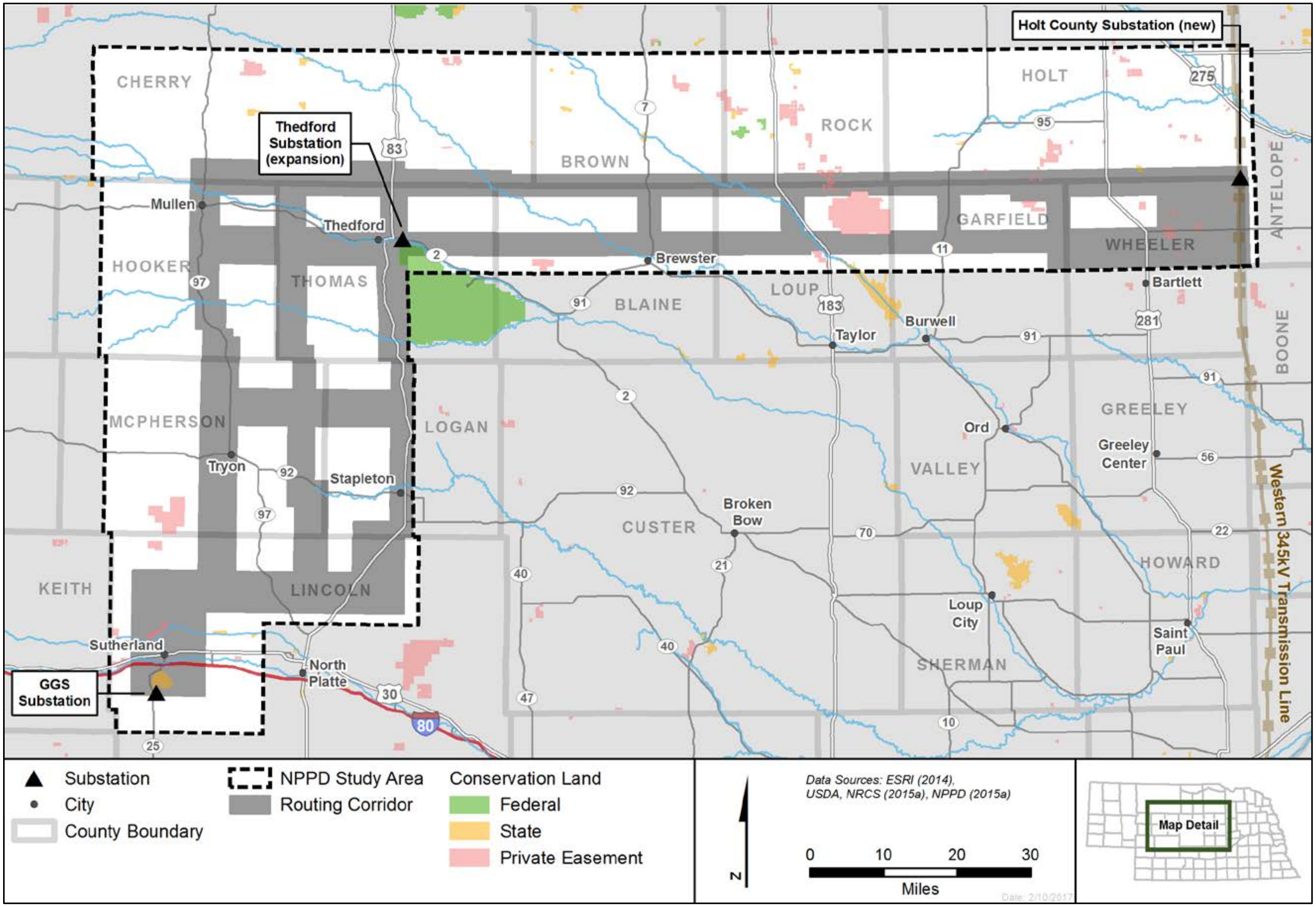



**Figure 2-1. Nebraska Public Power District's R-Project Study Area and Corridors**

### 2.2.3 Route Development Process

NPPD developed routing criteria based on the data collected for the R-Project study area, input received from the public, and agency-expressed concerns and priorities. These criteria were used to evaluate the study area for areas of resource sensitivity (see Table 3.5-1 in NPPD [2015a] for more information about the routing criteria). The resource sensitivity criteria used by NPPD during the route development process is a measure of probable adverse response of each resource to direct and indirect impacts associated with the construction, operation, and maintenance of the proposed 345 kV transmission line. Generally, the criteria fell into three categories: 1) land use, 2) environmental, and 3) engineering data or information (Table 2-1).

**Table 2-1. Routing Selection Criteria**

| Category | Criteria |
|---|---|
| Land use | • Proximity to occupied houses, towns/villages, churches, cemeteries, and schools<br>• Proximity to public and private use airports; proximity to wellheads; other buildings in the ROW<br>• Proximity to platted developments; pasture/rangeland and irrigated and dry land cropland crossed<br>• Center-pivot conflicts; cultivated field bisections; number of parcels crossed<br>• Number of landowners affected by the Project ROW |
| Environmental | • Threatened and endangered species habitat<br>• Wetland/jurisdictional waters crossed<br>• Recorded conservation easements crossed<br>• Trees and shelterbelts in the ROW<br>• Cultural resources within 500 feet<br>• River and named stream crossings<br>• Preliminary whooping crane stopover habitat within 1-mile of centerline<br>• Tern and plover habitat within 0.25 mile of centerline<br>• Miles of Sandhills Scenic Byway crossed and paralleled |
| Engineering and construction | • Floodplain crossings<br>• Miles of Sandhills ecoregion crossed<br>• Number of heavy angles required to change direction of the transmission line route<br>• Line length and cost<br>• Transmission line relocation<br>• Railroads crossed and paralleled<br>• State, U.S., and interstate highways crossed<br>• Major pipelines crossed and paralleled<br>• Crossings of existing transmission and sub-transmission lines<br>• Length of transmission lines paralleled<br>• Proximity of communication towers<br>• Existing access for construction and operation |

### 2.2.4 Alternative Route Alignments

NPPD acquired additional detailed data for the study area corridors and verified these data against field conditions. Then, NPPD eliminated the most western north-south corridor and minor connecting corridors (see Figure 2-2). This main corridor was eliminated because existing access and terrain and soil conditions were significantly less desirable than the other corridors for construction and maintenance of the transmission line.

NPPD identified more than 2,000 miles of potential route links and evaluated the links using the routing criteria and public input provided at open house meetings about the study corridor. Based on this analysis, NPPD connected route links to create potential routes that presented the least impact with an acceptable balance of the routing criteria. After identifying and evaluating approximately 800 miles of potential routes, NPPD selected five end-to-end alternative routes (Figure 2-3).

> ***Route Links***
>
> NPPD identified more than 2,000 miles of potential route links and evaluated the links.

### 2.2.5 Substation Sites

NPPD selected substation sites—GGS Substation, Thedford Substation (Figure 2-4), and Holt County Substation (Figure 2-5)—based on five primary criteria:

1. Proximity to NPPD’s preferred route
2. Generally level topography
3. Proximity to existing all-weather access
4. Availability of appropriate acreage
5. Limited environmental issues

### 2.2.6 Configuration of Route Alignments

#### 2.2.6.1 GGS Substation to Thedford Substation

NPPD evaluated and compared two alternative routes for the GGS Substation to Thedford Substation section (Figure 2-6). NPPD also considered several alternate links that were not evaluated in detail. Of the potential route links identified and evaluated, NPPD determined that two potential route segments—alternative routes A and B—would provide the best routing opportunities from GGS Substation to the Thedford Substation (Figure 2-6). After evaluation, NPPD selected alternative route A as its preferred route because when compared to alternative B, alternative A would be the most suitable for construction; cross fewer miles of the Sandhills Ecoregion; provide more miles of existing access than alternative route B; provide more paved access, rather than sand roads; affect fewer landowners; and have fewer homes within 300 feet, fewer churches within 500 feet, and fewer acres of pasture/rangeland in the ROW.

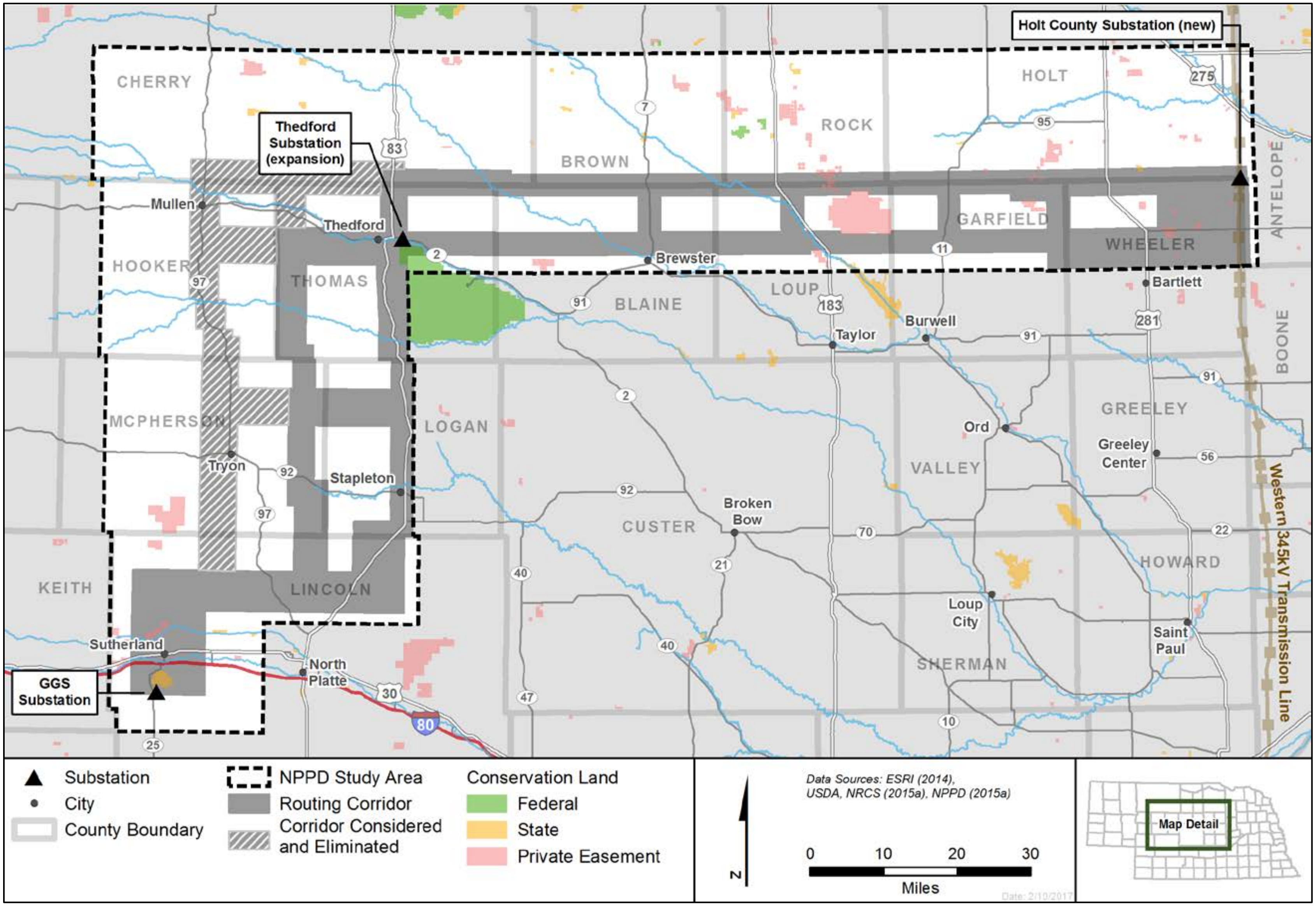



**Figure 2-2. Corridors that Nebraska Public Power District Considered but Eliminated**

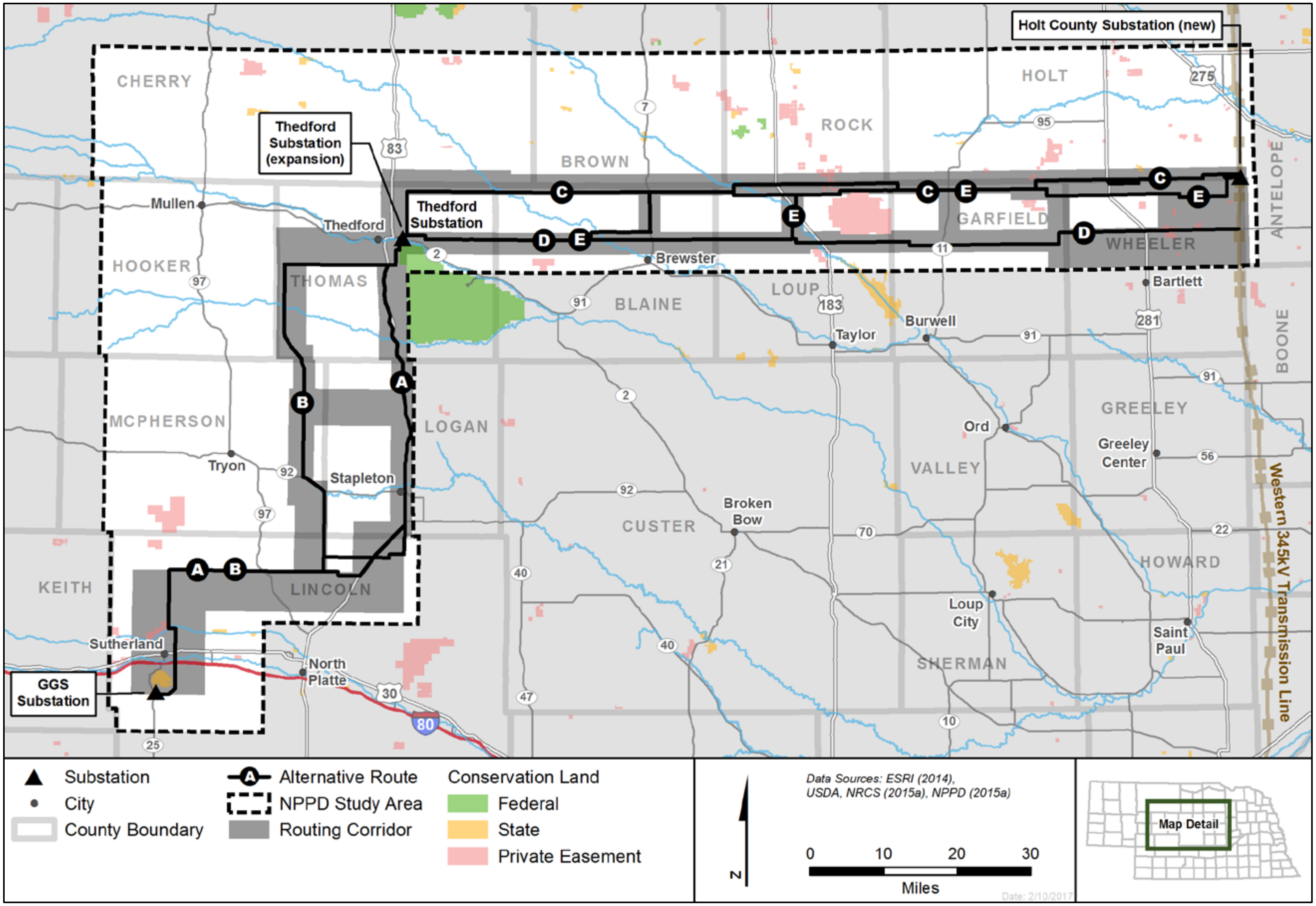



**Figure 2-3. Nebraska Public Power District's Alternative Routes**

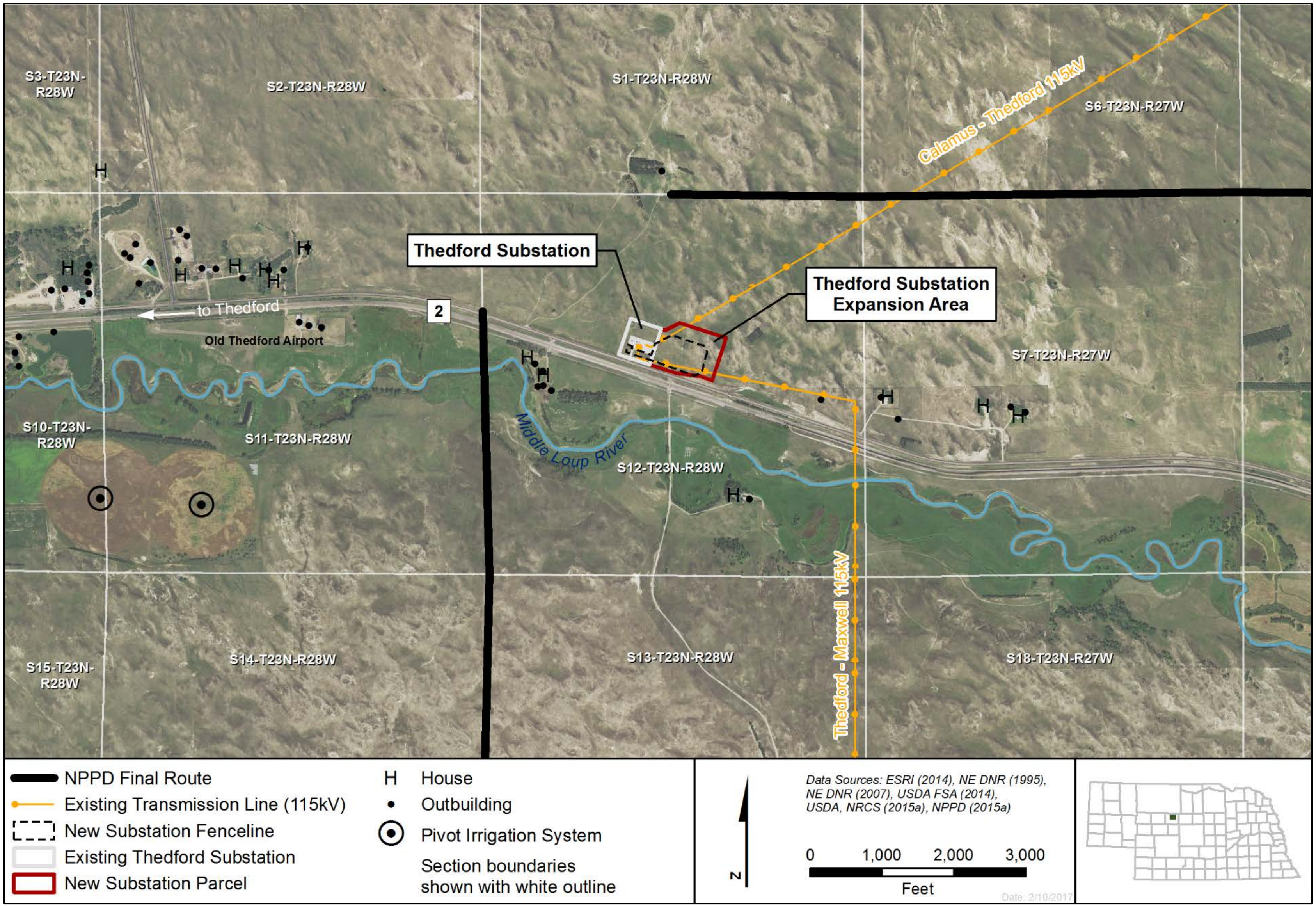



**Figure 2-4. Nebraska Public Power District's Proposed Thedford Substation**

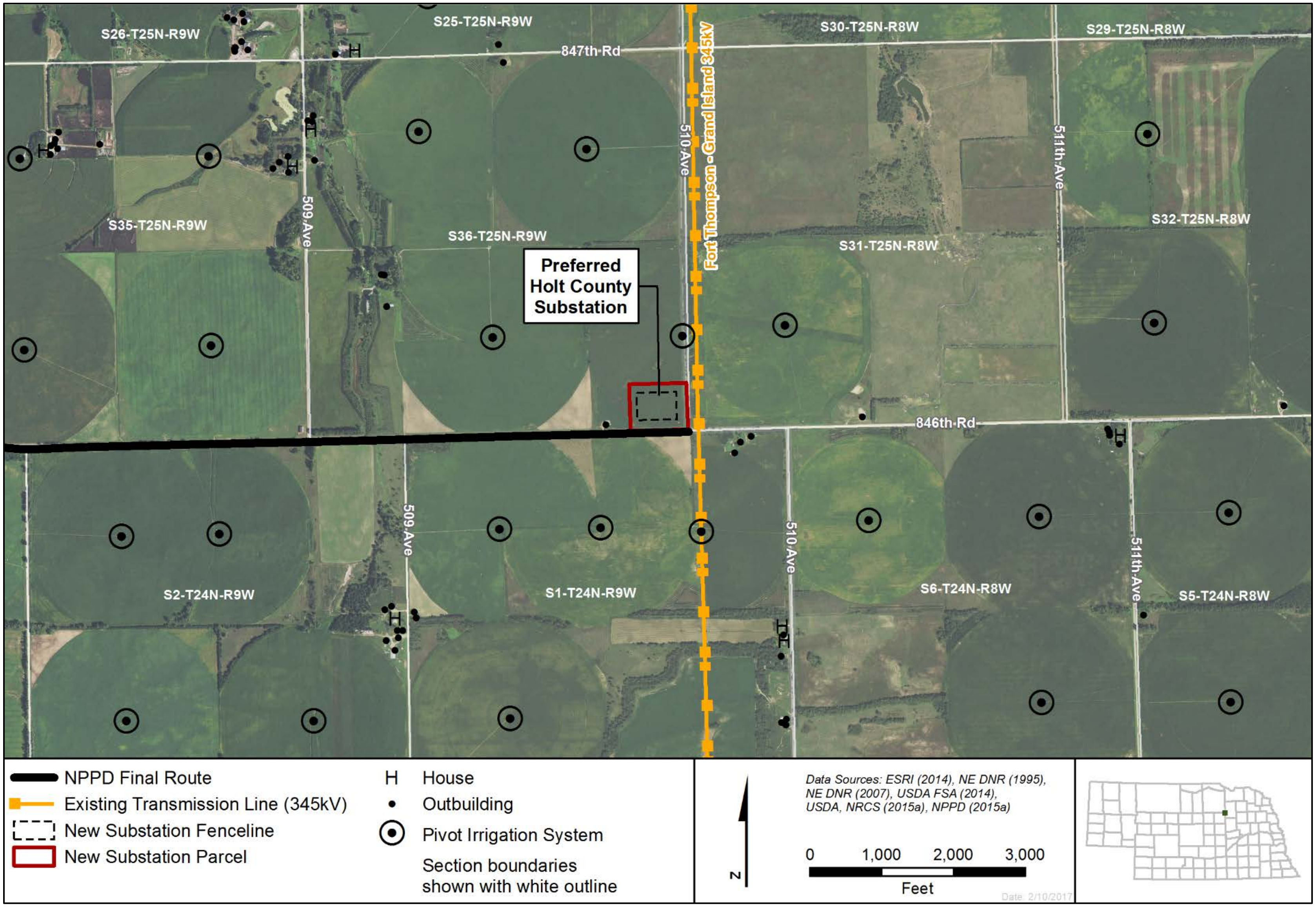



**Figure 2-5. Nebraska Public Power District's Preferred Substation Site in Holt County**

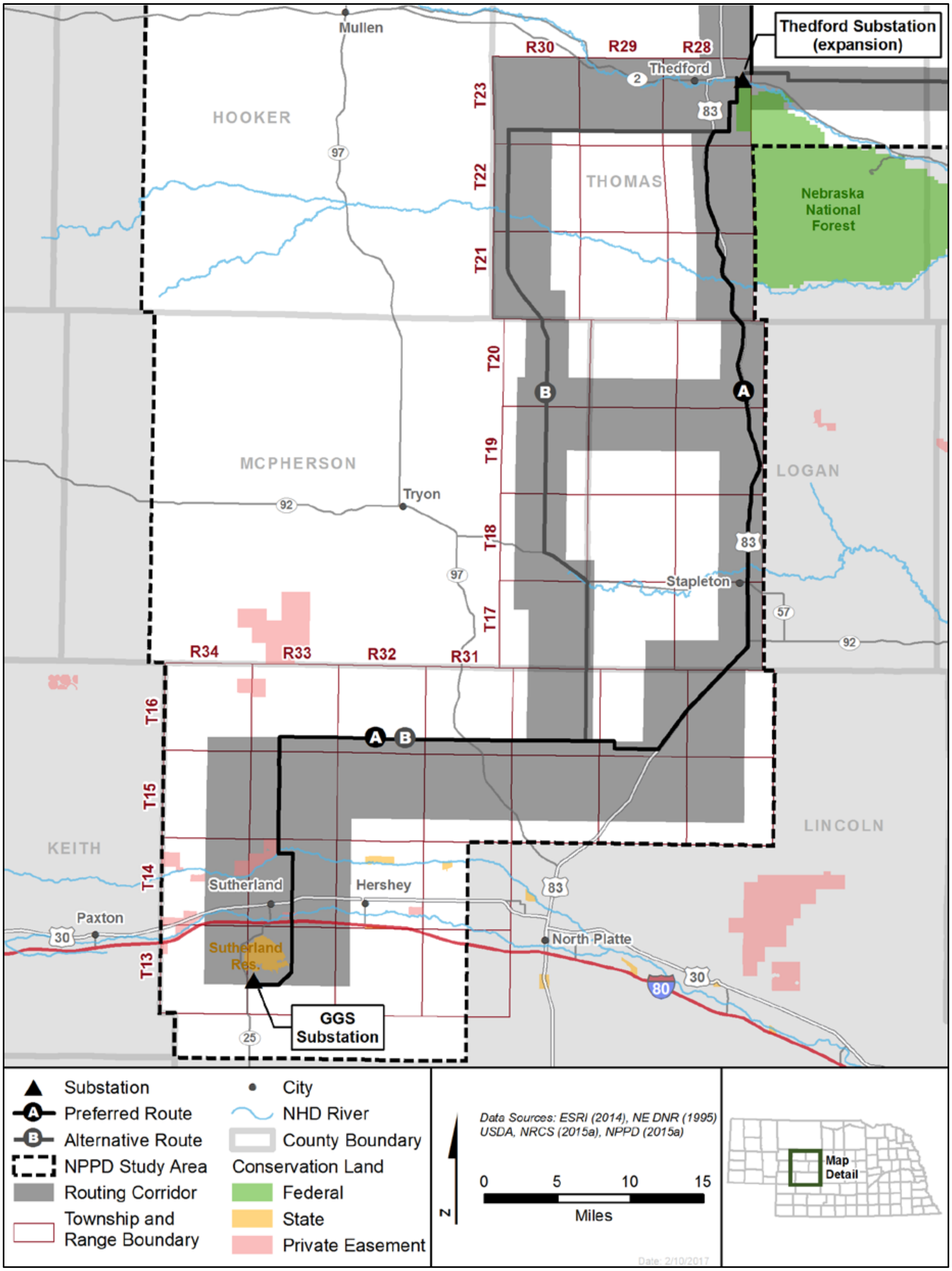



**Figure 2-6. Preferred and Alternative Routes from Nebraska Public Power District's GGS Substation to Thedford Substation**

#### 2.2.6.2 Thedford Substation to Western Line

NPPD evaluated and compared three alternative routes—alternative routes C, D, and E—for the Thedford Substation to Western's line section (Figure 2-7). NPPD selected alternative route C as its preferred route because alternative route C would:

- Be the most suitable for construction after consideration of many variables
- Provide significantly more miles of existing access
- Have less threatened and endangered species habitat in the ROW
- Have fewer wellheads and other buildings in the ROW
- Have less acres of pasture/rangeland in the ROW

NPPD also considered several alternate links that were not evaluated in detail.

### 2.2.7 Selection of Proposed Route

NPPD's preferred route from GGS Substation to the Thedford Substation was modified to become its proposed route to enable four private airstrips, which are located north and south of Highway 83 in Section 5, Township 16 North, Range 28 West and Section 8, Township 16 North, Range 28 West in Lincoln County, to operate safely, and the preferred route from the Thedford Substation to Western's line was modified to become the proposed route. Several changes to the preferred route were suggested by landowners and others. NPPD made further modifications to the preferred route to avoid sensitive features, including homes, an existing commercial aerial spraying operation, and newly identified Wetland Reserve Program exclusion areas. The proposed route was taken to public hearings in each of the eight counties, as required by Nebraska statute. NPPD evaluated comments taken at the hearings and selected a final route in January 2015 (see Figure 2-8).

## 2.3 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit, NPPD would not implement the HCP, and the R-Project would not be constructed. Beetle populations would not be affected because the R-Project would not be built. Under the No-action Alternative, the need for the R-Project (i.e., enhancing reliability, relieving congestion, and providing opportunities for renewable energy projects) would remain unmet and electrical power transmission needs may become increasingly challenging to meet over the next 50 years. Identifying another solution to meet the prescribed need would require NPPD or another electrical utility to initiate a new project planning process; however, future projects that do not include construction of an R-Project transmission line are too speculative to predict and adequately describe for a no-action condition; therefore, the No-action Alternative assumes that no project would be constructed.

> ***No-action Alternative***
>
> USFWS would not issue the permit, NPPD would not implement the HCP, and the R-Project would not be constructed.

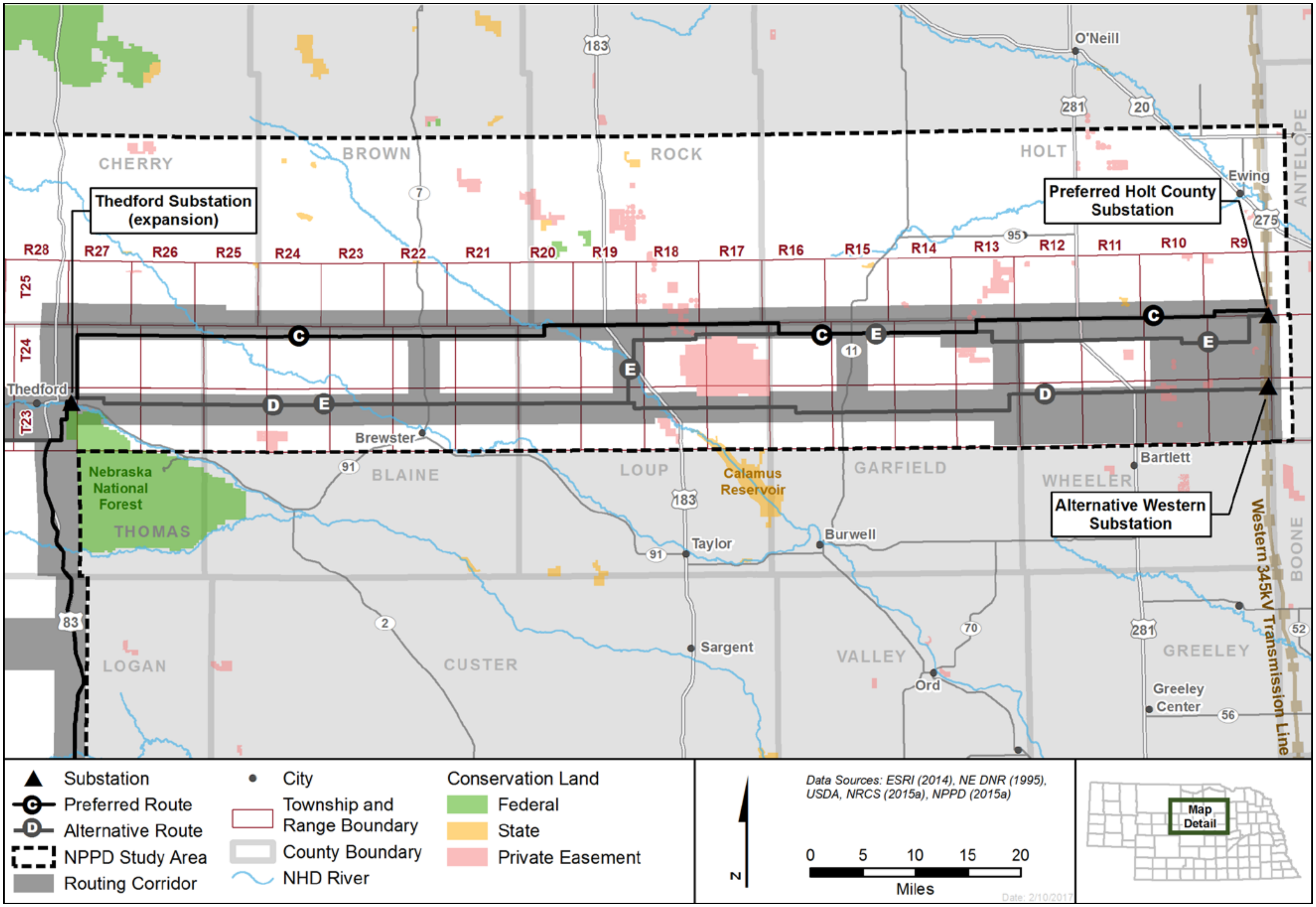



**Figure 2-7. Thedford Substation and the Preferred and Alternative Routes to Western's 345 kV Transmission Line**

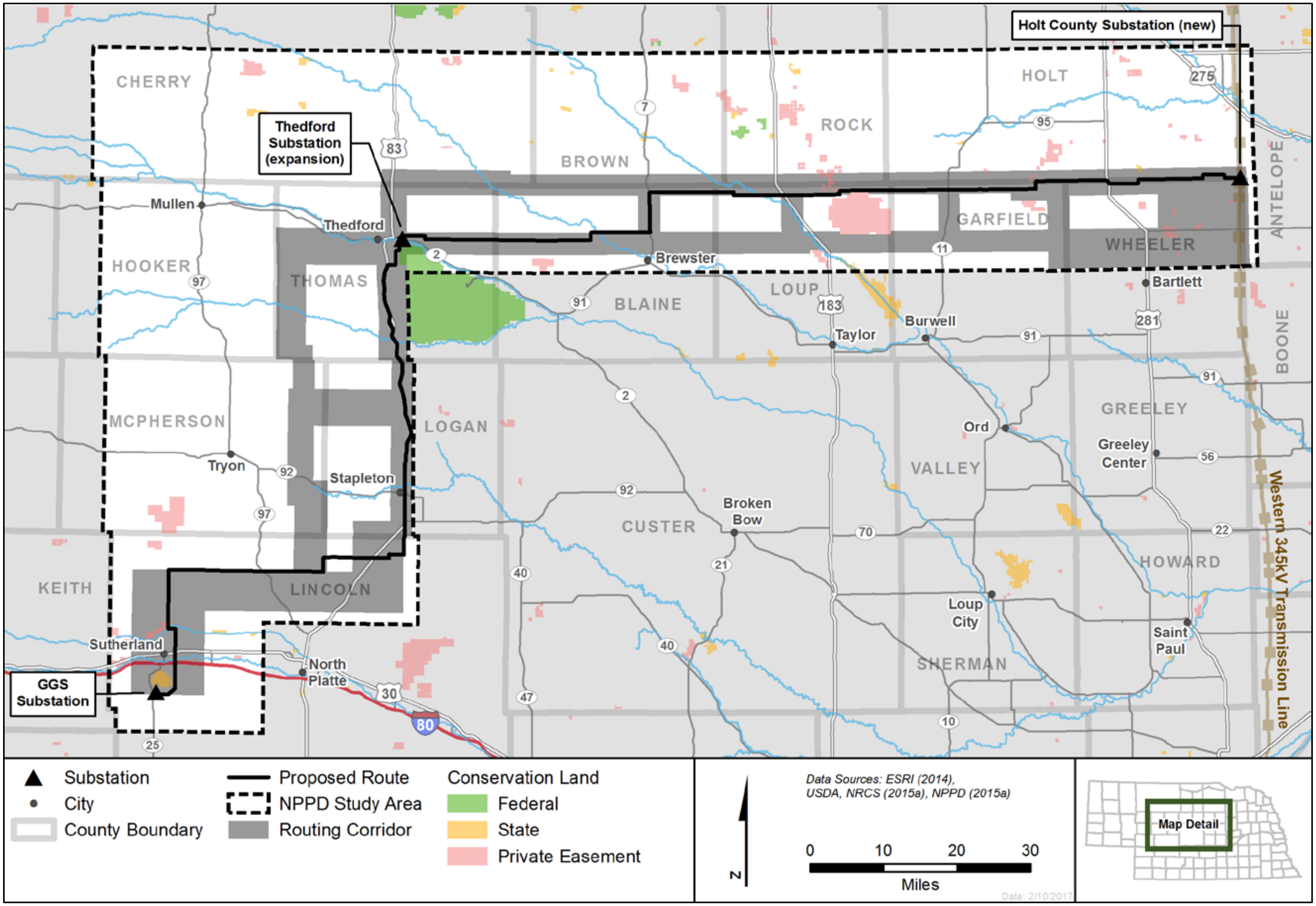



**Figure 2-8. Nebraska Public Power District's Final Route**

## 2.4 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Alternative A involves the Service's issuance of a permit for NPPD's R-Project, which includes covered activities and the conservation measures identified in the draft HCP. Presented in the draft HCP are covered activities associated with construction of the transmission line, expansion of two substations, and construction of a new substation at the eastern terminus, and operation (including emergency repair activities). Specific activities that would be covered under the permit are presented in Appendix C.

### 2.4.1 Final R-Project Route

> ***Public Comments***
>
> NPPD received and evaluated more than 2,500 public comments during the route selection process.

NPPD used the preferred route and substation sites to select its 225-mile-long, final route and substation sites (Figure 2-8). The public was involved during all phases of the routing and siting process, and NPPD received and evaluated more than 2,500 public comments during this process. The R-Project would involve constructing a 225-mile-long, 345 kV transmission line in two segments. The 100-mile-long north/south segment would begin at the GGS Substation located south of Sutherland, Nebraska. From there, it would extend north of Sutherland then east to U.S. Highway 83. The R-Project would then travel north following U.S. Highway 83 to connect to an expanded substation site adjacent to NPPD's existing substation east of Thedford, Nebraska. The 125-mile-long east/west segment would begin at the expanded substation at Thedford, Nebraska, then proceed east connecting to a new substation in Holt County, where it would connect to Western's Fort Thompson to Grand Island transmission line.

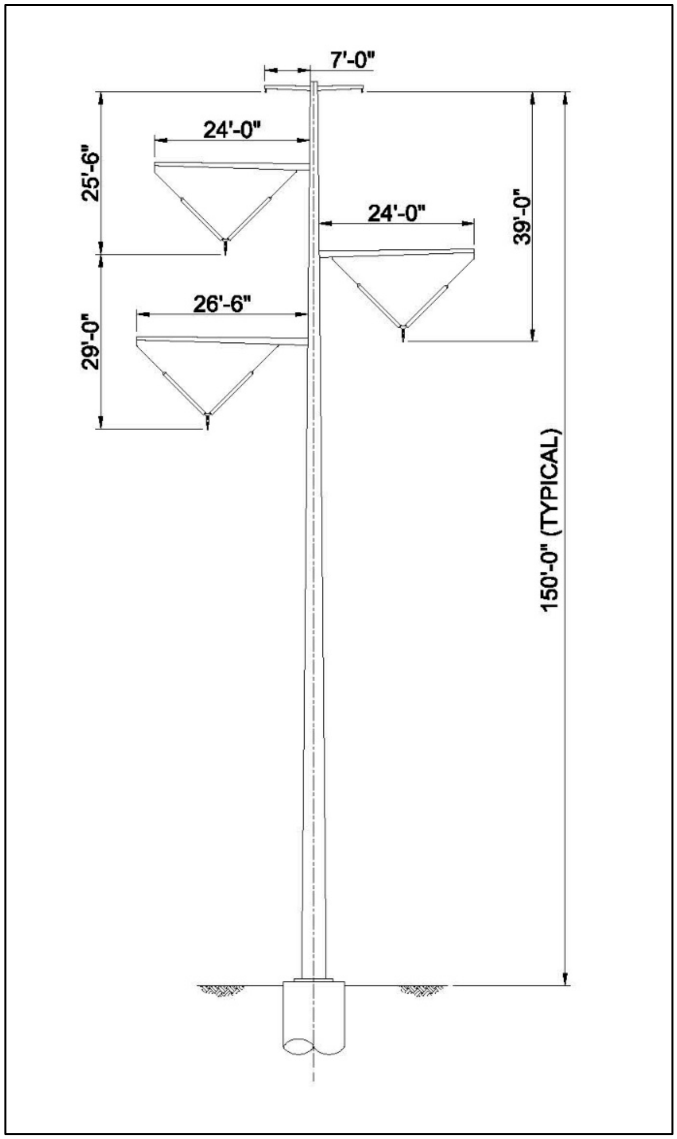
### 2.4.2 Transmission Line Design

Two types of structures would be used for the R-Project transmission line—tubular steel monopoles (Figure 2-9) and steel lattice towers (Figure 2-10). Figure 2-11 depicts the segments of NPPD's final route where steel lattice towers and tubular steel monopole structures would be located. Tubular steel monopoles, which are typically used on most NPPD projects, require large equipment to install and would be used along the transmission line route where there is relatively good access, established roads exist, including U.S. Highway 83, or in cultivated fields. Tubular steel monopole structures would be placed approximately 1,350 feet apart (average ruling span[2]) and would have an average height of 150 feet with a range of 120 to 175 feet.

2 The standard, typical, or expected span distance; specific spans may be increased or decreased depending on a specific situation or condition.

Steel lattice towers would be used in areas of the Sandhills where existing access roads are limited or do not exist (Figure 2-10). Lattice towers can be constructed with less overall effect on the surrounding area because smaller equipment and helicopter construction can be used. Span lengths between lattice towers would be the same as monopoles (1,350 feet), and the towers would have an average height of 130 feet with a range of 90–155 feet. Both tubular steel monopoles and lattice towers can be designed for angles (where the line changes direction) or dead-ends to withstand the increased lateral stress of conductors pulling in two different directions.

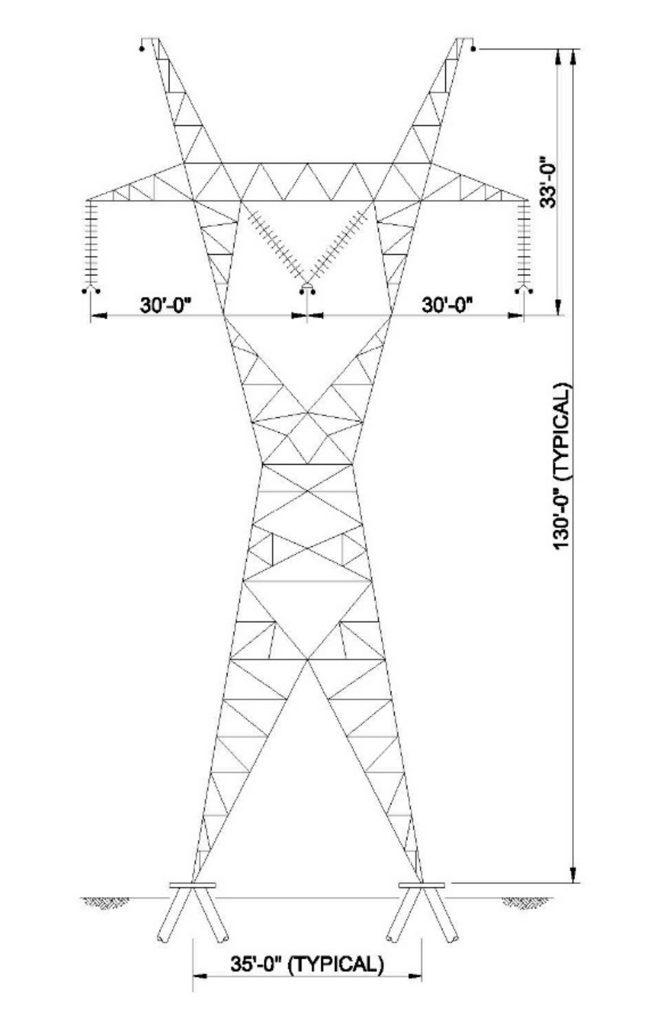
Tubular steel monopoles require cast-in-place concrete foundations. In areas where water-compromised soils are present, underground temporary steel casings may be used to hold excavated walls for monopole foundations. Lattice tower foundations would have helical pier foundations that do not require concrete or temporary casings. The purpose of a helical pier foundation is to transfer the load of a structure through the pier to a suitable soil depth. A helical pier foundation is an extendable deep-foundation system with helical plates welded or bolted to a central shaft. Load is transferred from the shaft to the soil through the bearing plates. The width of the ROW would be 200 feet (100 feet each side of centerline) for the entire transmission line, unless otherwise specified.




Source: NPPD (2015a)

**Figure 2-9. Proposed Monopole Structure with Concrete Foundation**

Selection of a conductor’s mechanical strength is dictated by the ice and wind loading expected to occur in the region where the transmission line is built. Because Nebraska is at risk of extreme icing events and severe weather, the conductor will be Aluminum Conductor Steel Reinforced, common for many power lines in the state. The conductor’s strength in a steel-reinforced stranding is a function of the percentage of steel in the conductor area. The aluminum carries most of the electrical current, and the steel provides tensile strength to support the aluminum strands. To protect the 345 kV transmission line conductors from direct lightning strikes, two lightning-protection shield wires, also referred to as ground wires, would be installed on the tops



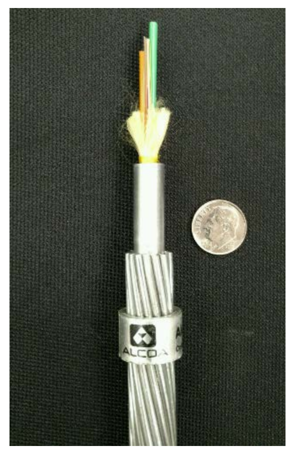

Source: NPPD (2015a)

**Figure 2-10. Proposed Lattice Tower Structure with Helical Pier Foundation**

of each structure utilizing specialized shield wire connection brackets or arms. Electrical current from the lightning strikes would be transferred through the shield wires and structures into the ground.

One of the shield wires would be an extra-high-strength steel wire approximately 0.45 inch in diameter. The second shield wire would be an optical ground wire (OPGW) constructed of aluminum and steel, which would carry 24 glass fibers within its core. The OPGW, which would have a diameter of approximately 0.65 inch, would be used to facilitate internal NPPD communications between substations.

A grounding system would be installed at the base of each transmission structure and would consist of copper ground rods embedded in the ground in immediate proximity to the structure foundation, and connected to the structure by a buried copper lead. In addition, other hardware would be installed on the structures as part of the insulator assembly to support the conductors and shield wires including clamps, shackles, links, plates, and various other pieces composed of galvanized steel and aluminum. Additional hardware not associated with the transmission of electricity may be installed as part of the Project, including bird flight diverters, aerial marker spheres used to warn aircraft, and aircraft warning lighting as required for the shield wires or structures per Federal Aviation Administration (FAA) regulations.




Source: NPPD

*Optical Ground Wire*

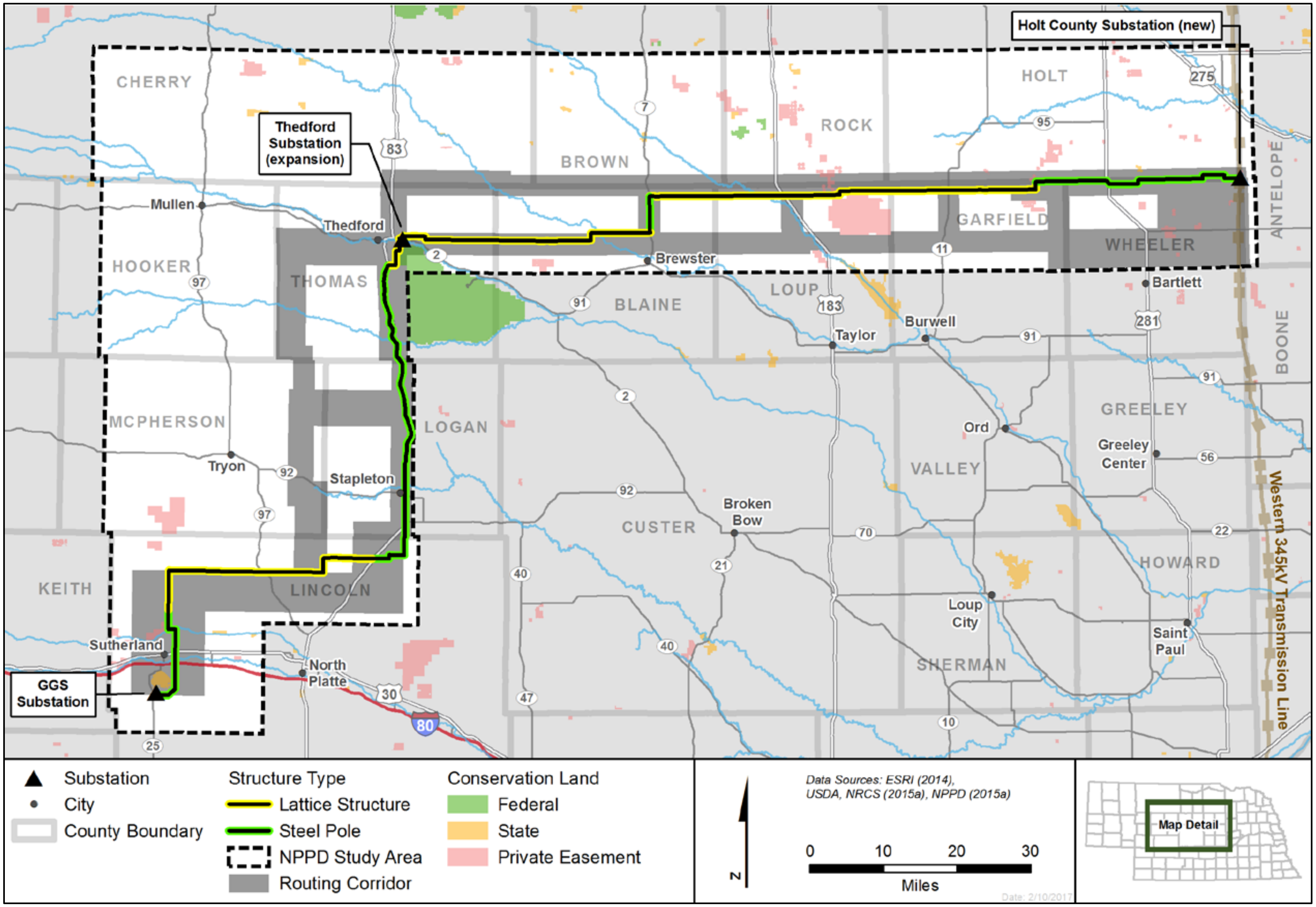



**Figure 2-11. NPPD's Final Route with Segments of Steel Lattice Towers and Tubular Steel Monopole Structures**

### 2.4.3 Substation Design

The GGS Substation, located in Lincoln County, just south of Sutherland Reservoir SRA and north of West Power Road, would be expanded within its existing footprint and would include installation of a 345 kV breaker, 345 kV reactor, and 345 kV dead-end structure.

> ***GGS Substation***
>
> …would be expanded within its existing footprint.

The Thedford Substation expansion site is located in Thomas County, east of Thedford, east of the existing Thedford 115 kV Substation and north of State Highway 2. The current land use of the site is pasture/rangeland. The substation expansion would encompass approximately 13 acres. The major components of the substation would include 345 kV breakers and associated disconnect switches, 345 kV reactors, 345 kV dead-end structures, 345 kV bus and associated support structures, fencing, grounding, and a control building with protection and control devices.

The Holt County Substation would be located in Holt County on the northwest corner of the intersection of 846th Road and 510th Avenue. The current land use of the site is center-pivot irrigated cropland, and the substation would encompass up to 12 acres. The major components of the substation would include 345 kV breakers and associated disconnect switches, 345 kV reactors, 345 kV dead-end structures, 345 kV bus and associated support structures, fencing, grounding, and a control building with protection and control devices.

### 2.4.4 Communications System

The R-Project would require a number of telecommunications support systems that would be configured and designed to support the overall availability and reliability requirements for the operation of the line and the supporting substations. The primary communications for protection would be a Power Line Carrier over the power line. The secondary communications for protection and control would be provided via the one OPGW installed in a shield wire position on the transmission line. In addition to protection and control, the communications system will be used for Supervisory Control and Data Acquisition (SCADA). The SCADA system is a computer system for gathering and analyzing real-time data used to monitor and control the transmission system (substation equipment and the line itself). A SCADA system gathers information, such as the status of a transmission line, and transfers it to a central site, alerts the central site if the line has de-energized, carries out necessary analysis and control, and displays the information.

The secondary communications would be an all-digital fiber system using the OPGW located on the transmission line structures. The optical data signal degrades with distance as it travels through the optical fiber cable. It is anticipated that three signal regeneration sites would be required for the proposed R-Project. Three signal regeneration sites would be located within the transmission line ROW and would consist of equipment housed in an enclosed in a small cabinet that would measure approximately 72 inches high by 45 inches wide by 27 inches deep. Power would be supplied to each regeneration site by existing adjacent distribution power lines. One signal regeneration site would be required between GGS Substation and the Thedford Substation, and two signal regeneration sites would be required between the Thedford Substation and the Holt County Substation.

### 2.4.5 Transmission Line Construction

#### 2.4.5.1 Sequence of Construction

If the Service issues a permit to NPPD, construction of the 345 kV transmission line and substations would start after the permit is issued. Assuming construction were to begin in late 2017, electrification of the transmission line would occur in late 2019 (approximately 21 to 24 months after initiation of construction). The general sequence of construction for the R-Project is described below. Various phases of construction would occur at different locations throughout the construction process and require several crews operating at the same time in different locations.

> ***Construction Sequence***
>
> Construction of the 345 kV transmission line is scheduled to start in 2017 after issuance of an ITP and ROD.

#### 2.4.5.2 Surveying and Staking

Construction survey work would consist of determining or refining the centerline location through updated electronic and aerial survey techniques, specific pole locations, ROW boundaries, and temporary work area (i.e., fly yards/assembly areas and materials storage yards) boundaries. Final alignment design and staking would be determined in accordance with NPPD's engineering design criteria for a 345 kV transmission line and the conditions outlined in the National Electrical Safety Code (NESC) (IEEE Standards Association 2016).

#### 2.4.5.3 Noxious Weed Management

Management of noxious weeds would be addressed in the Restoration Management Plan to prevent and control the spread of noxious and invasive weeds during construction of the R-Project (see Appendix A of the draft HCP). Examples of noxious weed control measures that could be implemented during construction of the R-Project include: avoiding driving through weed-infested areas to prevent spread; inspecting material sources used on the construction site to ensure they are weed-free before use and transport; and cleaning construction equipment and vehicles to prevent noxious weeds from spread or invasion. Large patches of noxious weeds that threaten restoration efforts may also be treated with herbicides. Any use of herbicides would be applied by a licensed applicator and the specific directions for that herbicide would be followed. If application of restricted-use herbicides is determined to be necessary to control noxious weeds in restoration areas, NPPD would provide the Service and NGPC with information about such restricted use herbicides (including Material Safety Data Sheets) prior to use. Restricted-use herbicides are not available for purchase or use by the general public and must be applied by a certified applicator.

#### 2.4.5.4 Right-of-Way Tree Clearing

Because the Sandhills landscape is primarily grassland, vegetation removal in the 200-foot-wide ROW would be minimal. Mature trees under or near the conductors would be removed to provide adequate electrical clearance as required by NPPD's Transmission Vegetation Management Standard No. OG-T&D-St-002, which is based on NERC and NESC standards for maintaining reliability of electrical facilities (NERC 2016).

Tree clearing would be completed outside the migratory bird nesting season to the extent practicable. If clearing must be completed during the migratory bird nesting season, NPPD would complete surveys prior to tree removal to identify and avoid any occupied nests. Tree clearing in Holt, Wheeler, Garfield, and Loup counties would be conducted outside the northern long-eared bat pup season (June 1 to July 31).

After the ROW boundaries are staked and pole locations are marked, trees in the ROW zone that have the potential to contact the line would be cleared. Danger trees would be identified and removed during initial ROW clearing. Tree stumps would be cut to grade and would remain, unless the landowner requests removal.

> ***Danger Trees***
>
> Trees or tree limbs that, although located outside the transmission line ROW and normal clearing limits, are of such a height; in poor condition; in a location (e.g., side hill, proximity to transmission lines, and soil characteristics); or of a species type that they represent a threat to the integrity of the transmission line conductors, pole structures, or other facilities.

#### 2.4.5.5 Access for Construction

To minimize ground disturbance, NPPD would maximize the use of existing roads and two-tracks, wherever feasible, to access structure locations during construction. Large areas of the Sandhills do not have an existing road network, such as section line roads. In these areas, overland access and temporary access easements would be required to access structure locations and work areas during construction and maintenance. Overland access would be used to the greatest extent possible where existing access is not available to avoid soil disturbance and compaction. For overland access, NPPD would use existing two-tracks where available, would use low-ground-pressure tracked or rubber-tired equipment, would not complete improvements (blading or fill), and would drive over vegetation rather than remove it. Even though vegetation may be damaged, leaving the vegetation in place would create vertical mulch on the surface soil and leave the seed bank in place. Crushed vegetation would facilitate revegetation because it typically re-sprouts during the next growing season after temporary use is completed. Temporary access routes may require improvements such as blading, and, where required, placement of fill material. A combination of these access scenarios may be required to access a structure work area. The alignment of any new overland or temporary access routes would follow the existing landform contours in designated areas where practicable, providing that such alignment does not impact other sensitive resources.

Consideration of access would begin where construction equipment would leave the existing maintained road network. Access to structure locations, fly yard/assembly areas, pulling and tensioning sites, and other temporary work areas would be broken down into three access categories:

- Access Scenario 1 would include the use of existing two-tracks and greenfield overland travel with no improvements. Access Scenario 1 would not create any new disturbances, so existing vegetation would be left in place. Access Scenario 1 would be reserved for all-terrain vehicles (ATVs), light vehicles, and low-ground-pressure equipment that can travel with no improvements to the path.
- Access Scenario 2 would include new, temporary access routes, existing two-tracks that would require some improvement, and overland travel with large or heavy vehicles and equipment that could require improvements for access. Improvements to existing access (including two-tracks) and new access routes could require blading and placing fill material on geofabric where required.
- Access Scenario 3 would include new permanent access roads that would be left in place after construction activities are completed. Access Scenario 3 would be used primarily at substation locations and in specific circumstances where a route may be left in place at the landowner's request.

Low-ground-pressure equipment is defined as equipment used during construction that can travel overland with no improvements to the access path. Low-ground-pressure equipment would not require the removal of vegetation and would not disturb the landscape, other than crushing vegetation. The exact locations that may require improvements for access are not known at this time; therefore, all access to pulling and tensioning sites, fly yard/assembly areas, material storage yards, and tubular steel monopole structures has been classified as Access Scenario 2. All access that would be used to install lattice towers only (i.e., does not also proceed to a pulling and tensioning site) has been classified as Access Scenario 1 because the equipment necessary to install the foundations and structures would use existing two-tracks and greenfield overland travel with no improvements, as described above.

Equipment used in the construction of Access Scenarios 2 and 3 may include, but would not be limited to, bulldozers, front-end loaders, dump trucks, backhoes, excavators, graders, roller compactors, water trucks, crane trucks, and light vehicles.

Bridges and/or culverts installed for stream crossings would typically be removed upon completion of construction. Culverts at ditch crossings may be installed to get from existing roadways onto private land. These crossings may be left in place after construction for future access for maintenance or removed upon request. Any culverts installed would maintain the existing hydrology of the drainage and would not alter or impede flow. Use of low-ground-pressure equipment, matting, or other disturbance-minimizing techniques would be considered and utilized as needed.

A final Access Plan would be completed for the R-Project once final design of transmission structures and a ground-based inspection of potential access are completed. Access Scenarios 1, 2, and 3 used to estimate potential effects on environmental resources in this DEIS are based on preliminary design and may require changes. The final Access Plan would delineate the location and types of access to each structure and the type of equipment allowed for each type of access.

### 2.4.6 Fly Yards/Assembly Areas and Materials Storage Yards

Temporary work areas would be required for materials and equipment storage and staging for construction activities. The materials storage yards would serve as field offices, reporting locations for workers, parking space for vehicles and equipment, construction materials storage, and fabrication and assembly. Fly yards would be used for construction with helicopters; materials and equipment would be loaded into slings or choker cables for transport and placement at structure locations via helicopter. Fly yards would be located within the same footprint of lattice tower assembly areas. Fly yards/assembly areas and materials storage yards would be located along existing access roads and in previously disturbed areas when practicable. Grading and fill of these sites may be required. Upon completion of construction, all fill, including gravel, would be removed, soils would be de-compacted, and the area would be re-vegetated to the appropriate specifications.

#### 2.4.6.1 Batch Plants and Borrow Areas

Concrete batch plants may be necessary for constructing foundations for steel monopole structures along existing access for a portion of the transmission line. Commercial ready-mix concrete may be used when access to structure locations is economically feasible. Existing concrete batch plants and borrow areas would be used to the maximum extent practicable. If needed, any new batch plants or borrow areas would be sited in previously disturbed locations and would not be located in environmentally sensitive areas, including threatened and endangered species (e.g., the beetle, western prairie fringed orchid, whooping crane) habitats, wetlands, or cultural resource areas.

#### 2.4.6.2 Structure Work Areas

At each structure location, a temporary work area would be needed for construction lay-down, structure assembly, and structure erection. To the extent necessary, the work area would be cleared of vegetation and bladed to create a safe working area for placing equipment, vehicles, and materials. In grassland areas, little, if any, clearing of vegetation would be needed. The ground disturbance required is 100 feet by 100 feet for lattice tower work areas and 200 feet by 200 feet for steel monopole work areas. After line construction, all areas not needed for normal transmission line maintenance would be graded to blend as near as possible with the natural contours, then re-vegetated.

#### 2.4.6.3 Pulling and Tensioning Sites

Wire pulling and tensioning sites are locations where specialized equipment (e.g., winch trucks, light crawler tractors, and excavators) are used to spool out and tension the conductors and shield wires. Along tangent sections of the line, pulling and tensioning sites would be located approximately every 2 to 4 miles for steel monopoles and 4 to 6 miles for lattice towers. Pulling and tensioning sites would require 2 acres of temporary disturbance per work site. Additional pulling sites are needed where major turns in the line occur. These angle structure or point-of-intercept sites would require pulling and tensioning in two directions to allow for the angle in the line. Wire pulling and tensioning sites would be cleared and bladed only to the extent necessary to perform construction activities safely.

#### 2.4.6.4 Foundation Excavation and Installation

An auger rig would be used to excavate holes for the steel monopole structure foundations. The poles would be installed on drilled pier concrete foundations to a depth of approximately 25 to 45 feet, depending on load and soil characteristics. All monopole structures would use cast-in-place concrete footings, which would be installed by placing reinforcing steel in excavated foundation holes and encasing it in concrete. Concrete would be delivered to the site in concrete trucks. Chute debris from concrete trucks would be washed at approved locations, and the debris would be hauled offsite and disposed of in non-environmentally sensitive areas after hardening.

Excavated holes left open or unguarded would be covered and/or fenced where needed to protect the public, livestock, and wildlife. Any remaining spoils would be stockpiled at the localized work site and used to backfill holes. All remaining spoils not used for backfill would be hauled offsite and disposed of in non-environmentally sensitive areas.

For lattice tower structures, screw-in helical pier foundations would be used in areas of the Sandhills where existing access roads do not exist. Helical pier foundations do not require excavation. Each leg of the tower would require a helical pier foundation (four legs total). Final designs have not been completed, but it is anticipated that each foundation would consist of three or four 7- to 12-inch diameter piles that are 20 to 40 feet in length. The helical piers would be installed with an excavator that has a torque head where the bucket usually is located. The piers would be screwed into the ground, and no spoils would need to be removed from the site.

Once installed, the piers would be cut to the correct grade and elevation, and then a cap that connects to the tower leg would be welded or bolted. Anchor bolts or stub angles would be used to secure the structure to the foundation. Because of the cutting and welding that has to be performed at each site, NPPD would require the construction contractor to provide fire protection to avoid the potential for wildfires. The construction contractor would be required to have a water tank and fire extinguishers onsite during these activities along with using additional prevention measures such as fireproof roll-up mats and welding tents.

#### 2.4.6.5 Transmission Structure Assembly and Erection

Generally, tubular steel structures would be assembled and framed at each structure work area. For tubular steel monopoles, work areas need to be large enough to accommodate laying down the entire length of the poles while pole sections are assembled and cross-arms are mounted. Typically, insulator strings and stringing sheaves would be installed at each conductor and ground wire position while the pole is on the ground. Stringing sheaves would be used to guide the conductor during the stringing process for attachment onto the insulator strings. The assembled pole would then be erected in-place by a crane and secured to the foundation.

Lattice towers would be assembled at designated fly yards/assembly areas and then transported to the structure work area in multiple helicopter lifts (two to three anticipated) until the complete lattice tower is erected, thereby negating the need for a large crane at each structure work area. Insulators, hardware, and stringing sheaves would be preassembled at a fly yard for helicopter placement. The structures would be rigged with insulator strings and stringing sheaves at each shield (ground) wire and conductor position.

#### 2.4.6.6 Stringing of Conductors, Shield Wire, and Fiber Optic Ground Wire

Once structures are in place, a “sock-line” would be pulled (strung) from structure to structure and threaded through the stringing sheaves on each structure by helicopter. If necessary in longer, high-tension stringing sections, a second larger-diameter and stronger line would be attached to the sock-line and strung prior to the attachment of the conductor and the shield wires. This process would be repeated until the shield wire, OPGW, and conductor are pulled through all sheaves.

Shield wires, OPGW, and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment. These sites may differ in size and dimensions depending on the structure’s purpose (e.g., mid-span or dead-end), site-specific topography, and whether anchoring of the shield wire or conductor would be located at these sites. The tensioner, in concert with the puller, would maintain tension on the shield wires or conductor while they are individually fastened to the towers. Once each type of wire has been pulled in, the tension and sag would be adjusted, stringing sheaves would be removed, and shield wires and the conductors would be permanently attached to the insulators.

Splicing would be required at the end of conductor and shield wire spools during stringing. Compression fittings or implosive-type fittings would be used to join the conductors and shield wires. Implosive splicing technology is a splicing alternative where a small amount of explosive is placed around an aluminum sleeve. The layer of explosive is designed with the right properties of detonation velocity, pressure, and geometry so that it will create the required compression to connect two lengths of conductor or shield wire together in a controlled manner. The detonation of a compression fitting creates a flash and a loud boom similar to the sound at the end of a barrel of a 12-gauge shotgun blast (about 150 decibels [dB]) with the dB level reducing with distance (Tyburski and Moore 2008; Carlsgaard and Klegstad 2012). Implosive -type fittings are commonly used in the transmission industry. OPGW fibers would be spliced together in an enclosure mounted on a structure. Splicing would occur at structure work areas or pulling and tensioning sites at approximately 20 locations along the transmission line route during the second year of construction. There would be approximately 7 detonations per location for a total of 120 detonations, each sounding like a 12-gage shotgun blast. Caution would be exercised during construction to avoid scratching or nicking the conductor surface to avoid introducing points where coronas could occur.

At tangent and small-angle towers, the conductors would be attached to the insulators using clamps while at the larger-angle dead-end structures the conductors are cut and attached to the insulator assemblies by “dead-ending” the conductors, either with a compression fitting or an implosive-type fitting. Both are industry-recognized methods. When using the implosive-type fitting, private landowners, and public safety organizations would be notified before proceeding with this method.

For safety and efficiency reasons, wire stringing and tensioning activities are typically performed during daylight hours and are scheduled to coincide to the extent practical with periods of least road traffic in order to minimize traffic disruptions. For protection of the public during stringing activities, temporary guard structures would be erected at road and overhead line crossing locations where necessary. Guard structures would consist of H-frame wood poles placed on either side of the crossing to prevent ground wires, conductors, or equipment from falling on underlying facilities and disrupting road traffic.

Typically, guard structures would be installed just outside the road ROW. Although the preference is for access to each of these guard structures to be located outside the road ROW, it may be necessary for access to be within the road ROW depending on topography and access restrictions imposed by the regulatory agency (e.g., Nebraska Department of Roads [NDOR], county road and bridge department). Access use within the road ROW would be performed in compliance with the stipulations of the crossing permit and regulatory agency requirements.

Part of standard construction practices prior to conductor installation would involve measuring the resistance of the ground to electrical current near the structures. If the measurements indicate a high resistance, additional ground rods would be installed. The pole grounding system is used to transfer lightning strikes to ground. This is similar to the ground system installed on any building. This is not related to potential effects of electromagnetic fields (EMFs), as discussed in Section 3.16, *Public Health and Safety*.

#### 2.4.6.7 Construction Waste Disposal

Construction sites, material storage yards, and access routes would be kept in an orderly condition throughout construction. Refuse and trash would be removed from the sites and disposed in an approved manner. Construction trash would be disposed of appropriately, not burned. In remote areas, trash and refuse would be removed to a construction staging area and contained until such time as it can be hauled to an approved site. Oils or chemicals would be hauled to an approved site for disposal. Potential contaminants such as oils, hydraulic fluids, antifreeze, and fuels would not be dumped on the ground, and all spills would be cleaned up.

### 2.4.7 Substation Construction/Expansion

Construction/expansion of the substations would initially consist of survey work and geotechnical sample drillings to determine foundation requirements and soil resistivity measurements that would be used in the final design phases of the stations. Once the final design of each station has been completed, a contractor would mobilize to perform site development work, including grubbing and then reshaping the general grade to form a relatively flat (1 percent slope) working surface. This effort also would include the construction of permanent all-weather access roads. An 8-foot-tall, chain-link fence would be erected around the perimeter of the substation to prevent unauthorized personnel from accessing the construction and staging areas. The perimeter fence would be a permanent feature to protect the public from accessing the facility. The excavated and fill areas would be compacted to the required densities to allow structural foundation installations. Oil containment structures to prevent oil from transformers, reactors, and circuit breakers from getting into the ground or waterbodies in the event of rupture or leak would be installed as required.

Following the foundation installation, underground electrical raceways and the copper ground grid would be installed, followed by steel structure erection and area lighting. The steel structure erection would overlap with the installation of the insulators and bus bar, as well as the installation of the various high-voltage apparatus typical of an electrical substation. The installation of the high-voltage transformers would require special high-capacity cranes and crews (as recommended by the manufacturer) to be mobilized for the unloading, setting into place, and assembling of the transformers. The enclosures that contain the control and protection equipment for the substation would be constructed, equipped, and wired. A final crushed-rock surface would be placed on the subgrade to make for a stable driving and access platform for the maintenance of the equipment. After the equipment has been installed, the various systems would be tested, and then the facility would be electrically energized. Energization of the facility would be timed to occur with the completion of the transmission line work and other required facilities.

### 2.4.8 Site Restoration

Following construction, temporary work areas and access routes would be removed and the area restored to its original condition to the greatest extent feasible. The reference to “greatest extent feasible” is intended to recognize that there may be situations where returning the area to original conditions would not be the goal. In some instances, NPPD may need to contour a sloped area to prevent equipment from rolling over; these areas would not be re-contoured to their original conditions. Likewise, if an area were to contain noxious weeds or invasive species prior to construction, it would not be returned to its original condition because NPPD would revegetate the area with native species. The reference to “greatest extent feasible” does not mean that stabilization and revegetation would not occur; NPPD would stabilize and revegetate all temporarily disturbed areas. If initial restoration efforts are not successful, NPPD would continue to implement restoration measures until restoration goals are met. (A detailed description of restoration effectiveness monitoring and adaptive management is provided in the draft HCP.) The topsoil may be bladed back across the disturbed road section and the access blocked as determined through mutual agreement between NPPD and the private landowner. In these areas, seeds and roots contained in the topsoil layer normally provide a natural source for new vegetation growth. Other temporary disturbed areas, such as structure work areas and staging areas, would be restored and re-vegetated, as required by the private landowner.

NPPD's restoration planning team; private landowners; local USDA, Natural Resources Conservation Service (NRCS), staff, and other rangeland experts would be consulted regarding the appropriate techniques, seed mix, and rate to re-vegetate areas disturbed from construction. Vegetation on permanent access road surfaces may be periodically managed to allow equipment travel, if necessary. Temporary culverts would be removed. All practical means would be used to restore the land, outside the minimum areas needed for safe operation and maintenance, to its original contour and natural drainage patterns. A Restoration Management Plan that describes the methods and activities that would be executed to restore temporary disturbances to habitat that supports the beetle is provided in the draft HCP (Appendix A).

The Restoration Management Plan would be finalized and submitted to the Service prior to the start of construction. The Restoration Management Plan would include stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet these stipulations. Additional details regarding restoration monitoring and milestones to identify when restoration has been achieved are described in the draft HCP.

To ensure restoration of beetle habitat, NPPD would establish an escrow account to ensure the implementation and success of restoration efforts. NPPD prepared and submitted to the Service an escrow agreement for review that will be finalized prior to implementation of actual construction activities. As R-Project disturbed lands are successfully restored according to performance and success criteria outlined in the escrow agreement, NPPD and the Service would agree on the percent of funds from the escrow account that could be returned to NPPD.

### 2.4.9 Special Construction Practices

#### 2.4.9.1 Construction with Helicopters

The type of helicopters needed and the duration that they may be used would depend on the selected contractor's overall approach to construction and the availability of equipment. Because a construction contractor has not yet been selected, the quantity, type, duration, and timing of construction using helicopters cannot be predicted.

Construction with helicopter techniques would be used for the erection of lattice towers (see Figure 2-10), stringing of conductor and shield wire sock line, and other R-Project construction activities. The use of helicopters for other structure erection would be evaluated based on site- and region-specific considerations, including access to structure locations, sensitive resources, permitting restrictions, construction schedule, weight of structural components, time of year, elevation, availability of heavy lift helicopters, and/or construction economics. Helicopter erection of structures is a viable option for all locations that do not prohibit or restrict helicopter use. Helicopter fly yards would be located within the same footprint of lattice tower assembly areas, referred to as fly yards/assembly areas.

When construction with helicopters methods are employed, the structure assembly activities would be based at a fly yard/assembly area. Optimum helicopter methods of erection would be used. Optimum helicopter methods are those that are the best or most favorable for the safe and practical use of helicopters.

Prior to installation, each tower would be assembled in multiple sections at the fly yard/assembly area. Bundles of steel members and associated hardware would be transported to the appropriate fly yard/assembly area by truck and stored. The steel bundles would be opened and laid out by component section and then assembled into structure subsections of convenient size and weight according to the helicopter's lifting capabilities.

After assembly at the fly yard/assembly area, the complete tower or tower section would be attached by cables from the helicopter to the top of the tower section and airlifted to the tower location. The lift capacity of helicopters would depend on the elevation of the fly yard/assembly area, the tower site, local weather conditions, and the intervening terrain. The heavy lift helicopters that would be used to erect the complete towers or sections of a tower have the capacity to lift a maximum of 15,000 to 20,000 pounds per flight, depending on elevation.

Helicopter flights used in the construction of power lines are covered under visual flight rules and do not require the filing of formal flight plans with FAA. However, the helicopter pilots and construction contractor would develop an internal daily flight plan for the preferred flight path of that day's activities. Daily flight plans would likely be developed 1 to 2 days prior to the placement of structures and would depend on local weather conditions and topographic features. The daily flight plan would follow the safest and most direct route possible between the fly yard/assembly area and structure locations. Sensitive features that would be avoided by the daily flight plan may include, but are not limited to, occupied homes, businesses, concentrations of cattle, active bald eagle nests, and large concentrations of waterfowl or sandhill cranes. Flight altitudes would depend on weather conditions, topography, and the load being lifted; however, they would typically range between 500 and 1,000 feet.

Upon arrival at the tower location, the section would be placed directly onto the foundation or on top of the previous tower section. Guide brackets attached on top of each section would assist in aligning the stacked sections. Two to three trips would be required to complete each structure, depending on the lift capacity of the helicopter. Once aligned correctly, line crews would climb the towers to bolt the sections together permanently. Current estimates are that a single helicopter could successfully erect five to six structures in a day. Multiple helicopters may be employed at one time to facilitate construction activities at different locations along the route. The use of multiple helicopters would depend on the contractor and may or may not be employed.

Helicopters would use temporary work areas such as fly yards and staging areas for landing, overnight storage between flights, and refueling. Each fuel truck would be equipped with automatic shutoff valves and would carry spill kits. In addition to the required preventive spill measures, matting or the use of a water truck may be required to spray the site to reduce fugitive dust.

Other R-Project construction activities potentially facilitated by helicopters may include delivery of personnel, equipment, and materials to structure work areas, hardware installation, and pulling shield wire and conductor sock lines. Helicopters would also be used to support the inspection and management of the R-Project by NPPD. The use of helicopters for pulling shield wire and conductor sock lines is the normal and expected construction technique for wire stringing on both lattice tower and tubular steel monopole sections of the line. Helicopters used for pulling shield wire and conductor sock lines are typically much smaller than the heavy-lift helicopters used to set lattice structures. Helicopters would be used to deliver fly-in portable water tanks (large collapsible bladders) to each lattice tower during periods of active construction to assist with fire prevention.

#### 2.4.9.2 Distribution Power Line Relocation

NPPD's final route overlaps with approximately 28 miles of existing overhead distribution power lines owned and operated by various rural utility providers. Of these 28 miles of existing distribution power lines, 22 miles would be relocated as overhead and 6 miles would be relocated underground. Because of power line spacing regulations required for maintaining facilities, the existing distribution power lines would be relocated outside the R-Project ROW, or in the case of underground lines, to the extreme edge of the R-Project ROW. These lines would not be moved far from their current location. For example, those lines along public roads would be moved to the other side of the road.

Distribution power line poles are much smaller than those used for transmission lines and have smaller ROW and span lengths. The average span length for distribution power poles is 200 feet. Relocation of existing overhead distribution lines would require a single line truck called a digger-derrick truck. Each distribution structure would require a 2,400-square-foot (40-foot x 60-foot; 0.06 acre) work area. The digger-derrick truck would not require access improvements.

Installation of underground distribution lines would require a small tracked trenching machine, which would dig a 6-inch-wide trench where the conductor would be placed. A 14-foot-wide travel path is assumed for the trenching machine to move down the underground distribution line ROW.

#### 2.4.9.3 Well Relocation

Implementation of the R-Project would require NPPD to relocate five existing wells that serve livestock watering tanks and irrigation pivots along the transmission centerline (note: this number may change as negotiation with landowners progresses). Existing wells would be capped, and new wells drilled. New wells likely would be relocated approximately 150 feet from their current location to provide electrical clearance during installation and future maintenance by the landowner. A well drilling truck would be required for the installation of the relocated wells. Each well would require a 2,400-square-foot (40 x 60 feet; 0.06 acre) work area. A small tracked trenching machine would be used to run a pipe from the relocated well to the livestock watering tank. Each pipe would be approximately 150 feet long. A 14-foot-wide travel path is assumed for the trenching machine to move along the pipe.

### 2.4.10 Operations and Maintenance Practices

#### 2.4.10.1 Permitted Uses

After the transmission line has been energized, land uses compatible with safety regulations, operation, and maintenance would be allowed.

#### 2.4.10.2 Safety

Safety is a primary concern in the design of this ROW and transmission line. A transmission line is protected with power circuit breakers and related line relay protection equipment. If conductor failure or grounding (tree contact) occurs, power would be automatically removed from the line.

Lightning protection would be provided by overhead shield wires along the line. Fences, metal gates, pipelines, or other items that cross or are in the transmission line ROW would be grounded to prevent electrical shock. If applicable, grounding outside the ROW may also occur (additional detail is provided in Section 3.16, *Public Health and Safety*).

#### 2.4.10.3 ROW Vegetation Management Program

NPPD has developed a Transmission Vegetation Management Program (TVMP) to direct operation and maintenance personnel on how to manage vegetation to ensure the safety of transmission lines. The TVMP would be used to prevent outages from vegetation located on transmission ROW, minimize outages from vegetation located adjacent to ROW, and maintain clearances between transmission lines and vegetation on and along the transmission ROW. In addition to the management of vegetation, the TVMP also provides guidance on how NPPD would report vegetation-related outages of the transmission systems to the appropriate regional entity and NERC.

Woody vegetation such as trees and shrubs that may grow in or adjacent to the ROW could interfere with the continuous safe operation of the transmission line and cause outages. These trees and shrubs would be removed by manual or mechanized clearing. Stumps would be cut as close to the ground as practical but not removed unless requested by the landowner. NPPD would work with landowners to make arrangements for the disposal of brush and wood. Because the ROW is mainly grassland, little to no vegetation management would be required in the ROW.

ROW vegetation management may include the limited use of herbicides. Herbicides would be applied directly to cut tree stumps to prevent regeneration. Temporarily disturbed areas in the ROW would be restored, which may require treatment of noxious weeds in these areas with herbicides. If application of restricted-use herbicides is determined to be necessary to control noxious weeds in restoration areas, NPPD will provide the Service and NGPC with information about such restricted use herbicides (including Material Safety Data Sheets) prior to use. Once the area is restored to goals described in the Restoration Management Plan, NPPD would no longer be responsible for noxious weed control because that would be the responsibility of the landowner.

#### 2.4.10.4 Transmission Line Inspection

NPPD would use helicopter, fixed-wing aircraft or ground patrols to inspect NPPD's transmission system twice per calendar year (defined as beginning on January 1 and ending on December 31). It is not anticipated that routine inspection activities would affect whooping cranes (see the draft HCP and Migratory Bird Conservation Plan [MBCP]); however, NPPD crews would receive training on whooping crane identification and guidelines for avoiding the disturbance of whooping cranes, if they are present when NPPD crews are performing normal daily activities. Ground patrols would be conducted using light ATVs or foot patrol. Transmission line technicians would inspect line hardware, conductor and shield wire, structural steel, vegetation management encroachments, and ROW encroachments and clearances.

Unscheduled aerial patrols may be required during emergency or storm conditions. Under these circumstances, an NPPD employee familiar with the lines in question would accompany the aerial patrol pilot.

#### 2.4.10.5 Routine Maintenance and Repairs

Routine scheduled maintenance and repairs would not begin until 30 years after the in-service date and would occur once every 10 years for the remainder of the life of the transmission line (50 years). Routine maintenance and repairs require a detailed inspection that would involve sending personnel to each structure to check the stability of the structure and hardware associated with the transmission line. Maintenance and repairs noted during the detailed inspection would be scheduled in advance and would not require an immediate response.

To complete routine maintenance and repairs, NPPD would use ATVs, light vehicles, and low-ground-pressure equipment where possible. Improvements to access paths required to reach each structure would not be required for routine maintenance and repairs. Routine maintenance and repairs would be scheduled in advance from October through April to avoid spring and fall migration periods.

#### 2.4.10.6 Emergency Repairs

> **Maintenance**
>
> All routine maintenance and repairs would be scheduled to occur outside the beetles's active season (October–April).

Emergency repairs require an immediate response by NPPD personnel to ensure the safe and efficient operation of the transmission line. Emergency repairs may include repairs to isolated damages, such as single insulators or weak points on conductors, and large-scale repairs following severe weather events. Isolated damages would be addressed immediately after discovery and cannot be predicted or scheduled for repair. Smaller, yet essential, repairs are typically noted during the transmission line inspections described above. In an emergency situation, NPPD would use appropriate equipment (including helicopters and tracked and/or rubber-tire vehicles) to repair the transmission line within a reasonable time frame.

Emergency repairs may be completed at any time of the year, including the beetle's active season. Any potential effects from emergency repairs would be temporary and may require restoration. The majority of effects from emergency repairs, if any, would result from the need to obtain access to structures. Emergency repairs would follow the procedures described in the final Access Plan and approved Restoration Management Plan for any required construction activities.

Necessary access for emergency repairs would follow the same access scenarios identified for construction, to the extent practicable. Instances where the same access identified for construction may not be used include: repairs that require larger equipment than was used during construction, stream crossings that have changed because of changes in stream course during permit duration, and landowner construction of a new road or two-track that is more efficient for emergency repair access.

While the exact location of emergency repairs cannot be predicted, NPPD can estimate the acres potentially disturbed. NPPD estimates that the acres temporarily disturbed during emergency repairs would be equal to 20 percent of the total temporary disturbance that would occur during construction. Data from NPPD records on lattice tower transmission lines of similar design to the ones in the vicinity of the R-Project were reviewed to determine the extent of past storm damage. Records indicate cumulative storm damages that required emergency repairs damaged an average of 15 percent of an overall line's length. The majority of storm damages requiring emergency repairs occurred to lines east of GGS Substation. Lines west and north of GGS Substation had minimal storm damage and required little to no emergency repairs. In addition to being located in areas less likely to be affected by major storms compared to other parts of the state, the R-Project is designed to have storm structures installed every 8 to 10 miles to further limit storm damage and emergency repairs. Storm structures are specifically designed to contain damage to the transmission line to one section and prevent damage from continuing down the line. The use of storm structures is another measure that would limit the amount of emergency repairs required over the life of the R-Project.

### 2.4.11 Incidental Take Permit Covered Activities

Activities resulting in incidental take of the beetle for the R-Project and described below are referred to in this DEIS as covered activities. This DEIS analyzes the impacts of all activities required for the construction, operation, and maintenance of the R-Project and implementation of the HCP, of which the covered actives are a subset. Appendix C, which summarizes each activity associated with the R-Project and whether it is or is not a covered activity, was developed as a collaborative effort among NPPD, the Service, and NGPC. Although periodic emergency repairs would be included in the permit as covered activities, routine maintenance and repairs would not be included as covered activities. Routine maintenance and repairs will not take place until 30 years after construction of the transmission line and can be scheduled ahead of time and do not immediately threaten the continued operation of the transmission line. NPPD would schedule all routine maintenance and repairs to occur outside the beetle's active season (October–April) would use low-ground-pressure equipment, and would not require any ground improvements (temporary fill or other improvements that would disturb beetle habitat) for access. By following these avoidance and minimization measures, routine maintenance and repairs should have minimal effect on individual beetles or their habitat and are not included as a covered activity. See Section 3.7 for additional details regarding these applicable avoidance and minimization measures.

### 2.4.12 Compensatory Mitigation

NPPD would protect land in perpetuity to support the Sandhills population of the beetle to mitigate impacts on the species after avoidance and minimization measures in the draft HCP are implemented.

> ***500 acres***
>
> NPPD would secure at least 500 acres of occupied habitat as mitigation lands.

NPPD would secure mitigation lands to offset the R-Project's impacts through one of two methods:

- NPPD would secure and manage the property(ies).
- NPPD would work with a third party to identify, secure, and manage the property(ies), with NPPD maintaining overall responsibility for mitigation success.

The majority of disturbances from covered activities (those activities likely to result in the take of the beetle as described in more detail in Section 3.7) would be temporary. NPPD would provide mitigation lands to conserve beetle habitat and offset temporary and permanent impacts resulting from construction and operation of the R-Project, including emergency repairs required after storms.

NPPD would secure at least 500 acres of occupied habitat and would make its best effort to secure mitigation lands prior to the onset of covered activities. The Service understands that acquisition of such lands either through fee title or conservation easement can be time consuming. As such, the draft HCP stipulates that NPPD would gain an interest in land mitigation through perpetual conservation easement or acquisition by fee title after finalization of the ROD and within a period of 2 years following initiation of construction. Likewise, if the conservation easements are held and managed by a third party, NPPD and that group would have to reach agreement on management protocol and management costs of the approved mitigation lands. NPPD's preference is to purchase a single tract of occupied habitat; however, the final acquisition would be based on parcel availability, habitat quality, and concurrence from the Service and NGPC.

### 2.4.13 Avoidance and Minimization Measures

The following list of avoidance and minimization measures were developed in coordination with the Service and NGPC to reduce potential effects on the beetle. These measures are meant to be a tool box to be used in specific areas and may not be applied to all covered activities.

- Use of helicopters for erecting lattice structures, stringing sock line, and mobilizing certain equipment.
- Use of low-ground-pressure equipment (see above)
- Use of helical pier foundations in the Sandhills with no existing access to reduce disturbance
- Use of existing access roads, including two-tracks, to the extent practicable
- Winter construction in specified areas
- Limited mowing and windrowing of vegetation in specified areas
- Limited removal of road kill (carrion) at structure locations along existing roads in specified areas
- Siting of disturbance areas on previously disturbed lands or unsuitable habitat to the extent practicable
- Sodium vapor lighting and downshield lighting at substations and temporary work areas, if necessary
- Limited nighttime construction during periods when the beetle is active

Specific avoidance, minimization, and mitigation measures that would be implemented by NPPD for each environmental resource category are described in the Avoidance, Minimization and Mitigation Measures section at the end of each resource topic in Chapter 3.

## 2.5 Alternative B: Tubular Steel Monopole Construction Only

During the public-involvement process, NPPD documented that the public prefers steel monopole structures to lattice structures to reduce impacts on visual and agricultural resources. For this reason, the Service made a decision to consider as an alternative for detailed analysis in the DEIS the use of tubular steel monopole construction for the entire length of NPPD's final route.

> **_Alternative B_**
>
> …a greater area of disturbance, resulting in an increase of take of the beetle.

As with Alternative A, Alternative B involves the Service's issuance of a permit for NPPD's R-Project HCP, which includes Project activities and the conservation measures identified in the draft HCP. Project activities would be essentially the same as those associated with Alternative A and would include construction of the transmission line, expansion of two substations, and construction of a new substation at the eastern terminus, operation and maintenance activities, and emergency repair activities. Measures to avoid, minimize, and mitigate anticipated effects are also included. Specific activities that would be covered under the permit are presented in Appendix C.

Under Alternative B, NPPD would construct the R-Project using only tubular steel monopole structures. Construction of this alternative would vary from Alternative A in three ways: 1) elimination of helicopter structure erection and fly yards/assembly areas, 2) increased area of disturbance where lattice towers would be constructed under Alternative A, and 3) increased disturbance from access routes and increased disturbance within the transmission ROW. Steel monopoles require concrete foundations and improved access routes because erecting the monopole structures does not include use of helicopters. Access routes must support the heavy equipment (e.g., concrete trucks and cranes) necessary to pour the concrete foundations and erect the structures. Where access routes do not exist, temporary access routes would be needed to each structure and these may require improvements. The requirement for additional work areas and improvements to temporary access routes under Alternative B would result in greater temporary disturbance (see Tables 3.1-3 and 3.1-4 for a comparison of the two action alternatives).

Temporary work areas would larger for steel monopoles than for lattice towers because the structure would be assembled on the ground at the structure location and then lifted into place with a crane. The upper portions of lattice towers associated with Alternative A would be assembled offsite and flown to the structure location via helicopter. This additional disturbance would result in greater restoration requirements.

NPPD defines two access scenarios applicable to the construction of transmission tower structures in Section 2.4.5.5 above; both of which apply to Alternative A:

- Access Scenario 1 includes the use of existing two-tracks and greenfield overland travel with no improvements. Access Scenario 1 would not create any new disturbances. Existing vegetation would be left in place. Access Scenario 1 is reserved for ATVs, light vehicles, and low-ground-pressure equipment that can travel with no improvements to the path. Scenario 1 applies to steel lattice tower construction.
- Access Scenario 2 includes new temporary access routes, existing two-tracks that would require some improvement, and overland travel with large or heavy vehicles and equipment that may require improvements for access. Improvements to existing access (including two-tracks) and new access routes may require blading and the placement of

fill material on geofabric where required. Access Scenario 2 applies to tubular steel monopole construction.

However, under Alternative B, which involves steel monopole construction, only Access Scenario 2 would be used. Heavy equipment (concrete trucks, dump trucks, large cranes) would be used to install concrete foundations, haul steel pole members, and assemble and erect all structures. This heavy equipment would require Access Scenario 2 to all structures resulting in the increased temporary disturbance. Permanent disturbance may also increase since no more than 10 percent of Access Scenario 2 would be left in place following construction (see Tables 3.1-3 and 3.1-4 for a comparison of the two action alternatives).

Because of the increased area of ground disturbance, more acres of suitable beetle habitat would be affected, resulting in a greater level of take of the beetle under Alternative B.

## 2.6 Alternatives Considered and Eliminated from Further Consideration

Alternatives considered in this DEIS but eliminated from detailed consideration came from several sources including: 1) the draft HCP prepared by NPPD, 2) alternatives suggested for consideration during public scoping, 3) alternative transmission line route adjustments suggested by landowners, and 4) alternative transmission line routes developed by the Service to minimize effects on the beetle.

### 2.6.1 Winter Construction Only

> ***Construction Schedule***
>
> Restricting all construction activities along the lattice tower/helical pier foundations to the beetle dormant period does not meet the R-Project construction schedule.

Under this alternative, NPPD would construct the entire lattice tower/helical pier foundations portion of the route when the beetle is dormant and below ground. All covered activities associated with construction of the lattice tower portions of the Project including work areas, foundation installation, structure erection, and stringing, pulling, and tensioning would occur when the beetle is dormant from October–April (approximately 7 months). If all covered activities were completed during the beetle dormant period, effects on individual beetles would be substantially reduced because individuals would be buried to their overwinter depth beneath the frost line, and heavy equipment accessing structure work areas and pulling and tensioning sites would not compact the ground to a degree that would affect overwintering beetles because of the frozen soil surface.

**Reasons for Elimination:** Restricting all construction activities along the lattice tower/helical pier foundations to the beetle dormant period is not feasible because of the lack of schedule flexibility and allowance for contingencies during construction. Shortened daylight hours and lower temperatures during the winter would result in slower construction progression and increased construction costs.

### 2.6.2 Lattice Tower Structures Only

Under this alternative, NPPD would construct the R-Project using only lattice tower structures. Lattice towers would be installed using helical pier foundations and helicopter erection.

> ***Steel Monopoles***
>
> NPPD documented that the public prefers steel monopole structures to lattice structures to reduce impacts on visual and agricultural resources.

**Reason for Elimination:** During the public-involvement process, NPPD documented that the public prefers steel monopole structures to lattice structures to reduce impacts on visual and agricultural resources. Thus, using only lattice towers for the entire R-Project would result in greater impacts on resources, such as visual and agriculture, because of their larger structure profile and base footprint. The use of lattice towers with helical pier foundations along major existing roads is not as economical as the use of steel monopoles with concrete foundations. While this alternative would likely reduce the effects on the beetle by reducing the acres of temporary disturbance because of the smaller structure work area required for lattice structures, the difference in beetle take would be minimal considering NPPD's final route only uses steel monopole structures for 66 miles along major existing roads in the permit area.

### 2.6.3 Capture and Relocation Conservation Measures

Under this alternative, NPPD would apply capture and relocation efforts described in the joint Service and NGPC *Conservation Measures for the American Burying Beetle* document (USFWS and NGPC 2008). These conservation measures include the application of "capture and relocation" efforts followed by designated "maintaining clear" activities defined in the conservation measures document (USFWS and NGPC 2008). Maintaining clear activities include mowing vegetation to less than 8 inches and removing carrion at proposed disturbance areas after that area has been cleared of beetles.

**Reasons for Elimination:** Capture and relocation followed by maintaining clear activities is not a viable alternative to reduce take of the beetle for the R-Project because:

- Certain areas along NPPD's final route have some of the highest potential beetle densities making it difficult to capture all individuals.
- Results of clearing efforts for other construction projects in these areas indicate that clearing beetle from these areas may not be achievable (for an area to be "cleared" of beetle there must be no captures for three consecutive trap nights).
- Maintaining clear activities in the remote areas of the Sandhills is not feasible because of the lack of suitable access and potential wind erosion caused by travel and mowing vegetation.
- Capture and relocation of the beetle is considered to be the take of the beetle, so all beetles captured and relocated must be included in the total take estimate, thus increasing take substantially. Beetles would be captured and relocated from an entire trap radius (500 acres) and would not be limited to those individuals that occur in the proposed disturbance areas.

- Relocating large numbers of beetles may increase resident beetle competition for limited availability of carrion resources at release sites.

This alternative would likely result in an increase in beetle harassment, injury, and mortality and was eliminated from further consideration.

### 2.6.4 Construction that Avoids American Burying Beetle Habitat and Does Not Require an Incidental Take Permit

Under this alternative, NPPD would complete the R-Project in such a way that take of the beetle would not be likely, and a permit covering the construction, operation, and maintenance of the R-Project would not be necessary. Completion of the R-Project with no take of the beetle would require complete avoidance of the beetle and its suitable habitat in the current estimated range (NGPC 2014a). The current estimated range of the species overlaps nearly all of the R-Project study area identified early in the Project development phase (see Figure 1-1).

**Reasons for Elimination:** Avoiding the current estimated range of the beetle and suitable habitat in that range is not feasible in meeting the need for the R-Project. The SPP's (2012) *Integrated Transmission Plan 10-Year Assessment Repor*t called for NPPD to construct a new 345 kV transmission line that originated at GGS Substation and proceeded north to a new substation in Thomas County, then east to a new 345 kV substation along the Fort Thompson to Grand Island 345 kV transmission line in Holt County. The purpose and need of the R-Project is to increase reliability of the electric transmission system, relieve congestion from existing lines in the transmission system, and provide additional opportunities for development of renewable energy projects. To improve reliability of the electric transmission system, the R-Project would create a northern transmission path separated from the existing electrical infrastructure to connect with the existing Fort Thompson to Grand Island 345 kV transmission line and provide for an intermediate connection along the line to NPPD's existing 115 kV transmission system at a substation east of Thedford, Nebraska. To enable future renewable energy development, the R-Project would provide capacity and access to the transmission system in north-central Nebraska. To meet this purpose and need, avoiding beetle habitat would be not possible, so NPPD is pursuing issuance of a permit from the Service.

### 2.6.5 Underground Construction

During public scoping, several commenters raised concerns about the potential impacts of the Project on the Birdwood Creek area, where whooping cranes and an abundance and diversity of other migratory birds are known to winter. One commenter brought up the possibility of constructing the line underground in sensitive areas such as this to decrease potential impacts on migratory birds.

Construction of underground transmission lines has been used in a number of specific applications and circumstances around the country, including:

- Areas of considerable congestion where a new, undeveloped ROW is unavailable or so limited that the reduced ROW width for undergrounding would present not just a viable alternative, but in many cases, the only practical alternative

- Areas where height restrictions (such as on or around airports) would prevent use of overhead lines
- Areas of considerable visual sensitivity (such as nationally designated scenic resources or National Register of Historic Places [NRHP] historic structures) where overhead lines would significantly affect the visual setting of the area
- Areas of significantly elevated land values where large portions of the additional costs of underground construction could be offset by significant reductions in overall Project cost obtained through the use of much narrower ROW

**Reasons for Elimination:** High-voltage underground transmission lines 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. Underground construction cost estimates are 15 to 20 times, or more, the cost of an overhead transmission line. Recent estimates for a single conductor per phase system were approximately $20,000,000 per mile. The R-Project would require at least three cables per phase to meet the SPP load requirements.

Where open-cut trenching is not feasible, a means of trenchless installation of ducts could be used. Common areas where open trenching may not be allowed are: crossing roadways, street intersections, railroads, bodies of water, wetlands and other environmentally sensitive areas. Trenchless operations, while typically more costly, enable a project alignment to cross sensitive or inaccessible areas without surface disturbance to minimize surface impacts during construction. Two types of trenchless methods are commonly used: 1) jack and bore and 2) horizontal directional drilling. Horizontal directional drilling methods would likely be needed for all river crossings on the R-Project, if this option were selected. While this method does not require any significant pit excavation, it requires a significant area at the entry and exit points of the drill. A typical entry point site requires an area of about 100 feet x 150 feet and an exit area of 100 feet x 100 feet. Heavy equipment and workers would cause temporary disturbance around the entry and exit pits.

One major environmental concern during horizontal directional drilling is the inadvertent return of drilling lubricant caused when excessive drilling pressure results in drilling mud propagating toward the ground surface or into the body of water. Horizontal directional drilling uses bentonite, a clay-type drilling fluid, to stabilize the bore and reduce mechanical wear. While bentonite is non-toxic, some plants and microscopic animals and fish and their eggs can be smothered by the fine bentonite particles, if discharged into waterways. For this reason, drilling lubricant would be discharged away from any associated waterbody.

Cable installation procedures and equipment are selected based on environmental conditions, equipment and material placement, and pulling requirements. In the typical cable pulling setup, the reel of cable is placed at the transition structure or at one of the manholes and the winch truck is placed at the opposite end of the conduit. Splicing of the cable commences once all the cable is pulled into a manhole from each direction. Generally, the equipment required for pulling the cable is very large and heavy, requiring good access to the pulling sites. Substantially more pulling and tensioning sites are required for underground installation compared to an overhead line, but the effects of these activities are limited and temporary.

Depending on the construction techniques and Project requirements, the ROW width can vary from 30 to 100 feet, although 50 feet is typical for 345 kV transmission lines. For projects with large load transfer requirements like the R-Project (greater than 3,000 amperes), a larger ROW may be needed to accommodate a multiple duct bank design. In an attempt to minimize conductor size, 10-foot, center-to-center separation between parallel duct banks is typically recommended. In addition to permanent easements, temporary construction easements may be required. All trees and vegetation in the permanent and temporary easements must be cleared for construction.

The significant cost differential between overhead transmission line construction and underground construction plus the abundance of open, undeveloped land eliminated the need to consider underground construction and its associated challenges and impacts. Therefore, underground construction was eliminated from further consideration as a viable alternative for not only constructing the entire Project but also for constructing short segments in environmentally sensitive areas (e.g., wetlands and river crossings).

Impacts on biological, geological, water and cultural resources from underground transmission lines, even short segments, include 1) increased potential for invasive species to establish in the ROW, 2) increased potential for wildlife displacement resulting from the disturbance from trenching activities in the ROW, 3) increased effects on the beetle from greater temporary disturbance from trenching and cable pulling operations and greater permanent disturbance from construction of manholes, reactors and transition stations, 4) increased potential for impacts from ground disturbance from trenching activities, 5) potential for impacts from increased soil temperatures during operation, and 6) potential degradation of water quality during construction when using trenchless techniques.

### 2.6.6 U.S. Fish and Wildlife Service's Alternative Transmission Line Route Selection

Alternatives that the Service typically analyzes in an EIS for a permit are variations of the permit (e.g., permit duration, level of permitted take, types of covered activities) and implementation of the HCP (including the location, amount, and type of conservation measures), or a combination of these elements. However, because the proposed issuance of a permit is the only way NPPD can obtain ESA compliance for the construction, operation, and maintenance of the R-Project, this DEIS deals with a wider range of alternatives.

For purposes of analysis in the R-Project HCP DEIS, the Service determined it should evaluate whether there are other ways to implement the Project that would minimize the impact on and take of the beetle and still meet NPPD's need for the R-Project. One way to avoid and minimize take of the beetle would be to construct the transmission line using a route located outside areas of known beetle occurrence. NPPD disagrees that alternative routes outside the study area would be reasonable or would meet its need. While the Service has no authority over routing of the R-

Project, it does have jurisdiction over permitting take of the beetle. Consequently, this DEIS evaluates possible options to avoid and minimize take of the beetle by using different routes for the transmission line.

One of the resonating themes of the comments received during the public scoping process was the need to consider alternative routes for the R-Project. Numerous commenters suggested that the transmission line use existing linear corridors or parallel existing roadways to minimize impacts. Given the relationship of the permit with the R-Project (i.e., NPPD cannot construct the Project without issuance of the permit) and in response to public comments, the Service developed three conceptual routes—northern, southern, and central—as described below (see Figure 2-12). The Service undertook this analysis to find an alternative route that would avoid or minimize effects on the beetle and its habitat. To accomplish this objective, it was necessary to consider areas outside the study area used by NPPD during its routing process.

#### 2.6.6.1 Development of Conceptual Routes

The Service conducted a programmatic level routing study to identify alternative conceptual routes that would avoid or minimize effects on beetle habitat, would be technically and economically feasible, and would achieve the stated purpose and need of the R-Project. This process involved several steps, including data collection, selection of and at times expansion of the NPPD study area, review of area constraints and opportunity features, and ultimately, identification of conceptual routes. To the extent practicable, the routing/siting criteria considered by the Service were similar to those used by NPPD but were separate and independent of the work undertaken by NPPD. The Service completed iterative rounds of field and engineering review, but with only limited agency coordination and no public input.

The portion of the R-Project from the Thedford Substation to the Project's eastern terminus at Western's 345 kV transmission line in Holt County crosses an area with a high probability of occurrence of encountering the beetle (Figure 1-2). The beetle and its habitat are abundant in this area based on many years of survey effort. Beetles are not present in the portion of the study area from GGS Substation to Stapleton, Nebraska, because it is too dry and habitat is fragmented. Therefore, the alternative route review was focused on the route segment between Thedford Substation and the Holt County Substation.

The process was primarily a focused effort conducted by the Service's interdisciplinary routing team to develop reasonable route solutions that minimize impacts on beetle habitat and are suitable for overall Project feasibility. As previously noted, the process did not include the iterative rounds of field and engineering review, agency coordination, and public input often done by utilities during the course of construction planning. Initial route development efforts started with identifying large area constraints (e.g., municipalities and large waterbodies) and opportunity features (e.g., paralleling exiting ROW features) in an expanded study area, which encompassed the endpoints of the R-Project and areas in between. These areas were identified using a combination of readily available public data sources.

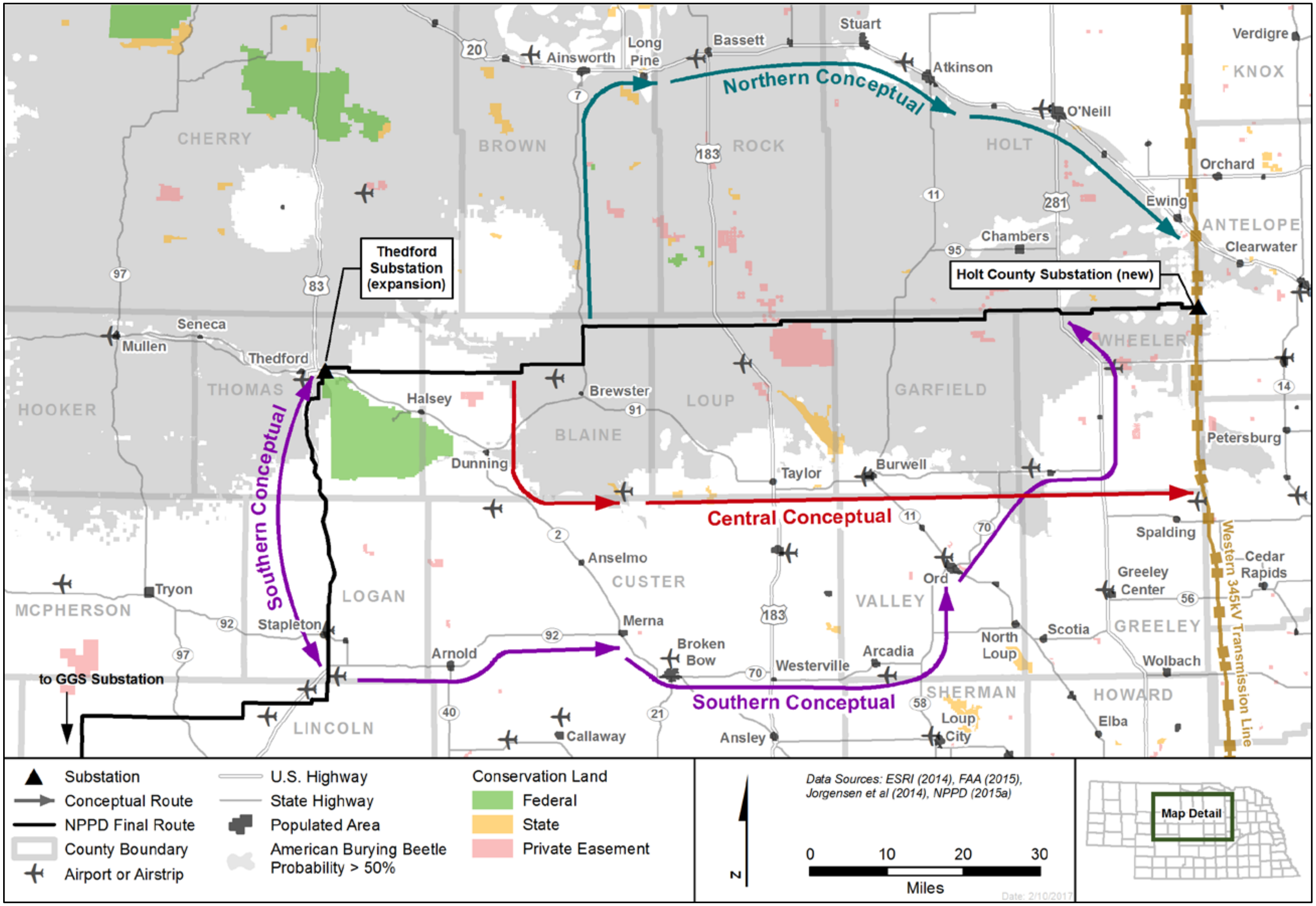



**Figure 2-12. Northern, Central, and Southern Conceptual Routes**

The Service's routing team used constraint information to develop conceptual routes adhering to a series of general routing and technical guidelines. Efforts were made to develop conceptual routes throughout the study area, where feasible, to ensure that all reasonable alignments were considered. Alignments were approximate at this stage, but were suitable for guiding field reconnaissance and preliminary engineering reviews. As the routing team continued to gather information and review the conceptual routes in greater detail, the alignments were revised and refined, resulting in the development of more specific alignments.

The more refined conceptual routes were analyzed using information from a desktop review and field reconnaissance. The following sections describe the conceptual routes that were developed for review and comparison.

#### Northern Conceptual Route Description

The northern conceptual route would traverse along NPPD's final route for 40 miles east of the Thedford Substation before turning to the north (Figure 2-13). The northern conceptual route primarily aligns parallel to state and U.S. highways for the majority of its length. After diverting from the R-Project final route, the northern conceptual route would parallel State Highway 7 to the north for approximately 34 miles. This stretch of the highway is sparsely developed (see Figure 2-13) and would allow for a consistent parallel alignment requiring no major diversions. Near the city of Ainsworth, the route would turn east to parallel U.S. Highway 20 and continue to parallel U.S. Highway 20 for the remainder of its length, until reaching Western's 345 kV transmission line in Holt County, about 9 miles north of the R-Project eastern terminus.

The 90 miles of route parallel to U.S. Highway 20 would require multiple significant diversions away from the highway to avoid the towns of Long Pine, Bassett, Newport, Stuart, Atkinson, Emmett, O'Neil, Inman, and Ewing. Additional minor diversions of the route would be required because of residential, commercial, and industrial development directly adjacent to the highway (Figure 2-13). As a consequence, the total length and thus cost of the R-Project would become economically infeasible.

The primary benefit of the northern conceptual route is that it would run parallel to existing highways through the Sandhills region, potentially allowing for easier access during construction and maintenance, eliminating the need for a new linear corridor through previously undisturbed land, and reducing the cumulative structure footprint area by allowing for a greater portion of the line to be constructed with monopole versus lattice towers. Construction of the line using monopoles along a greater portion would result in less permanent disturbance but greater temporary disturbance. Temporary disturbance in this case would be along a highway ROW where road construction has already caused disturbance.

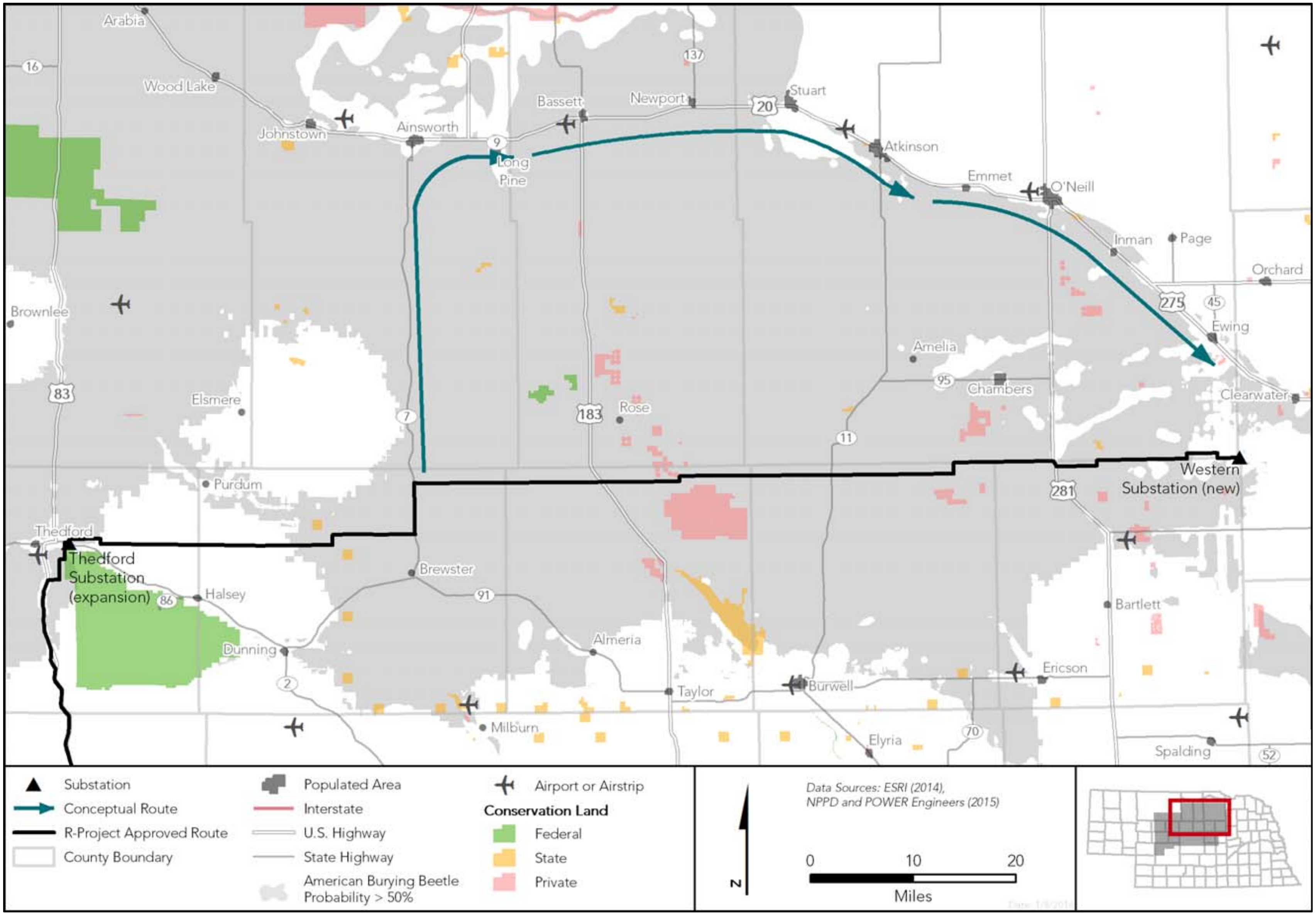



**Figure 2-13. Northern Conceptual Route Overview**

**Reason for Elimination of the Northern Conceptual Route from Further Analysis:** Because of the deficiencies cited above, the northern conceptual route was determined to be technically and economically infeasible. If the route were to be carried forward for further review, the alignment revisions would likely decrease the house counts (see Appendix B), while increasing the overall length and cost, increasing the number of heavy angle structures, decreasing the length parallel to roads and highways, and increasing the length along section lines. For these reasons and the added cost of 40 additional miles of transmission line, the northern conceptual route was not carried forward for further consideration. Appendix B presents a comparison between the northern conceptual route and NPPD's final route.

#### Southern Conceptual Route Description

The southern conceptual route would generally parallel State Highway 70 for the majority of its length but is only directly parallel to the highway for a short distance (Figure 2-14). Similar to the northern conceptual route, the southern conceptual route warranted significant revision due to the location of residences, pivots, towns, and cities along State Highway 70 and additional development within the highway corridor. However, unlike the northern route, revisions could be reasonably made to minimize impacts.

Although the southern conceptual route would not be directly parallel to the highway for the majority of its length, the revisions necessary to make the southern conceptual route feasible from a siting perspective would be less severe than would be necessary for the northern conceptual route. In addition, this portion of the study area is largely outside habitat with high probability of beetle occurrence. Fewer plant and wildlife species are expected in disturbed areas along and near the R-Project ROW, which would be located near the highway ROW and other disturbed areas in the southern conceptual route.

The Project requirement to connect to the Thedford Substation necessitates that the southern conceptual route would have two circuits sited along U.S. Highway 83—one that would travel along NPPD's final route from GGS Substation to the Thedford Substation and a second circuit that would travel along the same corridor from the Thedford Substation to a point 43 miles south of Thedford where the route turns to the east. The configuration of the additional segment of route, whether parallel to the original R-Project alignment or as a double-circuit section, would introduce reliability concerns, increase Project cost and construction complexity, and increase impacts from the route along that segment due to more structures (parallel alignment) or taller structures with larger footprints (double-circuit structures).

**Reason for Elimination of the Southern Conceptual Route from Further Analysis:** Because the 43-mile segment between Thedford and Highway 92 would result in increased impacts and costs (likely more than $90 million) associated with the overall length of the route, as well as decreased benefits from the many diversions from State Highway 70, the southern conceptual route was dismissed from further consideration. Appendix B provides a summary review of the quantitative impacts associated with the southern conceptual route versus NPPD's final route.

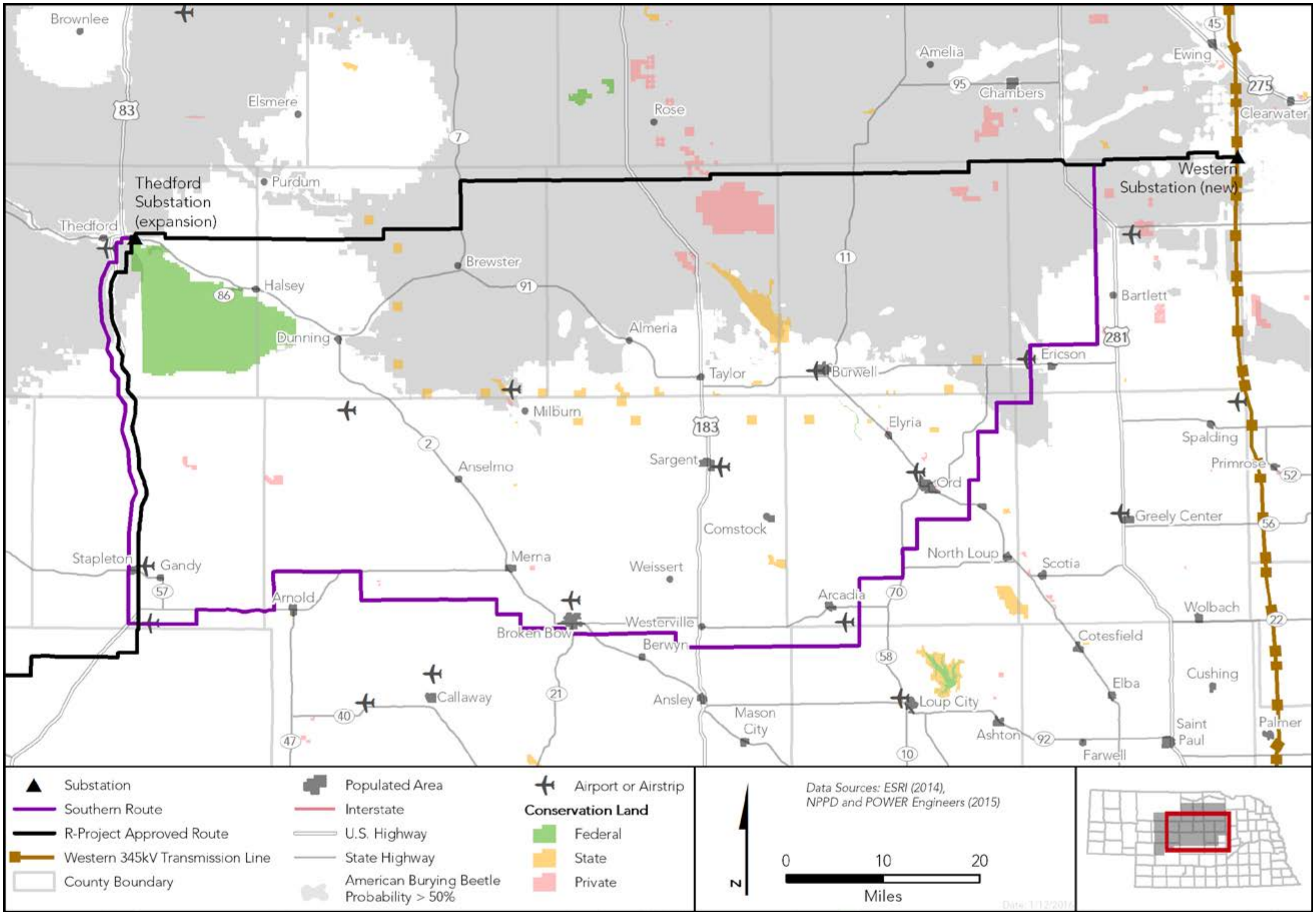



**Figure 2-14. Southern Conceptual Route Overview**

### Central Conceptual Route Description

> **Central Route**
>
> …was developed to remain along existing divisions of land parcels just to the south of the high probability beetle habitat.

The central conceptual route was developed to remain along existing divisions of land (such as highways and county lines) just to the south of the high occurrence probability beetle habitat areas (Figure 2-15). This route was also sited in this area because there are generally fewer water features (Sandhills lakes and marshes) and wet meadows to avoid impacts to migratory birds, including whooping cranes. The central conceptual route would continue along NPPD's final route for 26 miles east of the Thedford Substation before turning to the south near W. North Loup Road and Goose Creek. It would then continue approximately 16 miles south, to the Blaine and Custer county line before turning back to the east. The route would continue on an eastern trajectory for 60 miles with some modifications to avoid residences and other landscape features just before reaching Highway 70 in Valley County. The route would then continue east for 14 miles before turning north and running along U.S. Highway 281 for a short distance. At the intersection of State Highway 91 and U.S. Highway 281, the route would turn to the east and continue 13 miles before terminating at Western's 345 kV transmission line on the border of Wheeler and Boone counties. The initial guidance from SPP to NPPD gave some latitude in the siting of this eastern terminus along the Fort Thompson to Grand Island 345 kV transmission line, allowing a three-county area range to be used. The Service terminated the R-Project south of the NPPD-designated Holt County Substation with Western's 345 kV transmission line to minimize environmental effects and construction costs.

The basis of the central conceptual route development was to remain along existing section or half-section boundaries, while staying south of the Sandhills where beetle probability of occurrence was documented (see Figure 2-15), although this route does cross a drier portion of the Sandhills as described above. Development of the central conceptual route therefore involved a detailed review of section and half-section lines in the area along the northern edges of Custer and Valley counties and the southern portions of Garfield and Wheeler counties. In the absence of dense residential or commercial development in these areas, the primary small-area routing constraints are pivot irrigation systems, individual residences and farmsteads, private airstrips, and small public conservation lands.

The resulting route would avoid affecting these features for long stretches along a single section or half-section boundary. Unlike the northern and southern conceptual routes, the central conceptual route would not parallel an existing highway, and it would likely present similar construction access challenges as would NPPD's final route through this area. However, a large portion of the central conceptual route is located outside the Sandhills ecoregion in the Central Loess Hills Biologically Unique Landscape (BUL) where irrigated row crop agriculture and heavy soil, and often overgrazed pastures predominate.

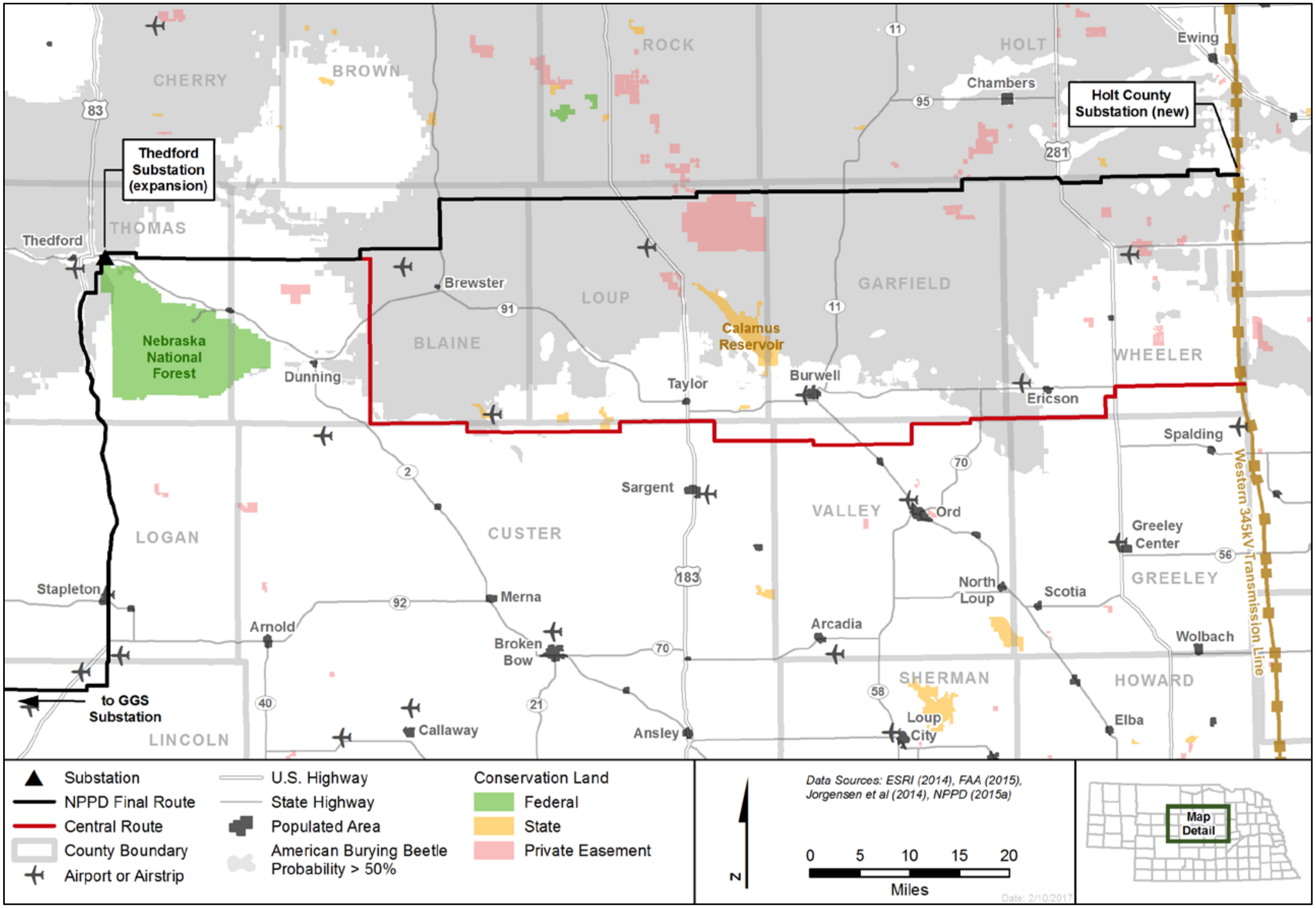



**Figure 2-15. Central Route Alignment**

### 2.6.6.2 Refinement of Central Route

Refinement of the central conceptual route began with the same conceptual delineation used for developing the northern and southern conceptual routes. As the central conceptual route was revised through an iterative process, finer scale data were required, such as individual residence locations and the availability of individual section and half-section lines as routing options. The routing team then performed field reconnaissance to ground-truth the Geographic Information System (GIS) datasets and ascertain the viability of the route in the field. Following field reconnaissance, additional minor revisions were made to the route to increase the distance from residences, avoid impacts on wetland features, and reduce tree clearing along windbreaks.

The central route would have an equal number of residences in proximity, towns and cities within 0.25 mile, and airports within 1.0 mile as NPPD's final route. However, the central route would cross fewer wetlands and have a shorter length in the Sandhills ecoregion than NPPD's final route. The primary benefit of the central route is that it would nearly avoid crossing habitat with a high probability of beetle occurrence, whereas NPPD's final route would cross 74.9 miles of areas with a predicted beetle occurrence greater than 70 percent. Table 2-2 summarizes the routing criteria for the central route in comparison to NPPD's final route.

**Table 2-2. Central Route Inventory of Quantitative Factors**

| Factor | NPPD's Final Route | Central Route |
|---|---|---|
| **Route Characteristics** | | |
| Route length (miles) | 224 | 241.7 |
| 90-degree angles (approximate) | 30 | 32 |
| Estimated new route segment cost[a] | $120,099,000 | $129,348,000–$144,720,000 |
| **Length Parallel** | | |
| Not parallel | 1.3 | 1.3 |
| Roads | 79.9 | 67.6 |
| Section lines | 142.9 | 172.8 |
| **Percent Parallel** | | |
| Not parallel | 1% | 1% |
| Roads | 36% | 28% |
| Section lines | 64% | 71% |
| **Land Use** | | |
| Cities within 0.25 mile (count) | 2 | 2 |
| Airports within 1 mile (count) | 1 | 1 |
| Length in Sandhills (miles) | 211.9 | 182.9 |
| Residences within 500 feet (count) | 6 | 6 |
| Residences within 0.25 mile (count) | 23 | 28 |

| Factor | NPPD's Final Route | Central Route |
|---|---|---|
| **Hydrology** | | |
| Primary river crossings | 7 | 9 |
| NWI wetlands (miles crossed) | 5.7 | 2.2 |
| State or Federal land crossed | Yes | Yes |
| State recreation trails crossed | Calamus River Trail | North Loup River Trail |
| Miles crossed in high probability (>70%) predicted beetle occurrence | 74.9 | 6.0 |
| NRHP sites | 1 | 1 |
| Barren land | 0% | 0% |
| Cultivated crops | 8% | 11% |
| Developed | 2% | 2% |
| Forest cover | 0% | 2% |
| Grassland/pasture | 85% | 82% |
| Water/wetlands | 5% | 3% |

[a] The cost estimate developed for the central route includes only the section of the NPPD final route east of where the central route diverges from NPPD's final route (east of Thedford Substation, in the north-central part of Blaine County). Cost estimates for the central route include only the sections of route not shared with the NPPD final route and were developed for comparative purposes. All cost estimates are based on a per-mileage calculation of spans requiring lattice towers or steel poles and do not include the base fixed costs. Any additional costs associated with potential further study of the central route (reconnaissance, public outreach, and detailed engineering) are not included in the cost estimates.

#### 2.6.6.3 Reasons for Elimination of the Central Route from Further Analysis

> ***Reason for Elimination***
>
> The central route was considered but dismissed as an alternative in the EIS because it would cause additional delays for NPPD to meet the in-service date as identified by SPP, which is part of the R-Project's purpose and need.

Analysis of the central route determined that it is feasible from both a technical and economic perspective. Groundtruthing revealed it was possible to build the central route from a technical standpoint; an economic analysis indicated the cost of building the central route segment was in the range of the cost for NPPD's analogous final route segment (see Table 2-2). The Service then considered other aspects of the R-Project that may potentially affect feasibility of the central route, including schedule. The R-Project has an in-service scheduled date of January 2018 as identified by the SPP (this date was determined to meet the purpose and need for the R-Project, which is to increase reliability of electric transmission systems, relieve congestion from existing lines, and provide opportunities for development of renewable energy projects). NPPD used an in-house public outreach process that began in 2013 and included over 2 years of public meetings to discuss siting and routing including the study area, corridors, routes and landowner impacts. The central route would require a re-initiation of this public involvement process and permitting with the Nebraska Power Review Board, and require the preparation of a revised HCP resulting in unacceptable delays.

Thus, while reasonable and feasible from a technical perspective, the central route was considered but dismissed as an alternative in the DEIS because it would add even greater delays than those already experienced by NPPD with respect to the in-service date identified by SPP, which is part of NPPD's need for the Project. Not meeting the in-service date could result in transmission system reliability issues and not provide the urgently needed congestion relief at the GGS Substation.

### 2.6.7 Other Suggested Route Alignments (Eastern and Western Adjustments)

NPPD and the Service evaluated two modifications to NPPD's final route for the R-Project suggested by members of the public (Figure 2-16). After preliminary analysis, these two suggested modifications were eliminated as documented below. Both of the route adjustments considered are modifications in the general vicinity of the GGS Substation.

#### 2.6.7.1 Eastern Route Adjustment

This route adjustment would emerge in a southerly direction from the GGS Substation and then east to North Platte and then would proceed north to NPPD's final route.

**Reason for Elimination:** This route adjustment was eliminated from further consideration because of the disadvantages listed below:

- At least six existing transmission lines are located in this area, and constructing a new 345 kV line along this route adjustment would require multiple crossings by the new line either over or under the existing lines, which would compromise the reliability of NPPD's electric system.
- During severe storm activity, if the suggested route adjustment were to be used, multiple transmission lines would be in jeopardy at the same time.
- The area of this proposed route adjustment is near the North Platte airport and restrictions are imposed by regulating agencies against constructing transmission line in proximity to an airport.
- The route adjustment would add approximately 16 miles of additional transmission line infrastructure that would increase cost of the R-Project by more than $20 million; additional costs would also be incurred for modifications to existing transmission lines to accommodate crossing existing lines in the area.

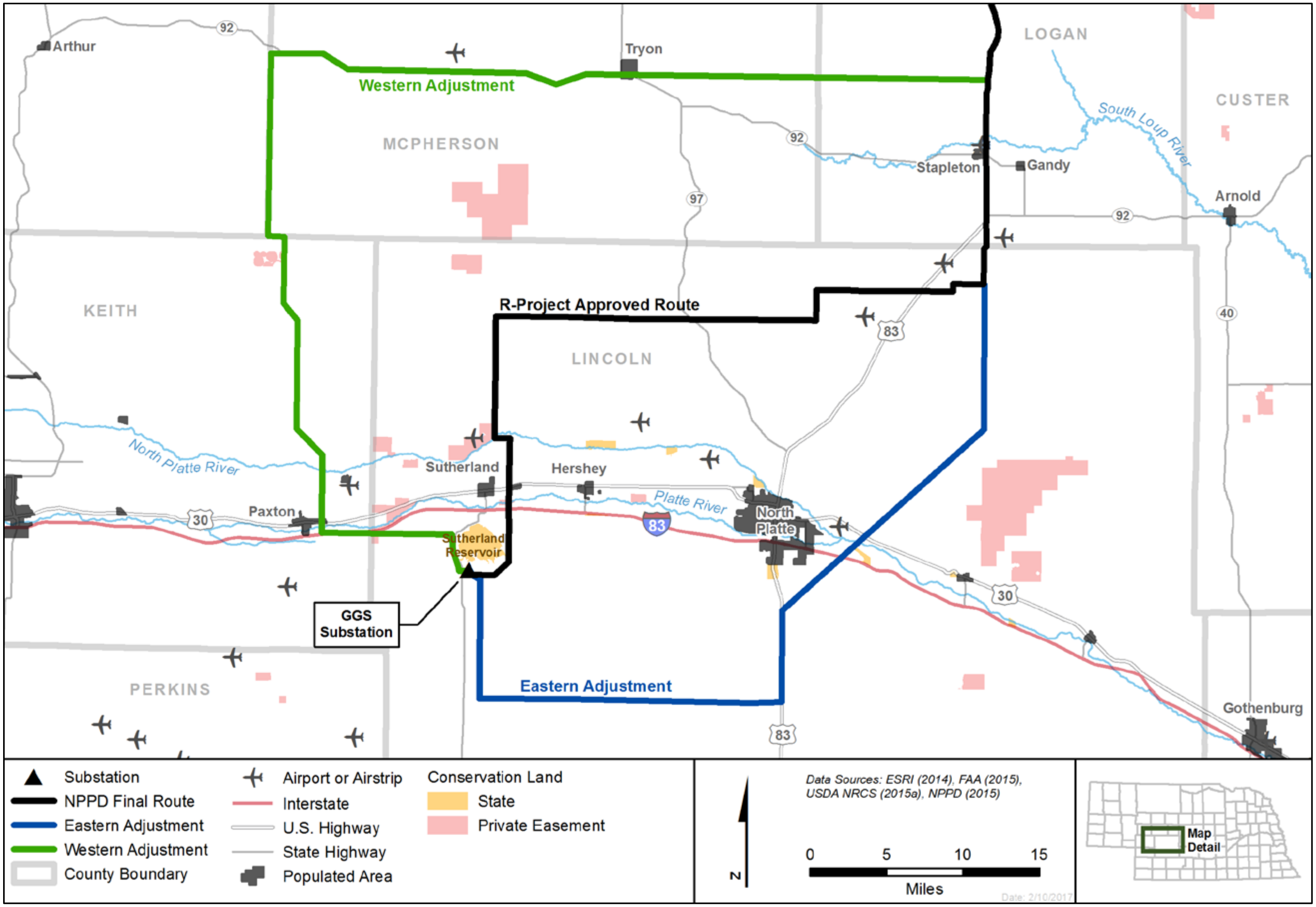



**Figure 2-16. GGS Substation and Eastern and Western Route Adjustments**

#### 2.6.7.2 Western Route Adjustment

This route adjustment would emerge from the GGS Substation in a westerly direction for approximately 10 miles and then proceed north to Highway 92. From here, the suggested route modification would proceed due east and connect with NPPD's final route.

**Reason for Elimination:** This route adjustment was eliminated from further consideration because of the disadvantages listed below:

- Routing transmission lines west from the GGS Substation and then proceeding in a northerly direction would create interferences with multiple existing single circuit and double circuit transmission lines.
- Routing modification would pose significant risk to the reliability of NPPD's major electric system in the North Platte area.
- Routing modification would affect riparian habitat along the South Platte River and the North Platte River
- Routing modification would affect a number of residences.
- Routing modification would add several miles to the transmission line route and add significant cost to the project.

# 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing environmental resources and the potential impacts that the alternatives described in Chapter 2 would have on those resources. Generally, NPPD's final route defines the Project area for the two action alternatives evaluated; however, the spatial area affected may change based on specific resource conditions. The affected environment and potential effects were determined by environmental specialists through literature searches and field observations on portions of the Project area where access could be obtained and at the substation sites and from information provided in agency and public comments. Desktop analyses and field surveys for wildlife, vegetation, wetlands, visual resources, and cultural resources were conducted by NPPD during 2014, 2015, and 2016 and results reported to the Service.

At the conclusion of the detailed impact assessment for the two action alternatives in each resource category, measures to avoid, minimize, and/or mitigate for the effects of implementing either alternative are identified. An effects summary is the last item provided at the end of each resource category to serve as a quick reference for readers, documenting the results of the effects analysis for both action alternatives.

## 3.1 Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation

### 3.1.1 Affected Environment

NEPA requires that the environment of the area that would be affected or created by the alternatives under consideration is succinctly described (40 CFR 1502.15). The Affected Environment section describes baseline or existing conditions of the resources that could be affected by implementation of either action alternative. The resource descriptions provided in this section serve as the baseline from which to evaluate the potential impacts of the alternatives. Depending on which resource is being described, the study area developed by NPPD during its routing process and presented in Figure 3.1-1 was used to describe baseline conditions for purposes of preparing this DEIS. In those instances when the area to characterize baseline conditions is either smaller or larger than NPPD's study area, an explanation is provided describing how and why the specific area was determined. Provided below is a general definition of the study area and Project area for purposes of this DEIS. The Project area is generally used to evaluate environmental consequences of implementing the two action alternatives and is discussed in more detail in the next section.

> **Study Area Defined:** the 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 developed by NPPD (as depicted in Figure 3.1-1) during its routing process and adopted by the Service for purposes of defining baseline conditions for preparing this DEIS.

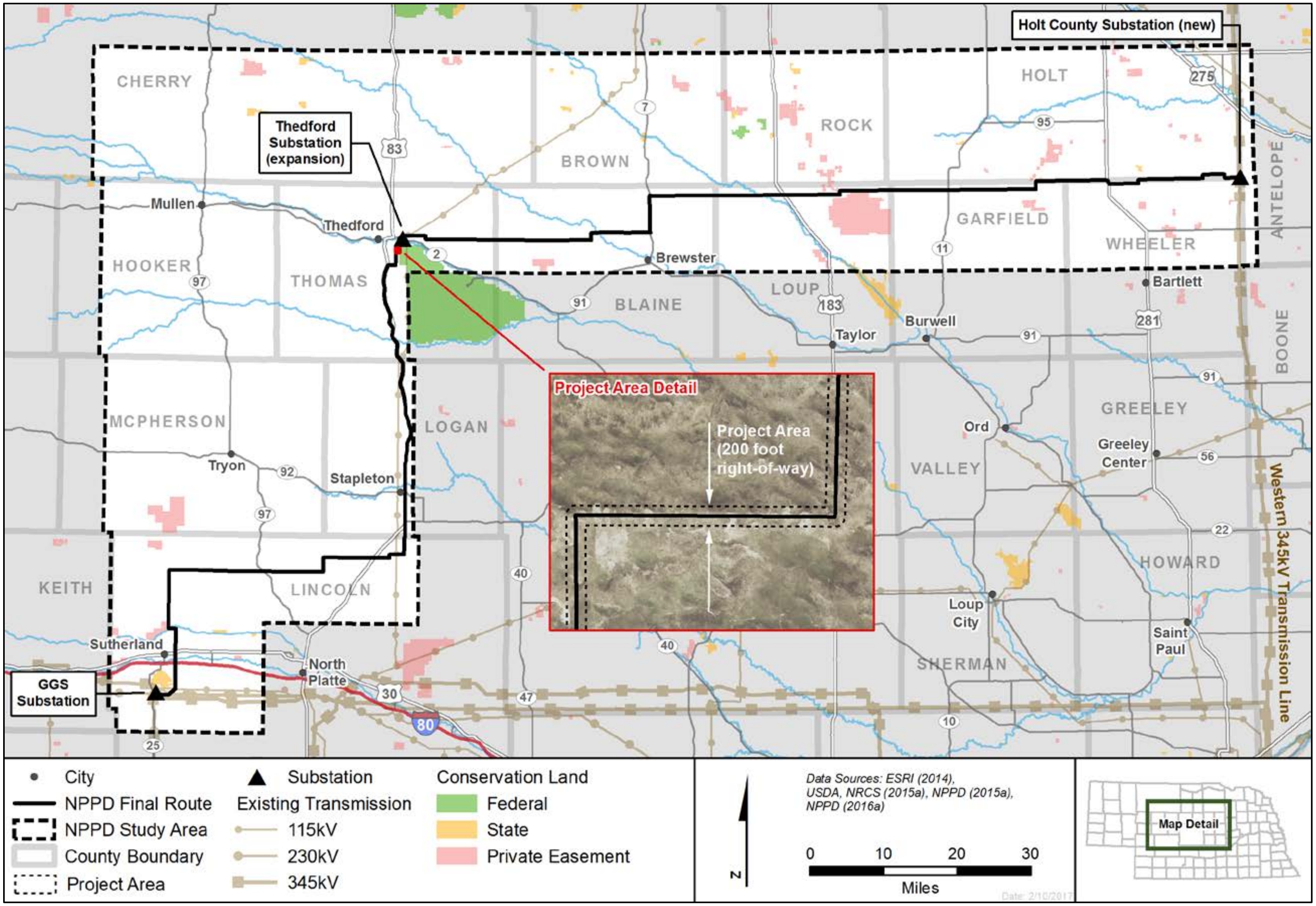



**Figure 3.1-1. Map of Study Area and Project Area**

**Project Area Defined:** the areas of disturbance in the 200-foot-wide transmission line ROW along NPPD's 225-mile-long, final route (approximately 100-mile-long north/south segment and approximately 125-mile-long east/west segment); land area permanently disturbed including structure bases, regeneration sites, permanent access, and substations; and land area temporarily disturbed including structure work areas; wire-pulling, tensioning, and splicing sites; construction yards/staging areas; fly yards and assembly areas; batch plant sites; borrow areas; distribution power line moves; well relocations; and temporary access.

It should be noted that many of the direct effects resulting from Project implementation are confined to a much smaller spatial area than the actual study area. The NPPD study area was adopted for expediency in terms of using readily available information to prepare the DEIS. In the Affected Environment section, baseline conditions are also described in regional terms, depending on the resource, to provide an environmental setting. Table 3.1-1 identifies the area used to characterize baseline conditions for each resource category and the area used for the effects analysis.

**Table 3.1-1. Affected Environment and Effects Analysis Areas for Each Resource Category**

| Resource Category | Area Inventoried to Characterize Affected Environment | Area Analyzed to Determine Effects from Action Alternatives (e.g., Project Area in Most Cases) |
|---|---|---|
| 3.2, Geology and Soils | The areal extent of geologic resources (i.e., bedrock, surficial, and mineral resources) and soil resources (i.e., soil associations, erodible soils, prime farmland, sensitive soils) in the study area; Level III and IV ecoregions used to describe regional context | The areal extent of geologic resources (i.e., bedrock, surficial, and mineral resources) and soil resources (i.e., soil associations, erodible soils, prime farmland, sensitive soils) in the Project area |
| 3.3, Water Resources | The areal extent of aquifers, watersheds, surface waters, floodplains, and 303(d) impaired waters in the study area | The areal extent of surface waters, floodplains, depth to aquifers, and 303(d) impaired waters in the Project area; surface waters (i.e., rivers, creeks, wetlands, canals, ditches, ponds, lakes, and reservoirs) and floodplains crossed by NPPD's final route |
| 3.4, Wetlands | The areal extent of NWI wetlands in the study area; the areal extent of desktop inventoried and field verified wetlands in the ROW; Level III and IV ecoregions used to describe regional context of wetland type abundance and/or rarity | The areal extent of NWI and field-verified wetlands in the Project area |

| Resource Category | Area Inventoried to Characterize Affected Environment | Area Analyzed to Determine Effects from Action Alternatives (e.g., Project Area in Most Cases) |
|---|---|---|
| 3.5, Vegetation | The areal extent of vegetation types, systems, and communities, and noxious weed species in the study area; Level III and IV ecoregions used to describe regional context of vegetation type abundance and/or rarity | The areal extent of vegetation types and the potential for loss of vegetation cover and establishment of noxious weed species to increase in the Project area; areal extent of woody vegetation (i.e., trees, tall brush, and shelterbelts) in the ROW |
| 3.6, Wildlife | Study area as defined above | Project area; known range and/or suitable habitat for wildlife species and extent of effects on those species |
| 3.7, Special Status Species | Study area as defined above; permit area as defined in R-Project draft HCP | Study area as defined above; permit area as defined in R-Project draft HCP; the areal extent of potential and/or suitable habitat for species and their current known range; known occurrences of species in the Project area |
| 3.8, Land Use | Study area as defined above | Publicly owned and/or managed lands, private parcels, rangeland, cultivated fields, center-pivot irrigation systems, transmission lines, and conservation easement areas bordered or crossed by the final ROW; occupied residences within 500 feet of the proposed ROW; towns or villages within 0.25 mile of the proposed transmission line ROW and substations, construction access roads and construction yards outside the ROW |
| 3.9, Recreation and Tourism | Publicly accessible lands in the study area | Recreational use areas or facilities (e.g., trails, campgrounds) crossed or bordered by the proposed transmission route; nearby areas or facilities where temporary road or site closures could influence use levels |
| 3.10, Cultural Resources | Study area as defined above | Cultural resources within 50 feet of any ground-disturbing activities associated with the Project, including the transmission corridor and all facilities, fly yards, laydown areas, and access roads, and for potential visual effects, historical resources within a 10-mile viewshed of the transmission centerline |

| Resource Category | Area Inventoried to Characterize Affected Environment | Area Analyzed to Determine Effects from Action Alternatives (e.g., Project Area in Most Cases) |
|---|---|---|
| 3.11, Transportation | Roadways, railways, and airports in the 7,039-square-mile study area as defined above | Roadways and railways crossed by the proposed transmission line route; nearby roadways that could receive additional traffic as a result of temporary road closures or detours; airports within 20,000 feet of proposed transmission facilities |
| 3.12, Visual and Aesthetics | The study area as defined above to characterize landscape setting, focus on effective viewshed (within 3 miles of NPPD's final route and substation locations) for characterization of more sensitive viewing locations | The area within which transmission lines and towers, substations, tree removal, and other Project components would be visible, with an emphasis on locations within 3 miles of NPPD's final route. (Note: the 3 miles for visual analysis currently included is unrelated to the Cultural Resources 10-mile designation for visual analysis.) |
| 13, Air Quality and Greenhouse Emissions | The study area as defined above | ROW and substation locations and access roads and construction sites; laydown areas where construction vehicles and equipment would operate |
| 3.14, Noise | The study area as defined above to characterize background noise sources and setting; identify noise receptors within 0.5 mile of the ROW and substation locations | Noise receptors within 0.5 mile of ROW and substation locations plus anticipated construction operations on access roads and constructions sites; laydown areas |
| 3.15, Hazardous Materials | ROW and substation locations plus a 1,000-foot buffer around these Project components | ROW and substation locations plus anticipated construction operations on access roads and constructions sites; laydown areas |
| 3.16, Public Health and Safety | The study area as defined above | ROW and substation locations plus anticipated construction operations on access roads and constructions sites; laydown areas |
| 3.17, Socioeconomics | The 14 counties in the study area | The 14 counties in the study area |
| 3.18, Environmental Justice | The 14 counties in the study area | 2010 Census blocks and census tracts within 0.5 mile of the proposed transmission line and substation locations |

Climate change refers to any significant change in average climatic conditions (such as mean temperature, precipitation, or wind) or variability (such as seasonality or storm frequency) lasting for an extended period (decades or longer). An increase in human greenhouse gas (GHG) emissions is said to result in an increase in the Earth's average surface temperature, commonly referred to as global warming or climate change. Climate change is expected, in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates.

Two aspects of climate change should be considered in an environmental effects analysis: 1) human impact on climate change, i.e., through actions, the potential to increase or decrease emissions of GHGs that contribute to climate change, and 2) the effect of climate change on humans, i.e., how the resources that are managed are likely to change in response to changing climate conditions and how that changes or otherwise affects management actions and the impacts of those actions on the resource.

The R-Project could have the potential to contribute to GHG concentrations because construction vehicles and equipment would generate emissions of gases such as carbon dioxide ($CO_2$) that are known to contribute to climate change; these effects are discussed in Section 3.13, *Air Quality and Greenhouse Gas Emissions*. However, GHG emissions associated with either of the action alternatives involving construction, operation, and maintenance, including emergency repairs would likely be negligible. Because the effects of the R-Project on climate change would be negligible and would not result in any unacceptable impacts, climate change as a resource topic was dismissed for detailed analysis in this DEIS.

### 3.1.2 Environmental Effects

The Environmental Effects section analyzes both beneficial and adverse impacts that would result from implementation of the alternatives described in Chapter 2. NEPA requires agencies to assess the direct, indirect, and cumulative impacts of all alternatives. Direct impacts are those that are caused by implementation of an action alternative and happen at the same location and time. Indirect impacts are those impacts that happen later in time and/or farther removed from the Project area, but are still reasonably foreseeable. Cumulative impacts are defined as the "impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are discussed in Chapter 4 of this document.

Depending on which resource is being evaluated, direct and indirect effects may: 1) be confined to a specific long-term footprint of the Project, 2) extend beyond the immediate Project area (e.g., an area within which habitat fragmentation, population-level effects, or regional effects may occur), or 3) extend over a larger area (e.g., 14 county-level effects on socioeconomics). Table 3.1-1 identifies the area used to evaluate environmental effects for each resource category. An explanation is provided in the environmental resource sections that follow regarding how and why the specific area for effects evaluation was determined. This analysis discusses potential effects and avoidance, minimization, and mitigation measures across all these spatial areas as they are relevant to specific resources. Effects resulting from either action alternative have been quantified, to the extent possible, based on preliminary design attributes and information provided by NPPD for each alternative, based on the route alignment and associated 200-foot-wide ROW and substation locations. Effects resulting from action alternative facilities or activities where an actual location has not been established are quantified to the extent possible based on approximate acres of disturbance under the preliminary design. Otherwise, potential effects were only qualitatively evaluated.

To determine whether an action has the potential to result in significant impacts, the context and intensity of the action must be considered. Context refers to impact timing and duration. Intensity refers to the area and severity of the impact. For purposes of this analysis, intensity definitions (i.e., low, moderate, and high) have been developed to assess the magnitude of effects for all of the affected resource categories resulting from implementing of either action alternative. Context in terms of duration and timing (i.e., when in the life cycle of the Project effects may occur) of impacts are estimated as either short term or long term. The definitions of intensity and duration are specific to each resource evaluated and are described in Table 3.1-2. In some cases, potential impacts have been determined to be negligible and for purposes of the DEIS are defined as not detectable.

**Table 3.1-2. Context and Intensity Definitions by Resource Category**

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **GEOLOGY AND SOILS** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Disturbance to geology or soils from construction, operation, and maintenance (including emergency repairs) would be detectable, but localized and discountable. Erosion and/or compaction would occur from construction and operation in localized areas, but natural restoration would resolve these issues. | Disturbance would occur over a relatively wide area from construction and maintenance (including emergency repairs) of the Project. Impacts to geology or soils would be readily apparent and result in short-term changes to the soil character or local geologic characteristics. Erosion and compaction impacts would occur over a wide area. | Disturbance would occur over a large area from construction and maintenance (including emergency repairs) activities of the Project. Impacts on geology or soils would be readily apparent and would result in short-term and long-term changes to the character of the geology or soils over a large area both inside and outside of the Project area. Erosion and compaction would occur over a large area. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **WATER RESOURCES** | | | |
| **Groundwater** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Impacts would result in a slight detectable change to water quantity in localized areas, however, water table levels would recover quickly and impacts would quickly become undetectable.<br>Groundwater quality would remain consistent with baseline conditions and State groundwater quality standards would not be exceeded as set forth by the Nebraska Department of Environmental Quality (NDEQ). | Impacts would result in a readily detectable change to water quantity that would be relatively localized. Water table levels would require longer time to recover to baseline conditions.<br>Change in water quality from baseline conditions would persist; however, would not exceed state water quality standards as set forth by NDEQ or impair designated beneficial uses of a waterbody. | Impacts would result in a substantial change to water quantity that would be readily detectable and over a large area. Lowering of the water table for long periods of time could result in lowering of baseline wetland inundation and stream flows.<br>Impacts would result in exceedance of state water quality standards as set forth by NDEQ and/or would impair designated beneficial uses of a waterbody. |
| **Surface Water** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | The effect on surface waters would be measurable or perceptible, but small and localized involving physical or chemical characteristics of the surface water. | The effect on surface waters would be measurable or perceptible and could alter the physical or chemical characteristics of the surface water resource but not to large areas. The functions typically provided by the surface water would not be substantially altered. | The impact would cause a measurable effect on surface waters and would modify physical or chemical characteristics of the surface water. The impact would be substantial and highly noticeable. The character of the surface water or aquatic influence zone would be changed so that the functions typically provided by the surface water would be substantially altered. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **Floodplains** | | | |
| **Short term:** Construction period or performance of emergency repairs plus time for disturbed vegetation to recover<br>**Long term:** Life of the Project (50 years) | Impacts could result in a detectable change to natural and beneficial floodplain values, but the change is expected to be small, of little consequence, and localized. There would be no appreciable effect of floodwater passage, storage, and infiltration (increases in flood elevation and duration) including impacts on human safety, health, and welfare. | Impacts would result in a change to natural and beneficial floodplain values that would be readily detectable, but relatively localized. Location of Project components or structures in floodplains could increase risk of flood loss including impacts on human safety, health, and welfare. | Impacts would result in a change to natural and beneficial floodplain values that would have substantial consequences on a regional scale. Location of Project components or structures would increase risk of flood loss including impacts on human safety, health, and welfare. |
| **WETLANDS** | | | |
| **Short term:** Construction period or performance of emergency repairs plus time for disturbed vegetative communities to recover<br>**Long term:** Life of the Project (50 years) | The effect on wetlands would be measurable or perceptible, but small in terms of area and the nature of the impact. A small effect on size or integrity would occur; however, wetland function would not be affected and natural restoration would occur if left alone. | The impact would cause a measurable effect on size or integrity or would result in a permanent loss of wetland acreage over small areas. However, wetland functions would not be adversely affected. | The impact would cause a measurable effect on both size and integrity or a permanent loss of large wetland areas. The impact would be substantial and highly noticeable. The character of the wetland would be changed so that the functions typically provided by the wetland would be substantially altered. |
| **VEGETATION** | | | |
| **Short term:** Construction period or performance of emergency repairs plus time for disturbed vegetation communities to recover<br>**Long term:** Permanent removal of vegetation over the | Impacts on vegetation would be detectable but discountable, and would not alter natural conditions measurably. Infrequent disturbance to plant communities could be expected, but without affecting local or range-wide population stability. Permanent removal of vegetation communities during the life of the Project | Impacts on native vegetation would be detectable and/or measurable. These disturbances could adversely affect local populations but are not expected to affect regional population stability. While some permanent vegetation removal would occur in key habitats, sufficient local habitat would remain functional to maintain the viability of the communities both locally | Impacts on native vegetation would be measurable and extensive. These disturbances could adversely affect local vegetation communities, and could affect range-wide population stability. Large quantities of specific vegetation communities would be permanently removed. Opportunity for increased spread of noxious weeds |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| life of the Project (50 years) | would be minimal. Natural restoration would occur resulting in no threat from noxious weeds. Opportunity for increased spread of noxious weeds would be detectable but discountable. | and throughout its range. Opportunity for increased spread of noxious weeds would be detectable and/or measurable. | would be measurable and extensive. |
| **WILDLIFE** | | | |
| **Short term:** Construction period or performance of emergency repairs plus time for disturbed wildlife habitat to recover<br>**Long term:** Life of the Project (50 years) | Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but discountable and would not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, breeding, and/or sheltering. Sufficient habitat would remain functional at both the local and range-wide scales to maintain the viability of the species. | Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and/or measurable. Occasional responses to disturbance by some individuals could be expected, with some adverse impacts on feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat would retain function to maintain the viability of the species both locally and throughout its range. | Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and would be extensive. Frequent responses to disturbance by some individuals is expected, with adverse impacts on feeding, reproduction, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts would occur during critical periods of reproduction or in key habitats and would result in direct mortality or loss of habitat that might affect the viability of the species. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **SPECIAL STATUS SPECIES** | | | |
| **Short term:** Construction period or performance of emergency repairs plus time for disturbed vegetation to recover<br><br>**Long term:** Life of the Project (50 years) | Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable, but would not measurably alter natural conditions. Sufficient habitat would remain functional at both the local and range-wide scales to maintain the viability of the species. No take of Federally listed species or impacts on designated critical habitat is expected to occur. | Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable and/or measurable. Some alteration in the numbers of sensitive or candidate species, or occasional responses to disturbance by some individuals could be expected, with some adverse impacts on feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat would remain functional to maintain the viability of the species both locally and throughout its range. No mortality or injury of Federally listed species is expected; however, some disturbance to individuals or impacts on potential or designated critical habitat could occur. | Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable and would be permanent. Substantial impacts on the population numbers of sensitive or candidate species, or an impact on the population numbers of any Federally listed species, or interference with their survival, growth, or reproduction is expected.<br><br>Direct or indirect impacts on candidate or sensitive species populations or habitat would result in substantial reduction to species numbers, unacceptable levels of take of Federally listed species numbers per the Service's criteria, or the destruction or adverse modification of designated critical habitat. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **LAND USE** | | | |
| **Short term:** Construction period or performance of emergency repairs plus recovery time for disturbed vegetation<br>**Long term:** Life of the Project (50 years) | Other than within the footprint of Project features (transmission tower structures, substations, and access roads) previous land uses would continue without interruption. Existing land uses such as agriculture, grazing, may experience temporary construction-related disturbances and intermittent, infrequent interruptions due to operation and maintenance (including emergency repairs). The Project would not conflict with local zoning or with management plans for state or Federal lands crossed by the transmission line. | Previous land uses (e.g., agriculture, grazing) would be diminished or required to change on a portion of the Project area in order to be compatible with the Project. Only a few parcels in the Project area would require zoning changes to be consistent with local plans. Some parcels in the Project area may require a change in land ownership through purchase or easement acquisition through condemnation. A utility corridor or related facilities would not be compatible with management plans for some non-governmental organizations (NGOs), local, state and/or Federal lands crossed by the transmission line or related facilities. | More than 25 percent of the Project area would require a change in land ownership or easement acquisition through condemnation. All land use (e.g., agriculture, grazing) on these parcels would be discontinued. Most parcels of land in the Project area would require zoning changes to be consistent with local plans. A utility corridor or related facilities would not be compatible with management plans for most NGOs, local, state and/or Federal lands crossed by the transmission line or related facilities. |
| **RECREATION AND TOURISM** | | | |
| **Short term:** Construction period or performance of emergency repairs plus time for recovery of disturbed vegetation<br>**Long term:** Life of the Project (50 years) | The impact would be detectable and/or would only affect some recreationists in the area. Users would likely be aware of the action, but changes in use would be slight. There would be partial area closures in the short term to protect public safety. There would be no long-term closures of popular recreation areas. | The impact would be readily apparent and/or would affect many recreationists in the area. Users would be aware of the action. In the short term, there would be complete area closures to protect public safety. However, the areas would be reopened after activities occur. Some users would choose to pursue activities in other available local or regional areas. | The impact would affect the majority of recreationists in the area. Users would be highly aware of the action. Most recreational areas would be closed or eliminated in the short term and the long term. Users would choose to pursue activities in other available local or regional areas and completely avoid the area. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **CULTURAL RESOURCES** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Construction activities in the vicinity of cultural resources would avoid any physical or vibratory disturbance to the resources.<br>The visual intrusion of the transmission line would have a negligible long-term effect on aboveground resources that gain their significance from their setting.<br>Ground disturbance or changes to the visual environment would not disrupt the integrity of traditional cultural properties (TCPs) or sacred sites. | Construction activities would take place within the boundaries of some archaeological sites; however, there would be no physical or vibratory effects on the characteristics of the sites that qualify them for listing in the NRHP.<br>The visual environment of sites with an aboveground expression or built-environment resources would be altered, but changes to the setting would not adversely affect the characteristics of the resources that qualify them for listing in the NRHP.<br>Ground disturbance or changes to the visual environment would have short-term impacts on TCPs or sacred sites, but long-term impacts would be avoided. | Archaeological sites would be disturbed through direct physical effects of ground disturbance within site boundaries from Project activities.<br>Project construction would cause structural damage to historical sites from vibrations.<br>The visual environment of sites with an aboveground expression or built-environment resources would be altered to the extent that the integrity of the resource would be compromised.<br>Ground disturbance or changes to the audio/visual environment would disrupt the integrity of TCPs or sacred sites. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **TRANSPORTATION** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Short-term (no more than 15 minute delay at any single location) temporary road or railway closures during construction, resulting in inconvenience but no measurable disruptions of traffic flow. Potential delays of emergency vehicles would not exceed 5 minutes. Negligible increase in daily traffic volumes during construction, resulting in perceived inconvenience to drivers but no actual disruptions to traffic.<br>Perceived inconvenience to drivers over the long term due to routine inspections by small vehicles or pickup trucks. | Road or railway closures lasting more than 15 minutes and up to 2 hours during construction, resulting in traffic disruption. Closures could be reconfigured on short notice to accommodate emergency vehicles, resulting in delays that do not exceed 15 minutes. Detectable increase in daily traffic volumes (with slightly reduced speed of travel) during construction, resulting in slowing down traffic and delays, but no change in level of service.<br>Short service interruptions (temporary closures for a few hours) to roadway and railroad traffic over the long term. | Road or railway closures exceeding 2 hours during construction, resulting in substantial disruption of traffic flow. Closures could not be reconfigured on short notice to accommodate emergency vehicles, resulting in delays of more than 15 minutes. Extensive increase in daily traffic volumes (with reduced speed of travel) resulting in an adverse change in level of service.<br>Permanent change in traffic patterns along primary roadways with an adverse change in level of service to worsened conditions.<br>Over the long term, infrequent but extensive operation delays and/or disruptions (temporary closure of one day or more) to roadways or railroad during sporadic “heavy work” events (flatbed trucks and cranes for tower or transmission line replacement) associated with the transmission line’s maintenance program. |
| **VISUAL RESOURCES AND AESTHETICS** | | | |
| **Short term:** Construction period or performance of emergency repairs plus recovery time of disturbed vegetation | Proposed changes could attract attention, but would not dominate the view or detract from current user activities. | Proposed changes would attract attention and contribute to the landscape, but would not dominate. User activities would remain unaffected. | Changes to the characteristic landscape would be considered substantial when those changes dominate the landscape and detract from current user activities. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **Long term:** Life of the Project (50 years) | | | |
| **AIR QUALITY AND GREENHOUSE GAS EMISSIONS** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | The impact on air quality associated with emissions of criteria pollutants associated with the construction, operation, and maintenance is measureable, but localized and low such that emissions would not exceed the National Ambient Air Quality Standards (NAAQS); greenhouse gas (GHG) emissions would not exceed the USEPA mandatory reporting threshold for GHG emissions. | The impact on air quality would be measurable and primarily localized, but have the potential to result in regional impacts. Emissions of criteria pollutants associated with construction, operation, and maintenance would not exceed the NAAQS; GHG emissions would not exceed the USEPA mandatory reporting threshold for GHG emissions. | The impact on air quality would be measurable on a local and regional scale. Emissions of criteria pollutants associated with construction, operation, and maintenance are high, such that they would exceed the NAAQS; GHG emissions would exceed the USEPA mandatory reporting threshold for GHG emissions. |
| **NOISE** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Noise impacts could attract attention, but would not dominate the soundscape or detract from current user activities during either construction or maintenance activities. | Noise impacts would attract attention, and contribute to the soundscape, but would not dominate. User activities would remain unaffected during construction or maintenance activities. | Impacts on the characteristic soundscape would be considered significant when those impacts dominate the soundscape and detract from current user activities during either construction or maintenance activities. |
| **HAZARDOUS MATERIALS** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Minor spills below thresholds for reporting to NDEQ | Spills reportable to NDEQ. | Spills far exceeding reportable quantities to NDEQ. |

| Context (Duration) | Low Intensity | Moderate Intensity | High Intensity |
|---|---|---|---|
| **PUBLIC HEALTH AND SAFETY** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | Operation of the proposed Project would not result in an increase of EMF levels that would rise to a level of concern with regard to public health and safety; limited potential for an increase in wildfires and no worker or public safety concerns. | Operation of the proposed Project would increase EMF levels, but not to a level that would adversely affect public health and safety. Potential for increased wildfires and the proposed project would be constructed and operated in a manner to be a public safety concern. | Operation of the proposed Project would increase EMF levels to a level high enough to adversely affect public health and safety. Potential for increased wildfires and the proposed Project would be constructed and operated in a manner to be a public safety concern. |
| **SOCIOECONOMICS** | | | |
| **Short term:** Construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | A few individuals, groups, businesses, properties or institutions would be affected. Impacts would be minor and limited to a small geographic area. These impacts are not expected to substantively alter social and/or economic conditions either beneficially or adversely. | Many individuals, groups, businesses, properties or institutions would be affected. Impacts would be readily apparent and detectable across a wider geographic area and could have a noticeable effect on social and/or economic conditions either beneficially or adversely. | A large number of individuals, groups, businesses, properties or institutions would be affected. Impacts would be readily detectable and observed, extend to a wider geographic area, possibly regionally, and would have a substantial influence on social and/or economic conditions either beneficially or adversely. |
| **ENVIRONMENTAL JUSTICE** | | | |
| **Short term:** construction period or performance of emergency repairs<br>**Long term:** Life of the Project (50 years) | No more than a few environmental justice communities would be affected, and impacts would be limited to a small geographic area. Additionally, impacts on these communities would not be high and adverse, and would not be experienced disproportionately when compared to other communities in the study area. | More than a few environmental justice communities would be affected across a wider geographic area. Impacts would be adverse, but not necessarily high. Environmental justice communities would possibly be disproportionately affected when compared to other affected communities in the study area. | A large number of environmental justice communities would be affected in a wider geographic area. Impacts would be high and adverse and would affect more environmental justice communities than other communities in the study area (disproportionate impact). |

Final design of the R-Project is not complete. Areas of disturbance from R-Project components described in Chapter 2 (e.g., access roads, transmission line tower sites, regeneration sites, structure work areas, wire-pulling, tensioning, and splicing sites, construction yards/staging areas, fly yards and assembly areas, batch plant sites, and borrow areas) have been determined, while others remain conceptual. Areas of disturbance are based on preliminary design (Table 3.1-3). For the purposes of environmental effects analysis, NPPD provided estimates of acreages of temporary and permanent disturbances for each Project component or activity (NPPD 2015a). NPPD assumed a 200-foot-wide transmission line ROW, 100 feet on each side of the centerline of NPPD's final route. This 200-foot-wide ROW and the preliminary design of other Project facilities allowed for some quantification of Project effects for both action alternatives (see Table 3.1-4). These estimates provide an adequate basis for the analysis of environmental effects and at the same time provide NPPD opportunities for additional implementation of avoidance and minimization measures in the final design.

During the final engineering design, the ROW width and the location of structures in the ROW can be adjusted as needed to address resource issues and facilitate compliance with design features and avoidance, minimization, and mitigation measures.

**Table 3.1-3. R-Project 345 kV Transmission Line Alternatives Design Characteristics Comparison**

| Component | Alternative A: Steel Monopole and Steel Lattice Tower Structures | Alternative B: Tubular Steel Monopole Structures Only |
|---|---|---|
| Line length | Approximately 225 miles | Approximately 225 miles |
| Structure type | Steel monopole and steel lattice tower | Steel monopole |
| Structure height | Steel monopole—120 to 175 feet<br>Steel lattice tower—90 to 155 feet | Steel monopole—120 to 185 feet |
| Span length | 1,350 feet | 1,350 feet |
| Number of structures per mile | 4.2 | 4.2 |
| ROW width | 200 feet | 200 feet |

**Table 3.1-4. R-Project 345 kV Transmission Line Alternatives Disturbance Comparison**

| Activity | Description | Estimated Acres | |
|---|---|---|---|
| | | Alternative A | Alternative B |
| **Land Temporarily Disturbed** | | | |
| Structure work areas | 200 x 200 feet (1 acre) per structure for steel monopoles.<br>100 x 100 feet (0.25 acre) per structure for steel lattice towers. | 486 | 825 |
| Wire-pulling, tensioning and splicing sites | 4 acres at each dead-end structure.<br>4 acres along tangents between dead-ends. | 275 | 294[a] |
| Construction yards/staging areas | 9 sites between 17 and 30 acres per site.<br>To be located along existing hard surface access roads and in previously disturbed areas. To be located outside environmentally sensitive areas (i.e., wetlands and special status species habitat). Pads to be graded ad and filled with gravel or geotextile and gravel where required. | 203 | 203 |
| Fly yards and assembly areas | 30 sites between 3 and 16 acres per site.<br>To be located in previously disturbed areas. To be located outside environmentally sensitive areas (i.e., wetlands and special status species habitat). Pads to be graded and filled with gravel or geotextile and gravel where required. | 193 | 0 (helicopters not used for structure erection) |
| Batch plant sites | Use existing batch plant locations. If needed, locate new batch plants in previously disturbed areas and outside environmentally sensitive areas (e.g., wetlands and special status-species habitat). | 0 | 0 (would need batch plants but assumption is the same as Alternative A) |
| Borrow areas | Use existing borrow areas. If needed, locate new borrow pits in previously disturbed areas and outside environmentally sensitive areas (e.g., wetlands and special-status species habitat). | 0 | 0 |
| Temporary access | A minimum of 14 feet wide.<br>Temporary access includes improvements such as blading and where required placement of fill material.<br>Temporary bridges and/or culverts to be installed for stream or wetland crossings would be removed upon completion of construction. Culverts would be installed to maintain the existing hydrology of the drainage. | 258 | 506 |

| Activity | Description | Estimated Acres | |
|---|---|---|---|
| | | Alternative A | Alternative B |
| Distribution power line moves | 28 miles of distribution power line relocation (22 miles overhead; 6 miles underground).<br>Each distribution pole requires a 0.06 acres work area (40 x 60 feet).<br>Underground requires a 6-inch trench.<br>All require temporary access with an assumed width of 14 feet. | 43 | 43 |
| Well relocations | Relocate four existing wells that serve livestock watering tanks and irrigation pivots.<br>Each requires 0.06 acre work area (40 x 60 feet) and approximately 150 feet of underground pipe.<br>14 foot wide travel path is assumed to install underground pipe. | 0.4 | 0.4 |
| | **Temporary Disturbance Subtotal** | **1,458.4** | **1,871.4** |
| **Land Permanently Disturbed** | | | |
| Structure base | Steel monopole (tangent)—40 square feet (7-foot-diameter foundations).<br>Steel monopole (dead-end)—95 square feet (11-foot diameter foundations).<br>Lattice towers (tangent)—64 square feet (16 square feet per leg x 4 legs) | 1.2 | 1.0 |
| Permanent access[b] | Permanent access—blade, fill, surface. Predominantly for substations, operations and maintenance needs, or roads left at landowner's request.<br>Bridges and/or culverts installed for stream or wetland crossings not expected to remain in place upon completion of construction. 14 feet wide. | 26[2] | 51[2] |
| Substations | Gerald Gentleman Substation—expansion within existing footprint.<br>Thedford Substation—13 acres of new permanent disturbance.<br>Holt County Substation—12 acres of new permanent disturbance. | 25 | 25 |

| Activity | Description | Estimated Acres | |
|---|---|---|---|
| | | Alternative A | Alternative B |
| **Permanent Disturbance Subtotal** | | **52.2** | **77** |
| **Other Disturbance** | | | |
| ROW tree clearing | Complete removal of trees and tall brush.<br>Removal methods will employ standard NPPD tree removal methods.<br>Avoid migratory bird nesting season if possible. If not possible, pre-construction surveys will identify migratory bird nests for avoidance. | 49 | 49 |
| **TOTAL** | | **1,559.6** | **1,997.4** |

[a] Location and footprint of wire pulling, tensioning, and splicing sites does not differ between the two action alternatives. Under Alternative A, when fly yard/assembly areas overlapped with wire pulling, tensioning, and splicing sites those disturbance acres were accounted for under fly yard/assembly areas. Because Alternative B does not include fly yard/assembly areas, all disturbances are accounted for under wire pulling, tensioning, and splicing sites in Alternative B.

[b] Permanent access is estimated at 10% of temporary access.

[c] Emergency repairs is estimated at 20% of temporary disturbance.

### 3.1.3 Significance Effects Determination

A determination of significance (e.g., significant effects) was made for those environmental resources determined to have a high intensity impact, as defined in Table 3.1-2, for an extended period. Significance determinations were made assuming all proposed avoidance, minimization, and mitigation measures would be implemented by NPPD. Significant effect determinations are addressed in the Effects Summary at the conclusion of each environmental resource discussion in Chapter 3.

## 3.2 Geology and Soils

**_Ecoregions_**

…denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources.

Nearly all of the study area occurs in the USEPA's Nebraska Sandhills Level III ecoregion (Figure 3.2-1), which covers approximately 20,000 square miles of central Nebraska (Chapman et al. 2001; Schneider et al. 2011). USEPA uses a hierarchical system to subdivide ecoregions using a coarse to finer scale to describe ecosystems and environmental resources in smaller regions of the United States. Portions of the study area also occur in the Northwestern Glaciated Plains, Central Great Plains, and Western High Plains Level III ecoregions (Chapman et al. 2001). The Nebraska Sandhills represents the largest area of sand dunes in the western hemisphere and the largest area of grass-stabilized dunes in the world, comprising one of the most distinct and homogeneous landscapes in North America that is largely devoid of cropland and trees. Size, pattern, and alignment of dunes follow a west-to-east trend (Chapman et al. 2001). Larger dunes in the western portions of the study area may reach up to 400 feet tall and stretch up to 20 miles (Bleed and Flowerday 1998). The sandy, inorganic dune soils only have a thin layer of topsoil containing organic matter.

Source: University of Nebraska, Lincoln

*Sandhills Ecoregion*

Elevation in the study area ranges from 1,970 to 3,940 feet, increasing gradually from east to west. Most of the area occurs as rolling to steep, irregular sand dunes stabilized by grasses and as narrow, elongated, nearly level to gently sloping valleys between the sand dunes. The landscape of the Sandhills can be divided into six main classifications including choppy sands, sands, sandy areas, subirrigated meadow, lakes and wetlands, and blowouts. Choppy sands occur among dunes with steep slopes (greater than 20 percent). On these slopes, gravity creates slippage on the surface soils, exposing the underlying sand along the dune hillside. Areas referred to as sands occur on gently rolling hills and valleys with slopes that are more gradual than the slopes of choppy sands. Sandy areas exist between dunes and are essentially flat with slopes of less than 3 percent. Subirrigated meadows occur between the dunes where the groundwater is close enough to the surface to allow plant roots to reach it. Lakes and wetlands are scattered throughout the Sandhills forming in the interdunal regions where the land's elevation dips below the level of the water table. Blowouts are sandy areas where rapid wind erosion "blows out" a hole in the surface of the landscape.

Blowouts, a form of wind erosion, of various sizes are scattered throughout the Sandhills ranging from a few feet in circumference to a few hundred feet (USDA 2015). The eastern portion of the study area is mainly rolling hills intersected by stream valleys (Schneider et al. 2011).

> ***Biologically Unique Landscapes***
>
> BULs designated by the Nebraska Natural Legacy Project fall within the study area.

Level IV ecoregions that fall in the study area include the Sandhills, Wet Meadow and Marsh Plain, Lakes Area, Central Nebraska Loess Plains, Platte River Valley and Terraces, Platte River Valley, Holt Tablelands, Moderate Relief Plains, and Flat to Rolling Plains (Figure 3.2-1) (Chapman et al. 2001). Most of the study area is in the Sandhills Level IV ecoregion with moderate portions in the Wet Meadow and Marsh Plains in the northwest portion of the study area and portions of the Lakes Area ecoregion scattered in the northern and western portion of the study area (Chapman et al. 2001). The remaining Level IV ecoregions occur only in minor amounts in the far northeastern and southwestern corners of the study area (Chapman et al. 2001). The Level IV ecoregions are described below.

The Sandhills Level IV ecoregion has expansive areas of sand sheets and undulating fields of grass-stabilized sand dunes. The Lakes Area Level IV ecoregion is located in the northwestern portion of the study area and consists of long linear dunes with interdunal valleys. Farther east in the study area, the Wet Meadow and Marsh Plain Level IV ecoregion marks a transition from the dune topography and fine sandy soils of the Sandhills to the south and west to a flat, sandy plain that is more gravelly and loamy to the east and north (Chapman et al. 2001; Schneider et al. 2011). This eastern portion is much flatter, while low-profile rolling sand dunes with interspersed marshes and lakes are scattered throughout the area (Schneider et al. 2011).

The Holt Tablelands Level IV ecoregion is a transitional area between the loamy, glaciated regions with loess soils to the east and the Sandhills in the west and south. The Moderate Relief Plains Level IV ecoregion consists of irregular plains and slopes greater than the surrounding flat and rolling plains of the surrounding ecoregion. Soils are silty and clayey loams, formed from eolian sediments (wind transported soil deposits), shallower than the thicker loess-capped uplands in the surrounding ecoregions. The Flat to Rolling Plains Level IV ecoregion consists of flat and rolling plains that are smoother, more level, and generally have thicker loess-mantled uplands than other surrounding ecoregions. The North and South Platte Valley and Terraces Level IV ecoregion is part of the extensive Platte River system. Runoff from historically large volumes of water from spring snowmelt that deposited silty and sandy alluvium in the floodplain created a wide alluvial valley and associated terraces. The Central Nebraska Loess Plains Level IV ecoregion consists of rolling dissected plains that have a deeper, calcareous, loess layer than adjacent ecoregions. The Platte River Valley Level IV ecoregion is a flat, wide alluvial valley with shallow, braided stream channels on a sandy bed (Chapman et al. 2001).

The climate of the Nebraska Sandhills is semi-arid with annual precipitation ranging from 23 inches per year in the eastern portions to 17 inches per year in the western portions. Approximately 75 percent of the precipitation falls between April and September with 50 percent occurring in May, June, and July (Bleed and Flowerday 1998). Snowmelt and summer rainfall provides an important source of groundwater recharge throughout the region. Temperature varies with cooler temperatures observed in the western portion and warmer temperatures in the eastern

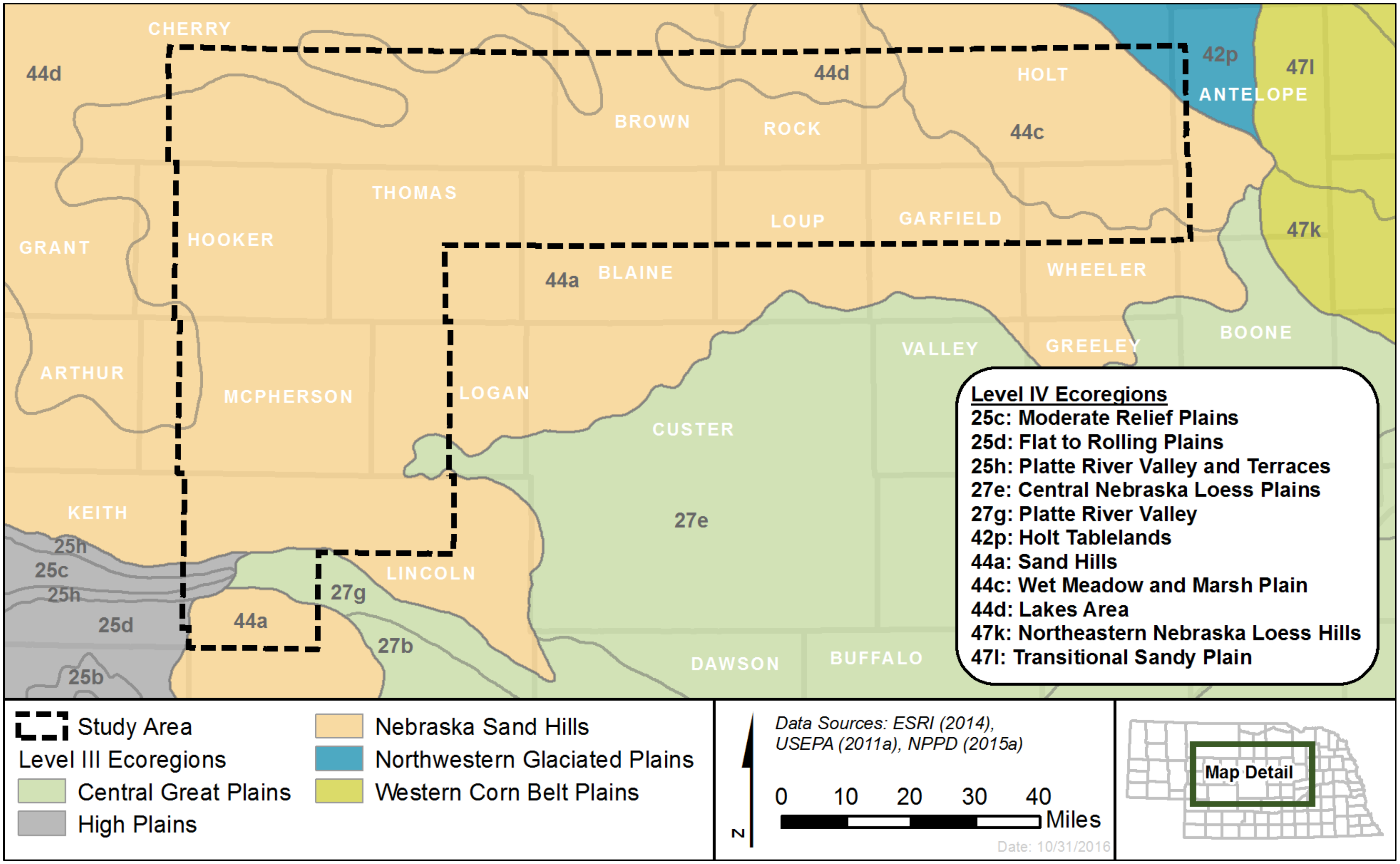



**Figure 3.2-1. Level III and Level IV Ecoregions in the Study Area**

portion. The average freeze-free season in the east is 150 days, compared to 120 days in the west (Bleed and Flowerday 1998). When averaged across the Sandhills, summertime high temperatures average 88 degrees Fahrenheit (°F), and wintertime lows average 9°F (Schneider et al. 2011).

The disparity in precipitation from east to west, as shown in Figure 3.2-2, can be indirectly observed by noting the density of wetlands in the Wet Meadow and Marsh Plain Level IV ecoregion (located in the eastern portion of the study area) versus the relatively dry areas of the Sandhills Level IV ecoregion (located in the western portion of the study area) (Chapman et al. 2001).

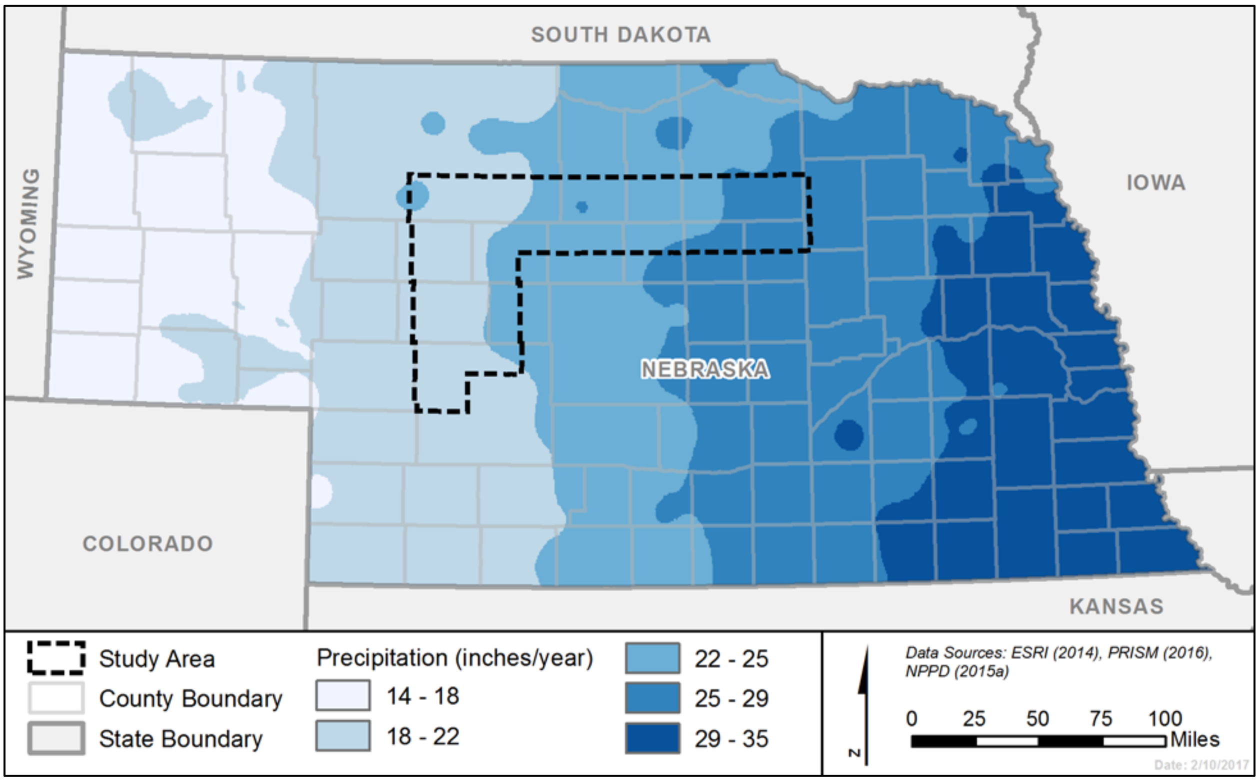



**Figure 3.2-2. Nebraska Precipitation**

### 3.2.1 Affected Environment

Most of the state is of Tertiary-aged bedrock that is of Pliocene age covered by Quaternary deposits along with glacial till, loess, and the Sandhills. Glacial till is present in southeast Nebraska, south of the Loup River to the Kansas state line. Loess is present from the town of Greeley to the Loup River. The Sandhills comprises mainly well-sorted sands present in dunes and sand sheets stabilized by existing vegetation. The Sandhills are geologically young, having several major episodes of dune formation occurring over the past 13,000 years. These dunes are poorly developed and have only a thin layer of topsoil that contains little organic matter. The fragile, sandy soils of the Sandhills ecoregion are susceptible primarily to wind erosion and potentially water erosion if they become denuded of vegetation, so disturbed areas need to be appropriately stabilized and restored.

The Ogallala Aquifer, which underlies the entire study area, is supplied mostly by rainwater and snowmelt that infiltrates through sandy soils rapidly, then accumulates on a confining layer such as clay or bedrock. The aquifer yields significant quantities of water and is a large source of groundwater (Schneider et al. 2011). Groundwater at or near the ground surface occurs throughout the year with most groundwater recharge occurring during larger precipitation events in the spring (Bleed and Flowerday 1998). Groundwater depth in the study area ranges from the surface for Sandhills lakes and wetland areas to depths of greater than 400 feet below the surface at the peak of the sand dunes. In the Nebraska Sandhills ecoregion, flatter areas are dominated by subirrigated meadows and wetlands and low-profile rolling sand dunes with interspersed marshes and lakes that are scattered throughout the area (Schneider et al. 2011).

***Blowouts***

…are a form of wind erosion that can form from human-caused disturbances and from natural processes.

Blowouts, a form of wind erosion, are a natural occurrence in the Sandhills. However, blowouts can also form from human-caused disturbances, such as impacts associated with cattle grazing, vehicle travel, and other activities that disturb vegetation and soil. Blowouts develop when vegetative cover is removed and sand is blown from the exposed windward side of the slope to be deposited onto the leeward side. As the erosion becomes more active and the blowout deepens, roots of the adjacent vegetation are exposed, until whole plants blow away. As the crater deepens, adjacent sands fall into the depression creating sharp, steep edges. These edges, caused by the sliding sand, catch the wind and cause increased turbulence acting to scour the already exposed soil, breaking more sand particles free, thus growing the blowout. Loose sand is quickly blown out and deposited on the leeward side of the crater (Stubbendieck et al. 1989). Blowouts are a naturally occurring part of the Sandhills landscape and provide habitat for rare plants, including the blowout penstemon (*Penstemon haydenii*).

The vast majority of the study area is rangeland, which correlates to the overall Sandhills regional characteristics. A major soil resource concern on rangeland is wind erosion in areas where the plant cover has been depleted by disturbances, including range fires, vehicle operation, and/or overgrazing as well as natural factors including drought and grasshopper infestations. Conservation practices on rangeland generally include proper range management and improvement practices, such as proper grazing use, deferment or rest periods, planned grazing systems, range seeding or interseeding (infrequent), and weed control.


Source: NGPC

*Sandhills blowout with blowout penstemon growing in the foreground*

Small areas of irrigated cropland occur in the study area, but these areas are rare because of the unsustainable, inorganic nature of the sandy soils. The major soil resource concerns on cropland are wind erosion, maintenance of organic matter content, soil cultivation, and soil moisture management (USDA 2006). Conservation practices on cropland are cropping systems that include high-residue crops, systems of crop residue management (such as no-till and mulch-till systems), irrigation water management, and nutrient management.

#### 3.2.1.1 Geology

As discussed earlier, the Sandhills are geologically young, and several major episodes of dune formation have occurred over the past 13,000 years. These dunes are poorly developed and only a thin layer of topsoil that contains little organic matter. The underlying bedrock in the entire study area consists of the Tertiary-aged Ogallala Group. The tertiary rocks of Nebraska are of continental origin and do not lie in a regular parallel sequence on Cretaceous formations in the central and western areas of the state. Their combined thickness in the western counties is 4,000 to 5,000 feet but decreases rapidly eastward. The Cretaceous system lies unconformably (i.e., not in a regular parallel sequence) on pre-Cretaceous rocks. The Cretaceous formations are mostly of marine origin from fresh water continental deposits (Condra and Reed 1959).

The Ogallala Group, composed of a poorly sorted mixture of sand, silt, clay, and gravel, generally is unconsolidated or weakly consolidated, but it contains layers of sandstone cemented by calcium carbonate. The maximum thickness of the Ogallala Group is 800 feet (Bleed and Flowerday 1989). The underlying geology varies across the Level IV ecoregions; in the Sandhills, it consists of Miocene soft sandstone overlain by eolian (windblown) dune sand and Pliocene and Pleistocene alluvial silt, sand, and gravel. Wet Meadow and Marsh Plain consists of Miocene soft sandstone overlain by eolian dune sand and sand sheets, and Pliocene and Pleistocene alluvial silt, sand, and gravel. The Lake Area consists of eolian dune sand and Pliocene and Pleistocene alluvial silt, sand, and gravel over Miocene soft sandstone. The underlying geology of the Moderate Relief Plains consists of Miocene sandstone and the Flat to Rolling Plains are underlain by sandstone and siltstone with a thin loess mantle. The North and South Platte Valley and Terraces consist mostly of Oligocene siltstone with some Miocene sandstone, and the Central Nebraska Loess Plains consists entirely of tertiary sandstone. The Platte River Valley is underlain by Quaternary and tertiary unconsolidated sand and gravel and the Holt Tablelands consist of Miocene soft sandstone (Chapman et al. 2001).

Surficial geology includes landforms and the unconsolidated materials that lie beneath them. The main surface material from east to west is described briefly below and shown in Figure 3.2-3. Alluvial silt, clay, sand, and gravel occurs on the floodplains of the Platte, Loup, and Elkhorn rivers in all of the counties that are crossed by the study area, except for Logan and McPherson counties. Alluvial sand, silt, clay, and gravel occurs only in the portion of the study area in Cherry County. Dune sands in Blaine, Brown, Cherry, Garfield, Holt, Hooker, Lincoln, Logan, Loup, McPherson, Rock, Thomas, and Wheeler counties include linear dunes, compound and complex barchans dunes (i.e., crescent shaped dune), compound and complex barchanoid ridge

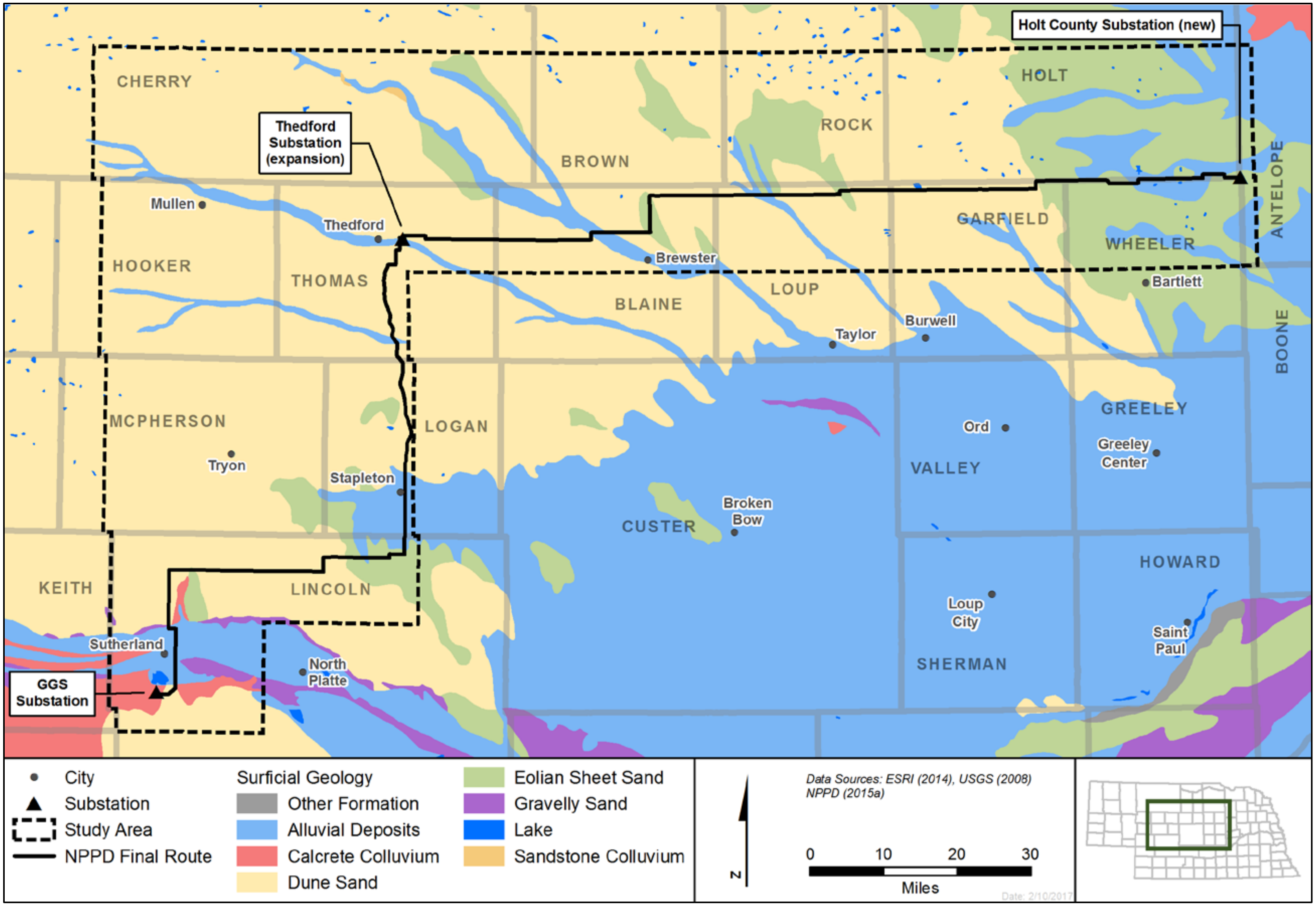



**Figure 3.2-3. Surficial Geology in the Study Area**

dunes, parabolic dunes, and dome dunes that differ in structure, shape, length, and height ranging from 25 meters to 1.5 kilometers in length and 15 to 45 meters in height. Eolian sheet sands are similar to dune sands but occur chiefly as a blanket-like deposit. Calcrete and granitic clast loamy to gravelly colluvium (i.e., unconsolidated sediments that have deposited at the base of hillslopes) includes bedrock outcrops and small areas of locally derived alluvium (i.e., loose, unconsolidated soil or sediments eroded and shaped by water and redeposited) in Lincoln County along the North and South Platte rivers. Sandstone clast fine sandy colluvium includes bedrock outcrops and local alluvium in Cherry County along the North Loup River. Gravelly sand of the Platte, North Platte, and South Platte River terraces occurs in Lincoln County along the North and South Platte rivers. Lakes include Hagan Lake, Swan Lake, Goose Lake, Sutherland Reservoir, Nichol Lake, and Whitewater Lake (Swinehart et al. 1994).

#### 3.2.1.2 Mineral Resources

The main mineral resource in the study area is aggregate (sand, gravel, and silt) found at abandoned, inactive, and active mineral mines/quarries in the study area. The mineral resources are used for road building and construction, fill material, well packing, and concrete. Currently, no oil, natural gas, or coal operations occur in the study area (University of Nebraska, Lincoln 2015).

#### 3.2.1.3 Soils

Soil characteristics for the study area were evaluated using data obtained from the NRCS soil surveys and the Soil Survey Geographic (SSURGO) database (USDA 2016). This included the soil surveys and SSURGO data of Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, Blaine, Rock, Loup, Holt, Garfield, Antelope, Boone, and Wheeler counties (USDA 1965–1993; USDA 2015).

> ***Soil Associations***
>
> …in the Sandhills are directly related to topographic areas such as rolling sand dunes, hilly sand dunes, and Sandhill valleys.

The dominant soil orders in the Sandhills are Entisols (i.e., soils that do not show any profile development other than an A horizon) and Mollisols (i.e., soils with deep, high organic matter, nutrient-enriched surface soil). Soils in the Sandhills are generally very deep, excessively to somewhat poorly drained, and often undeveloped, with most being excessively drained. The rolling to hilly sand dunes that are common in this area have been stabilized by the existing vegetative cover. When disturbed, the fragile nature of the soils can profoundly affect vegetation composition and succession in this system if topsoil is removed and recovery is low as in soils with a low tolerance of soil loss. On a coarse scale, the system may be divided into riparian, sands, choppy sands, and dry valleys. Soil type shift from sands in the west and on uplands to sandy loams and loams farther east and in floodplains.

##### Soil Associations

The USDA and University of Nebraska, Lincoln have divided the soils of the Sandhills into five primary soil associations for broad interpretive purposes (University of Nebraska, Lincoln 2014).

A soil association is a grouping of several soil series geographically associated in a characteristic repeating pattern. Soil associations in the Sandhills are directly related to topographic areas such as rolling sand dunes, hilly sand dunes, and Sandhill valleys (Bleed and Flowerday 1998). Soil associations consist of one or more major soils and minor areas of secondary soils that are not identified in the name.

Four of the five primary Sandhills soil associations are located in the study area (see Table 3.2-1 and Figure 3.2-4). The primary soil association in the study area is the Valentine Association. Secondary soil associations (associations greater than 5 percent of the study area) in the study area are the Loup-Ipage-Elsmere Association, Valentine-Dunday Association, Valentine-Els Association, and Valentine-Ipage-Els Association.

**Table 3.2-1. Soil Associations in the R-Project Study Area**

| Soil Association | % of Study Area |
|---|---|
| Valentine | 62 |
| Valentine-Ipage-Els | 14 |
| Valentine-Els | 10 |
| Valentine-Dunday | 6 |
| Loup-Ipage-Elsmere | 5 |
| Holdredge-Detroit-Butler | 1 |
| Hord-Dunday-Cozad-Anselmo | <1 |
| Hord-Hobbs-Cozad | <1 |
| Kuma-Keith-Goshen | <1 |
| Loup-Elsmere-Dunday-Almeria | 1 |
| Loup-Leshara-Inavale-Boel-Barney-Almeria | <1 |
| Orwet-Lawet-Elsmere | <1 |
| Platte-Gothenburg | <1 |
| Silver Creek-Humbarger variant-Caruso | <1 |
| Simeon-Paka-Brunswick | <1 |
| Thurman-Paka-Boelus-Bazile | <1 |
| Tripp-Cheyenne-Bridget-Bayard-Alice | <1 |
| Uly-Holdrege-Coly | <1 |
| Ulysses-Otero-Colby-Canyon | <1 |
| Valentine-Hersh | <1 |
| Valentine-Holdredge-Hersh | <1 |
| Valentine-Simeon-Dunday | <1 |
| Valentine-Thurman | <1 |
| Valentine-Thurman-Nora-Boelus | 1 |
| Wann-Lex-Lawet | <1 |

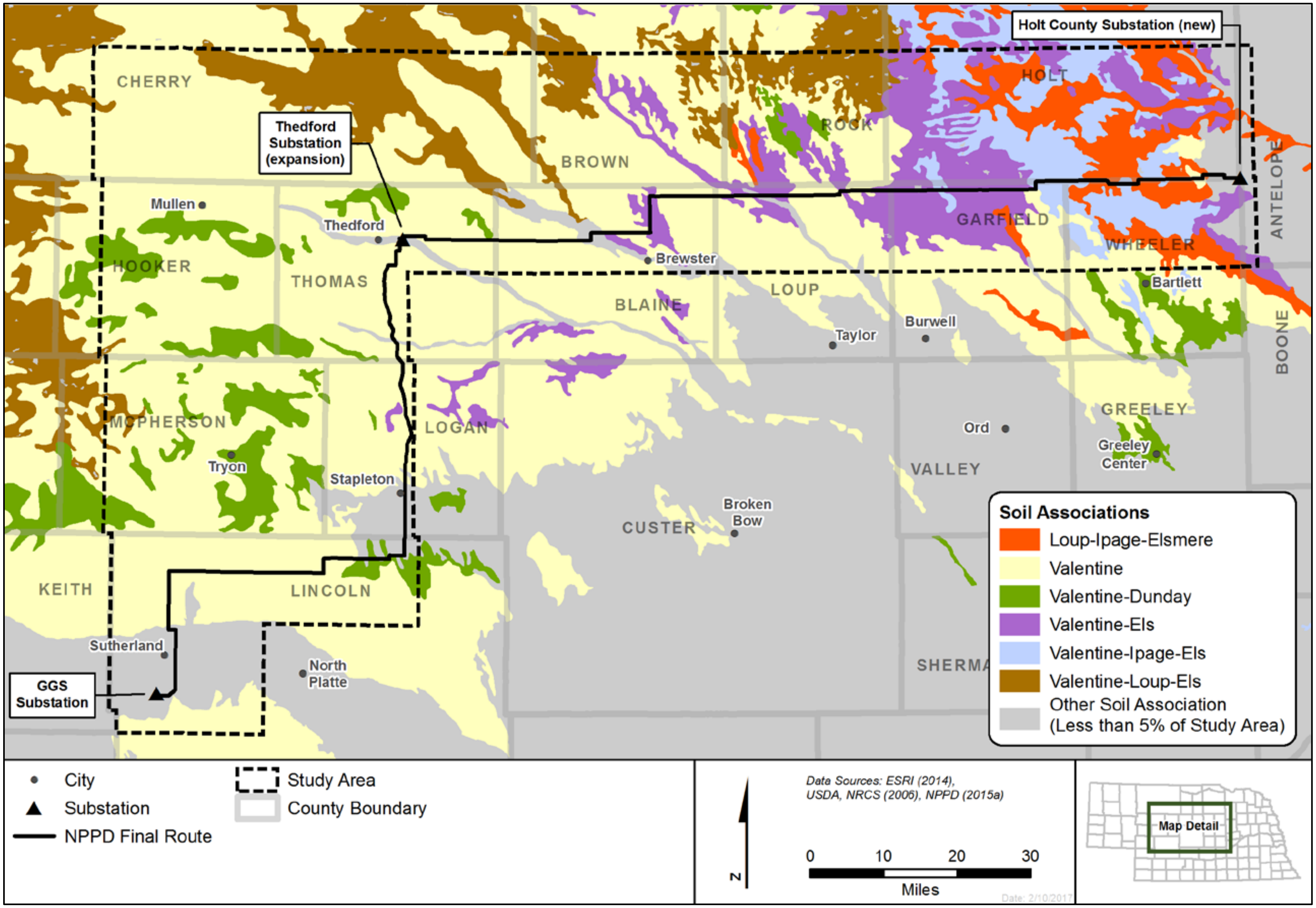



**Figure 3.2-4. Soil Associations in the Study Area**

The Valentine Association soils are deep, excessively drained, sandy soils occurring on dunes on nearly level to very steep surfaces with slopes ranging from 0 to 45 percent. Soil blowing is a serious hazard on the Valentine Association soils.

The Valentine-Ipage-Els Association soils are deep, excessively to somewhat poorly drained sandy soils on nearly level to rolling uplands in Sandhills valleys with slopes ranging from 0 to 24 percent. The association consists of soils on hummocks and dunes in the Sandhills and in the intervening wet valleys. The Sandhills dunes are generally oriented in a northwest-to-southeast direction. Valentine soils formed in sandy eolian material and Els and Ipage soils formed in sandy eolian and alluvial material. This soil association has negligible to low runoff depending on the slope. Wind erosion is a serious hazard on these soils, particularly in cultivated areas.

The Valentine-Els Association soils are deep, nearly level to very steep, excessively drained and somewhat poorly drained, sandy soils on uplands and in Sandhills valleys. The association consists of steep, hummocky Sandhills and intervening valleys and swales with slopes ranging from 0 to more than 30 percent. The soils in this association formed in windblown sand and alluvium.

The Valentine-Dunday Association soils are nearly level to rolling, excessively drained and somewhat excessively drained, sandy soils on Sandhills and in valleys. The association occurs on rolling sand dunes in the narrow to broad, intervening valleys with slopes ranging from nearly level in the valleys to strongly sloping on the dunes. The dunes and valleys have an east-west or northwest-southwest orientation. Valentine soils are mostly on rolling dunes and Dunday soils are in valleys.

The Loup-Ipage-Elsmere soils are deep, nearly level and very gently sloping, moderately well-drained to very poorly drained, sandy and loamy soils formed in eolian and alluvial sands occurring on bottom land, stream terraces, and in Sandhills valleys. The association consists of soils on bottom lands on stream terraces along the major streams and in Sandhills valleys with slopes ranging from 0 to 3 percent.

Twenty additional soil associations (Table 3.2-1) are located in the study area but together cover less than 5 percent of the study area (USDA 2015).

### Erosion Potential

The soil characteristics of wind erodibility, K Factor, T Factor, and slope were used to evaluate erosion potential. In general, soil susceptibility to water erosion is relatively low because of the highly permeable nature of sandy soils, except where slopes are steep. Wind erodibility indicates the potential for wind erosion based on slope, soil types, and wind characteristics. The SSURGO database divides wind erodibility into eight categories, and it is assumed that Groups 1 through 4 represent highly 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). The range for Groups 5 through 8 is from 56 to 0 tons per acre per year.

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 (DOE 2003). 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.

The soil 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. The factor of 1 ton per acre per year is for shallow or otherwise fragile soils and 5 tons per acre per year is for deep soils that are least subject to damage by erosion. The analysis for the R-Project used a loss tolerance of 2 tons per acre per year as a guideline.

Soil disturbance on steep slopes would be more prone to soil erosion. To assess R-Project areas with steep slopes, a slope inclination of 15 percent or greater was used to define steep slopes for the R-Project.

Table 3.2-2 shows the soil erosion factors for the study area. Nearly all soils in the study area are highly wind erodible at 97 percent. The percent of soils in the study area with a high K Factor is 2 percent, with a low T Factor is less than 1 percent, and with steep slopes is 4 percent. Wind erodibility is the major soil erosion factor in the study area.

**Table 3.2-2. Soil Erosion Factors in the R-Project Study Area**

| Total Analysis Acreage[a] | Erosion Factors (percent of area) | | | |
|---|---|---|---|---|
| | Highly Wind Erodible[b] | High K Factor[bc] | Low T Factor[d] | Slopes Greater than 15%[e] |
| 4,512,192 | 97 | 2 | Less than 1 | 4 |

[a] Includes acreage within the study area
[b] Includes wind-erodibility groups equal to and greater than 86 tons per acre per year
[c] Includes K Factors equal to and greater than 0.37 ton per acre per year
[d] Includes T Factors equal to and less than 2 tons per acre per year
[e] Slope percentage data from SSURGO

### Prime Farmland

According to the USDA (7 CFR § 657.5(a)(1)), prime farmland contains soils with the best physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops. 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.

Source: The Fence Post

*Row Crop Farmland*

Table 3.2-3 shows the percentage of prime farmland, prime farmland if drained, prime farmland if irrigated, and farmland of statewide importance in the study area as mapped by USDA. The combined amount in the study area of prime farmland (2 percent), prime farmland if drained (<1 percent), and prime farmland if irrigated (<1 percent) is 3 percent. The amount of farmland of statewide importance is 1 percent. The State Conservationist can designate specific soil map units as farmland of statewide importance. The prime farmland is primarily located in Antelope, Lincoln, and Logan counties and at the very eastern end of the R-Project in Holt County. The prime farmland if drained is located in Antelope, Cherry, Holt, Lincoln, Logan, and Wheeler counties. The prime farmland if irrigated is located in Blaine, Brown, Cherry, Lincoln, Logan, Loup, McPherson, and Thomas counties. The farmland of statewide importance is located in a few scattered areas in Antelope, Blaine, Cherry, Lincoln, Logan, Loup, Brown, Holt, McPherson, Rock, Thomas, and Wheeler counties. Prime farmland should be assessed by evaluating whether the proposed uses (i.e., proposed transmission line) would have the same long-term, positive impact on the local economy as crop production.

**Table 3.2-3. Prime Farmland in the R-Project Study Area[a]**

| Total Analysis Acreage | Sensitive Soils (percent of area) | | | |
|---|---|---|---|---|
| | Prime Farmland | Prime Farmland if Drained | Prime Farmland if Irrigated | Farmland of Statewide Importance |
| 4,512,192 | 2 | Less than 1 | Less than 1 | 1 |

[a] Prime farmland data from SSURGO

### Soil Restoration Potential

Soil restoration potential indicates the ability of the soil to recover from degradation, which is often referred to as soil resilience. The ability to recover from degradation means the ability to restore functional and structural integrity after a disturbance. Several soil factors were used to evaluate the soil's restoration potential for the R-Project, including soil compaction potential, droughty soil, and hydric soil.

Soil compaction tends to reduce water infiltration, which 1) affects plant production and composition, 2) increases runoff (generally resulting in increased erosion rates), and 3) affects organisms living in the soil. Compaction is predominantly influenced by moisture content, but it is also influenced by depth to saturation; percent of sand, silt, and clay; soil structure; organic matter content; and content of coarse fragments. Although all soil is susceptible to compaction to varying degrees, wet soils are more readily compacted than dry, and clay loam or finer soils with poor drainage characteristics were assumed to be highly compaction prone. As a conservative measure, it was assumed that if the soil is disturbed by construction equipment or operations vehicles, there is at least some potential for soil compaction. For purposes of this analysis, highly compactable soils are defined as fine-textured soils (sandy clay, silty clay, and clay) (Soil Survey Division Staff 1993) and soils with somewhat poorly drained to very poorly drained characteristics. The amount of compaction-prone soils located in the study area is small, and no highly compaction-prone soils are present within the study area.

Droughty soils contain a texture of sandy loam or coarser and are moderately to excessively well drained. Because of their low water-holding capacity, droughty soils may not hold enough water in the root zone to support plant life, making revegetation difficult. For purposes of this analysis, a soil was considered droughty if it is considered coarse-textured (sands and loamy sands) (Soil Survey Division Staff 1993) and has a drainage class of moderately to excessively well drained.

Hydric soils are formed under saturation, flooding, or ponding for a sufficient period to develop anaerobic characteristics in the upper soil horizon. Hydric soils, combined with surface water or shallow groundwater and indicative vegetation species, are necessary indicators of wetlands (see Section 3.4, *Wetlands*). Disturbance of hydric soils may result in decreased water storage capacity of soil, decreased soil porosity, and decreased ability to replace hydrophytic vegetation. The primary hydric soil types in the study area include the following: Tryon loamy fine sand, Loup fine sandy loam, Marlake soils, Gothenburg soils, Almeria soils, and Fluvaquents.

Table 3.2-4 shows the soil restoration factors in the study area. No highly compaction-prone soils are located in the study area because no fine-textured soils exist in the study area. A vast majority (82 percent) of the soils are considered droughty because of the high percentage of coarse-textured soils in the study area and could have limited success of vegetation restoration vegetation if disturbed. All hydric soils make up 4 percent of the study area and predominantly hydric soils make up less than 1 percent of the study area.

**Table 3.2-4. Soil Restoration Factors in the R-Project Study Area**

| Total Analysis Acreage | Factors Affecting Restoration (percent of area) | | | |
|---|---|---|---|---|
| | Highly Compaction Prone[a] | Droughty[b] | All Hydric Soils[c] | Predominantly Hydric Soils (66–99% hydric)[c] |
| 4,512,192 | 0 | 82 | 4 | Less than 1 |

[a] Includes moderately to poorly drained soils with fine-textured soils (sandy clay, silty clay, clay)

[b] Includes coarse-textured soils (sands and loamy sands) and moderately to excessively well-drained soils

[c] All hydric and predominantly hydric soils data from SSURGO, which includes overlap with NWI wetlands

### 3.2.2 Direct and Indirect Effects

The analysis of geology and soils considered changes in surface and underground geologic resources, mineral resources, soil productivity and stability, and sensitive soils that could occur as a result of the implementation of various R-Project activities. Activities related to construction, operation, and maintenance that could occur are described in detail in Chapter 2. Mitigation practices that would decrease the severity of impacts on geology and soils from construction, operation, and maintenance activities are discussed in Section 3.2.3, *Avoidance, Minimization, and Mitigation Measures*.

Each alternative was analyzed based on the likelihood of effects on geologic and soil resources described in the Affected Environment section. The area analyzed to determine effects on geology and soils includes the areal extent of geologic resources and soil resources in the Project area, defined in Table 3.1-1. The beneficial effects on geology and soils from the protection of lands to mitigate effects from the taking of the beetle were also considered in the analysis. The area of analysis may extend beyond the Project area boundaries for some indirect impact assessments.

The potential direct and indirect and short- and long-term effects on geology and soils from implementation of the R-Project are described below. Direct, adverse impacts on geology and soils are assessed and measured in terms of areal extent (e.g., acres) where R-Project activities occur and could cause the direct loss of geologic and soil resources as a result of clearing, grading, excavation, backfilling, and restricting access to aggregate mineral resources. Short-term effects are those that may affect geology and soils during construction of the R-Project and long-term effects are those that would persist throughout the life of the R-Project. The intensity of effects under each alternative is categorized as low, moderate, or high, according to the threshold criteria described in Section 3.1. Restoration of geology and soils disturbed or affected by construction, operation, and maintenance activities was considered when analyzing effects on geology and soils in addition to beneficial effects on geology and soils.

The following parameters were considered when assessing effects on geology and soil resources:

- The areal extent of geologic resources, including surficial and underground geologic resources and mineral resources, in the Project area and in the region
- The amount of geologic resources, including surficial and underground geologic resources, that would be disturbed temporarily and permanently from construction, operation, and maintenance of the R-Project
- Existing mineral extraction operations in the Project area and in the region
- The areal extent of soil resources, including prime farmlands and other important farmland soils, in the Project area and in the region
- The amount of soil resources, including prime farmland and other important farmland soils, that would be disturbed temporarily and permanently from construction, operation, and maintenance of the R-Project

#### 3.2.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect geology and soils or change surface geology, underlying bedrock geology, mineral resources, sensitive soils, and prime farmlands.

#### 3.2.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent implementation of the R-Project along NPPD's final route under Alternative A would result in direct effects on geology and soils in the study area in the short and long term. Specific effects on geology and soils from various construction, operation, and maintenance activities under Alternative A are described below.

**Direct Effects**

Under Alternative A, effects on geology, mineral resources, and soils in and adjacent to the Project area would be short and long term and would vary in intensity from low to moderate. Short-term effects would be temporary in nature and, following construction, would be reclaimed and revegetated. Long-term impacts would occur in areas where structures, surface facilities, or long-term access roads would be located for the duration of the R-Project. The avoidance, minimization, and mitigation practices discussed below would minimize the short- and long-term effects of the R-Project.

***Geology***

Direct effects on geology resulting from the construction of the R-Project under Alternative A would consist of the displacement of soil for monopole structure foundations and alteration of geologic features from earth-moving activities during construction. Most of the Project area would be within areas where bedrock is buried by unconsolidated sediments consisting of sand dunes and sand sheet, alluvial silt, sand, loess, glacial till, and gravel. Based upon soil borings and available soils data, the overburden layer of sands, silt, and gravel is expected to be thicker than the depth of the deepest foundations. In these areas, no effects on bedrock are expected. Generally, R-Project construction would require little disturbance to surficial geology and would not affect geologic formations throughout the Project area.

The construction of the R-Project would result in disturbance at intervals along the ROW for the placement of steel monopoles or lattice towers; additional disturbance would occur during the construction of the Holt County Substation and expansion of the Thedford Substation. Consequently, impacts on geology would be limited to these sites and would involve minimal disturbances of subsurface rock during drilling and use of augers to prepare foundation holes and the foundations for the substation sites. No excavation to bedrock is expected.

Borings for monopole structure foundations would extend approximately 20 to 40 feet below the surface with approximately 4.25 structures per mile. Displaced soil would be used for backfilling around structure foundation with excess material removed from the site. 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 because of compaction near unimproved roadbeds and on sensitive landscapes, especially if these impacts occur in areas where compaction-prone soils occur. However, the amount of compaction-prone soils in the Project area is small and no highly compaction-prone soils exist within the Project area.

In some areas, NPPD may use helicopter-aided construction to minimize ground disturbance, thereby reducing the need for blading typically necessary to develop vehicle access to structure locations. As a result of incorporating avoidance, minimization, and mitigation measures, effects on geology would be reduced from the already expected low- intensity levels.

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

### *Mineral Resources*

Although the R-Project would not cross any active mines or quarries, construction, operation, and maintenance could limit access to newly discovered aggregate resources located within the width of the ROW and prevent the mineral owner from developing those minerals in the future in that limited area. The fact that the R-Project avoids mineral-producing sites reduces potential impacts associated with lack of access to mineral resources; however, it is possible that undiscovered mineral resources may exist directly underneath the ROW, and some types of resources would not be practically accessible for the life of the Project. The types of minerals that would be affected would be near-surface mineral material deposits (e.g., sand, gravel, and silt). The acreage of deposits covered by the ROW would be minimal when compared to the amounts available for extraction throughout the study area. If other types of resources, such as oil and gas, are discovered under the ROW, those resources could potentially be accessed despite the presence of the transmission line, for instance through directional drilling.

The Project is not expected to preclude or restrict access to mineral resources. A direct, short-term, low-intensity effect 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 and amount to road closures or other access restrictions while construction is conducted in a given area.

No coal-resource mining operations occur in the Project area, and the ROW would not cross active oil and natural gas wells; therefore, operation of the Project would not affect mineral extraction.

### *Soils*

In general, the lattice tower and monopole construction impacts would be short term and localized; however, direct, long-term effects on soils would result from the loss of surface lands and soil productivity and quality from installing structure foundations, substations, and regeneration sites. Helical pier foundations would be used for lattice tower structures and would require fewer pieces of equipment, a smaller temporary structure work area, and less improved access to each structure than traditional foundations on steel monopole structures. Helical pier foundations do not require excavation, and no spoils need to be removed from the site, and thus the use of these structures minimizes disturbance. Approximately 25 acres of soils would be permanently affected to accommodate the Thedford and Holt County substations. However, impacts on soils at these sites, while permanent, would be localized and not extend beyond the boundaries of the substations. In total, approximately three regeneration sites would be required for the R-Project. In most cases, the regeneration sites would be located in the ROW and typically would be housed in an enclosed cabinet that will measure approximately 72 inches high by 45 inches wide by 27 inches deep. Impacts on soils at structure locations and substation sites would be long term and of low intensity.

Short-term, low- to moderate-intensity effects would occur in the ROW from construction traffic along the ROW and construction traffic along access routes and other ancillary construction sites. 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. 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 has the potential to degrade soil quality and productivity exposes the bare soil to the erosive forces of wind and water until vegetation or other ground cover is established. Modifying vegetation types (e.g., converting a forested area to grass) 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. However, the percentage of soils with a low tolerance of remaining productive following disturbance is small within the Project area. The ability of the soil to be productive following disturbance is addressed below.

Potential impacts on soils under Alternative A would include soil compaction and rutting, leading to accelerated soil erosion and an increased potential for erosion occurring on adjacent lands from either vehicle disturbances associated with construction activities or accelerated runoff resulting from the creation of impermeable surfaces. Operating motorized vehicles on moist soils, especially heavy equipment, is likely to compact the surface layer, which may increase runoff, decrease infiltration and aeration, and reduce soil productivity by making it more difficult for plant roots to establish or obtain soil moisture and nutrients. Because of the high prevalence of sand in the Project area, none of the soils are highly compaction prone, as indicated in Table 3.2-7. Rutting and/or soil mixing could also occur when soils are moist. The process of rutting reduces the aeration and infiltration of the soil, thereby reducing soil productivity. Rutting also disrupts natural surface water hydrology by damming surface water flows or by diverting and concentrating water flows creating accelerated erosion. If soil is compacted or rutted, it would need to be ripped, loosened, or otherwise treated at the end of the Project to restore its productivity, but the need for these activities is anticipated to be short term and of low intensity.

Grading and leveling would be required to construct structures and substations and for temporary work areas, staging areas, fly yards, and batch plants. During construction, the soil profiles would be mixed with a corresponding loss of soil structure. Soil mixing typically results in a decrease in soil fertility and a disruption of soil structure. Where the topography is relatively flat and grading occurs, it would be limited to the upper subsurface soil horizons. Where cut and fill slopes occur, the soil profiles would be mixed with a corresponding loss of soil structure. NPPD has developed avoidance and minimization measures to prevent topsoil mixing with subsoil and to promote successful revegetation following temporary disturbance. Examples include restoring temporarily disturbed areas and locating temporary work areas in previously disturbed areas. Erosion from disturbed areas would be minimal once vegetation is reestablished.

Direct, short-term, low-intensity impacts on soil resources would include the crushing of surface cover in the ROW (e.g., vegetation and duff, litter). Where woody material is chipped and left on the ROW, it may act as erosion control; however, the effects of wood chip additions greater than 3 inches on the soil resource include increased soil temperature in the winter, a moderate increase in soil moisture, and substantial decrease in soil nitrogen supply and understory vegetation. Although the increase in soil temperature and soil moisture would have relatively minor ecological effects, reductions in the soil nitrogen supply may temporarily reduce productivity of the soil and affect revegetation rates (Binkley et al. 2003). With increasing depth of wood chips, these impacts would increase in magnitude and duration.

To minimize ground disturbance, NPPD would use existing roads and two-tracks, wherever feasible, to access transmission line structure locations during construction. Temporary access for heavier equipment may require improvements, such as blading and placing temporary fill material, where required. However, fill material would be removed and these areas would be revegetated after construction is complete. While the exact locations of temporary access routes are unknown, the following general impacts from constructing access routes are anticipated:

- Topsoil would be removed from bladed roads in the route construction area as required and stored adjacent to the route or in a nearby workspace. Topsoil would be prone to erosion until adequate erosion controls are applied or topsoil piles are revegetated.
- As needed, access routes would be bladed/graded to allow for safe access and construction, which would expose soils and make them susceptible to erosion.
- The majority of the access would occur via overland access.
- Overland access would be via existing two-tracks where available, would be conducted with low-ground-pressure tracked or rubber-tired equipment, would not require improvements (i.e., blading or fill), and would involve driving over vegetation rather than removing it.

Direct, short-term effects on soils from soils disturbance would occur during operation and maintenance of the R-Project where ground disturbance is required. These activities would occur intermittently and impacts would be localized to areas where operation and maintenance occurs. Stormwater best management practices (BMPs), including the use of erosion- and sediment-control structures would require inspection, maintenance, and repair throughout the operation life of the R-Project to minimize soil erosion and sedimentation to surface water. Additionally, a Stormwater Pollution Prevention Plan would be developed to control sedimentation and preserve water quality. BMPs would be implemented as required during maintenance activities. Sediment control structures would be removed once restoration activities are successfully implemented.

NPPD would establish an escrow account and submit an escrow agreement to the Service for review and approval. The escrow agreement would address land restoration of beetle habitat following soil disturbance resulting from construction, maintenance, and emergency repair. Following construction, temporary work areas and access routes would be removed and the area restored to its original condition in accordance with the avoidance, minimization, and mitigation measures outlined below and stipulations in the Restoration Management Plan. The topsoil may be bladed back across temporary access routes in disturbed areas. Other temporary disturbed areas would be restored and revegetated to similar conditions as the surrounding area. The R-Project's restoration planning team, private landowners, local USDA offices, and other rangeland experts would be consulted regarding the appropriate techniques, seed mix, and rate to revegetate areas disturbed from construction. All practical means would be used to restore the land, outside the minimum areas needed for safe operation and maintenance, to its original contour and natural drainage patterns. Large subirrigated meadows could be temporarily disturbed during construction. These areas are difficult to access with standard equipment (e.g., tractor-pulled equipment and pickups) and require the use of low-ground pressure equipment or light ATVs and potentially the use of matting. Matting would be used in wetland areas depending on the conditions during the time of year construction would occur. The R-Project's restoration planning team would develop separate restoration methods for these areas.

Direct effects on geology and soils in the Project area during construction, operation, maintenance, and emergency repairs would likely occur in a relatively small proportion of the geologic and soil resources throughout the region. The likelihood of these impacts would be minimized through the appropriate avoidance and minimization measures; therefore, direct effects on geology and soils from construction, operation, maintenance, and emergency response activities would primarily be short term, and only minimal long-term impacts on soils would result from the loss of surface lands and soil productivity and quality when installing structure foundations and substations and would be of low intensity because they would not occur over a relatively wide area. In the event restoration activities are not successful and the effects continue longer than the construction period, the overall effects on soils could be long term and of moderate to high intensity, depending on the extent of erosion and compaction that occurs in the area of restoration and adjacent areas.

***Soil Erosion***—Certain soils in the study area would be more sensitive to soil erosion, including those with high wind erodibility, high K Factor, low T Factor, and steep slopes. K Factor and T Factor are indicators of erosion potential. These soils would incur greater adverse impacts from surface-disturbing activities than non-sensitive soils. When surface disturbance occurs on highly erodible soils, the potential for accelerated erosion is greater than on less-erodible soils. Helicopter construction techniques would be used for the erection of lattice structures, stringing of conductor and shield wire sock line, and other R-Project construction activities. Using helicopters could greatly increase fugitive dust levels for short periods and accelerate erosion, though NPPD would implement dust-control measures, such as watering or matting, on a case-by-case basis to minimize this impact. The risk of failure of minimization measures is greater on highly erodible soils. To be effective on highly erodible soils, more extensive minimization and mitigation measures and more aggressive maintenance techniques than those commonly used are required and are described below.

Table 3.2-5 shows the estimated area of potential soil-disturbing activities during construction, operation, and maintenance activities under Alternative A for soils with these erosion factors. While these estimates were established based on the best available information, the exact location and amount of soil disturbances for certain activities, such as permanent access roads for maintenance, are currently unknown and would depend on site-specific conditions, landowner negotiations, and the number and type of towers to be installed (steel lattice versus monopole). Similarly, the timing and location of emergency repairs are unknown and cannot be predicted. Specific avoidance, minimization, and mitigation measures for effects on geology and soils from emergency repairs would be determined by NPPD in consultation with the Service. The primary soil erosion factor is high wind erosion at approximately 1,394 acres. Soils with high K Factor, low T Factor, and where slopes are greater than 15 percent represent relatively small areas for soil erosion.

**Table 3.2-5. Acres of Potential Soil-Disturbing Activities on Sensitive Soils under Alternative A**

| Disturbance Type | Highly Wind Erodible[a] | High K Factor[b] | Low T Factor[c] | Slopes Greater than 15% |
|---|---|---|---|---|
| Structure work areas | 449 | 25 | -- | 11 |
| Fly yards/assembly yards | 193 | -- | 1 | -- |
| Construction yards/staging areas | 203 | -- | -- | -- |
| Pulling and tensioning sites | 261 | 8 | -- | 6 |
| Temporary access | 250 | 5 | -- | 3 |
| Distribution power line moves | 38 | 1 | -- | 1 |
| **Total acres** | **1,394** | **39** | **1** | **21** |

Source: NPPD (2016c)

[a] Includes wind-erodibility groups equal to and greater than 86 tons per acre per year

[b] Includes K Factors equal to and greater than 0.37 ton per acre per year

[c] Includes T Factors equal to and less than 2 tons per acre per year

***Prime Farmland***—Where structure foundations are required, direct and long-term effects on prime and unique farmland would occur in the form of lost soil resources and permanent removal of land from production. Overall, 52 acres would be permanently lost because of the Project. Because effects on prime and unique farmland are expected to be a fraction of the total acres permanently disturbed within the project area, the overall effects on prime farmland would be negligible to low.

Construction activities associated with the transmission line for Alternative A would have short-term effects on prime farmland soils in portions of the R-Project ROW that would be temporarily closed throughout the duration of construction activity. The temporary loss of these lands would be reversed when construction is completed and these soils would be returned to production.

Table 3.2-6 shows the estimated area of potential temporary soil-disturbing activities associated with R-Project construction activities under Alternative A on prime farmland. While these estimates were established based on the best available information, the exact location and amount of soil disturbances for certain activities, are currently unknown and would depend on site-specific conditions, landowner negotiations. Similarly, the timing and location of emergency repairs are not known and cannot be predicted. NPPD would address specific avoidance, minimization, and mitigation measures for effects on prime farmland from emergency repairs, to the maximum extent possible, in the escrow agreement that would be finalized with the Service.

**Table 3.2-6. Acres of Potential Soil-Disturbing Activities on Prime Farmland under Alternative A**

| Disturbance Type | Prime Farmland | Prime Farmland if Drained | Farmland of Statewide Importance |
|---|---|---|---|
| Structure work areas | 47 | 4 | 8 |
| Fly yards/assembly yards | -- | -- | 2 |
| Construction yards/staging areas | -- | -- | -- |
| Pulling and tensioning sites | 24 | 1 | 3 |
| Temporary access | 16 | 2 | 3 |
| Distribution power line moves | 3 | 1 | 1 |
| **Total acres** | **90** | **8** | **17** |

Source: NPPD (2016b)

Because the amount of expected permanent disturbance occurring from structure installation would constitute a minimal amount of the total land in the ROW, it is anticipated that a minimal amount of prime farmland would be permanently taken out of production because of such installation. Other permanent impacts, including permanent access and substations, would not be located on prime farmland. As a result, adverse impacts on prime farmland soils under Alternative A would be low. Additionally, the reduction in prime farmland availability would represent a small fraction of prime farmland in the larger Project area.

***Soil Restoration Potential***—The majority of the soils in the Project area are sandy and well drained and are considered droughty, as indicated in Table 3.2-7. Droughty soils can hinder restoration and make revegetation difficult because of their low water-holding capacity, particularly if rainfall is not adequate.

Approximately 66 acres of hydric soils (all types) located in Holt, Garfield, and Loup counties occur in the Project area, as shown in Table 3.2-7. Disturbance of hydric soils may result in decreased water storage capacity of soil, decreased porosity, and decreased ability to replace hydrophytic vegetation.

Droughty and hydric soils would be revegetated and restored resulting in short-term, low-intensity soil restoration impacts.

**Table 3.2-7. Acres of Potential Soil Disturbing Activities on Soils with Restoration Factors under Alternative A**

| Disturbance Type | Highly Compaction Prone[a] | Droughty[b] | All Hydric Soils[c] |
|---|---|---|---|
| Structure work areas | -- | 348 | 24 |
| Fly yards/assembly yards | -- | 133 | 10 |
| Construction yards/staging areas | -- | 156 | 3 |
| Pulling and tensioning sites | -- | 210 | 17 |
| Temporary access | -- | 201 | 8 |
| Distribution power line moves | -- | 24 | 4 |
| **Total Acres** | **0** | **1,072** | **66** |

Source: NPPD (2016b)

[a] Includes moderately to poorly drained soils with fine-textured soils (sandy, clay, silty clay, clay)

[b] Includes coarse-textured soils (sands and loamy sands) and moderately to excessively well-drained soils

[c] Includes the overlap with NWI wetlands

### Indirect Effects

No indirect effects on geology and soils are expected as a result of construction, operation, maintenance, and emergency repairs. NPPD would conduct all Project activities within the Project area and would implement avoidance, minimization, and mitigation measures to ensure that erosion and sedimentation would not occur in adjacent areas.

### 3.2.2.3 Alternative B: Tubular Steel Monopole Structures Only

Alternative B would be identical to Alternative A except that NPPD would construct the R-Project transmission line using steel monopole throughout the entire 225-mile length of the line, rather than using a combination of steel monopoles and lattice towers.

Effects on geology and soils under Alternative B would be similar to Alternative A, with differences from increases in the area of ground disturbance associated with access improvements, tower foundations, and structure work areas. Specific effects on geology and soils from various construction, operation, maintenance, and emergency repair activities (to the extent known) under Alternative B are described below.

### Direct Effects

Direct effects on geology and soils under Alternative B would generally be the same as or similar to Alternative A. Effects on geology, mineral resources, and soils in and adjacent to the Project area under Alternative B would be short and long term and would vary in intensity from low to moderate. Short-term effects would be temporary in nature and, following construction, would be reclaimed and revegetated. Long-term impacts would occur in areas where structures, surface facilities, or long-term access roads would be located for the duration of the R-Project.

#### *Geology*

Direct effects on geology resulting from the construction of the R-Project under Alternative B would consist of the displacement of soil for monopole structure foundations and alteration of geologic features from earth-moving activities during construction. Most of the Project area would be in areas where bedrock is buried by unconsolidated sediments consisting of sand dunes and sand sheet, alluvial silt, sand, loess, glacial till, and gravel. Based upon soil borings and available soils data, the overburden layer of sands, silt, and gravel is expected to be thicker than the depth of the deepest foundations. In these areas, no effects on bedrock are expected. Generally, R-Project construction would require little disturbance to surficial geology and would not affect geologic formations throughout the Project area.

The effects on geology for the placement of steel monopoles and for substations under Alternative B would be similar to Alternative A. Impacts on geology would be limited to these sites and would involve minimal disturbances of subsurface rock during drilling and use of augers to prepare foundation holes and the foundations for the substation sites. However, placement of additional steel monopoles would involve a higher number of sites and minimal disturbance of subsurface rock where drilling and use of augers to prepare foundation holes would occur compared to Alternative A. No excavation to bedrock is expected.

Borings for monopole structure foundations would extend approximately 20 to 40 feet below the surface with approximately 4.25 structures per mile. Displaced soil would be used for backfilling around structure foundation with excess material removed from the site. 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 because of compaction near unimproved roadbeds and on sensitive landscapes.

Impacts on surficial geology at structure locations and within the substation boundaries would be long term and of moderate intensity. Operation and maintenance activities are not expected to affect surface or bedrock geology.

#### *Mineral Resources*

Direct effects on mineral resources under Alternative B would be the same as Alternative A and could limit access to newly discovered aggregate resources located within the width of the ROW and prevent the mineral owner from developing those minerals in the future in that limited area. The acreage of deposits covered by the ROW would be minimal when compared to the amounts available for extraction throughout the study area. If other types of resources, such as oil and gas, are discovered under the ROW, those resources could potentially be accessed despite the presence of the transmission line, for instance through directional drilling.

The Project is not expected to preclude or restrict access to mineral resources. A direct, short-term, low-intensity effect 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 and amount to road closures or other access restrictions while construction is conducted in a given area.

No coal-resource mining operations occur in the Project area, and the ROW would not cross any active oil and natural gas wells; therefore, operation of the Project would not affect the extraction of these mineral resources.

#### *Soils*

Direct effects on soils under Alternative B would generally be the same as Alternative A. In general, the construction impacts would be short term; however, localized, direct, long-term effects on soils would result from the loss of surface lands and soil productivity and quality from installing structure foundations, substations, and regeneration sites. The amount of soils that would be permanently removed at each structure foundation location and permanent access associated with the substations, operations and maintenance, or roads left at landowner's request would be less for structure foundations but greater for permanent access. Approximately 1.0 acre of permanent disturbance would occur at structure foundations and 51 acres for permanent access. Approximately 25 acres of soils would be permanently affected to accommodate the Thedford and Holt County substations. However, impacts on soils at these sites, while permanent, would be localized and not extend beyond the boundaries of the substations. In total, approximately three regeneration sites would be required for the R-Project. In most cases, the regeneration sites would be located in the ROW and typically would be housed in an enclosed cabinet that will measure approximately 72 inches high by 45 inches wide by 27 inches deep. Impacts on soils at structure locations and substation sites while localized would be long term and low.

Short-term, low- to moderate-intensity effects would occur inside and outside the ROW from construction traffic of access routes and construction of material storage yards, batch plant sites, temporary staging areas, and work areas around each structure. The type of short-term effects on soils in the ROW under Alternative B would generally be the same as Alternative A and would include modification of soils by disrupting soil stability, changing vegetation cover that can reduce nutrient recycling, decreasing productivity, and increasing compaction and rutting. The subsequent effects on soils under Alternative B also would be the same as Alternative A.

Potential impacts on soils under Alternative B would include soil compaction and rutting, leading to accelerated soil erosion and an increased potential for erosion occurring on adjacent lands from either vehicle disturbances associated with construction activities or accelerated runoff resulting from the creation of impermeable surfaces. Operating motorized vehicles on moist soils, especially heavy equipment, is likely to compact the surface layer, which may increase runoff, decrease infiltration and aeration, and reduce soil productivity by making it more difficult for plant roots to establish or obtain soil moisture and nutrients. Because of the high prevalence of sand in the Project area, none of the soils are highly compaction prone, as indicated in Table 3.2-10.

Rutting and/or soil mixing could also occur when soils are moist. The process of rutting reduces the aeration and infiltration of the soil, thereby reducing soil productivity. Rutting also disrupts natural surface water hydrology by damming surface water flows or by diverting and concentrating water flows creating accelerated erosion. Temporary access under Alternative B for monopole installation would require using Access Scenario 2 to travel to structure locations, resulting in an increase from 258 acres to 501 acres of temporary disturbance. Access Scenario 2 would require some improvement to existing two-tracks and overland travel with large or heavy equipment that may require improvements for access. This would result in greater damage to soils traversed by construction equipment. Improvements may require blading and the placement of fill material on geofabric where required.

The disturbance in structure work areas would be greater by approximately twice as much under Alternative B compared to Alternative A (i.e., 486 acres for Alternative A and 825 for Alternative B). However, helicopters would not be used under Alternative B, resulting in less ground disturbance from establishment of temporary fly yards and assembly areas.

Grading and leveling required to construct structures and substations and for temporary work areas, staging areas, fly yards, and batch plants under Alternative B would have similar effects on soils as those described for Alternative A. During construction, soil profiles would be mixed with a corresponding loss of soil structure that could result in a decrease in soil fertility and a disruption of soil structure. Minimization and mitigation measures recommended to prevent topsoil mixing with subsoil and to promote successful revegetation following temporary disturbance are the same under Alternative B as Alternative A. Erosion from disturbed areas would be minimal once vegetation is reestablished.

Direct, short-term, low-intensity impacts on soil resources would include the crushing of surface cover in the ROW (e.g., vegetation and duff, litter). The effects of excess wood chips left on soils would be the same as Alternative A.

NPPD would generally use the same measures to minimize ground disturbance under Alternative B as those described for Alternative A. However, temporary access for heavier equipment may require improvements, such as blading, and placement of temporary fill material, where required. However, fill material would be removed and these areas would be revegetated after construction is complete. While the exact locations of temporary access routes are not known, the same general impacts that are anticipated under Alternative A in associated with construction of access routes are anticipated under Alternative B with the exception that temporary access under Alternative B for monopole installation would require using Access Scenario 2 to travel to structure locations which would cause greater impacts than using low-ground-pressure tracked or rubber-tired equipment for overland travel. Subsequently, more topsoil would be removed and stored adjacent to the road and greater erosion of soils could occur under Alternative B compared to Alternative A.

The direct effects on soils from contamination under Alternative B would be the same as Alternative A and the same application of avoidance, minimization, and mitigation measures would occur. These may not fully prevent soil contamination, but they would reduce the potential for soil contamination. Therefore, accidental spill would not result in widespread or long-term effects on R-Project soils.

The direct effects under Alternative B to soils from operation and maintenance of the Project generally would be the same as Alternative A and stormwater BMPs would be implemented and a Stormwater Pollution Prevention Plan would be developed to control sedimentation and preserve water quality. These activities would occur intermittently and impacts would be localized to areas where operation and maintenance occurs. BMPs would be implemented as required during maintenance activities. Sediment control structures would be removed once restoration activities are successfully implemented.

Under Alternative B, NPPD would also establish an escrow account that would include the same stipulations for successful restoration criteria and steps that would be taken in the event restoration of beetle habitat does not meet the stipulations. Large subirrigated meadows could be temporarily disturbed during R-Project construction. These areas are difficult to access with standard equipment (e.g., tractor-pulled equipment and pickups) and require the use of low-ground pressure equipment or light ATVs and potentially the use of matting. Matting would be used in wetland areas depending on the conditions during time of year construction would occur. The R-Project's restoration planning team would develop separate restoration methods for these areas. The number of acres that would be protected under Alternative B through mitigation measures required for the taking of the beetle to offset temporary and permanent impacts on beetle habitat would be greater (i.e., 660 acres) compared to Alternative A.

Overall, the amount of ground disturbance under Alternative B would include an additional 467 acres of total disturbance to geology and soils compared to Alternative A. These direct effects during construction, operation, maintenance, and emergency repairs on geology and soils in the Project area would mostly be localized and occur in a relatively small proportion of the geologic and soil resources throughout the region as only 25 acres would be permanently disturbed. Additionally, the likelihood of these impacts would be minimized through the appropriate avoidance, minimization, and mitigation measures. Therefore, direct effects on geology and soils from construction, operation, maintenance, and emergency repair activities would primarily be short-term impacts with only minimal long-term impacts on soils from the loss of surface lands and soil productivity and quality from installing structure foundations and substations and would be of low to moderate intensity because they would be localized and would not occur over a relatively wide area and only 25 acres of permanent disturbance would occur in the Project area.

***Soil Erosion***—The direct effects on soils that are more sensitive to soil erosion described for Alternative A would be the same under Alternative B. The risk of minimization and mitigation measures failure is greater on highly erodible soils. To be effective on highly erodible soils, more extensive minimization and mitigation measures and more aggressive maintenance techniques than those commonly used are required and are described below.

Table 3.2-8 shows the estimated area of potential soil-disturbing activities associated with R-Project construction, operation, maintenance activities under Alternative B on soils with these erosion factors. While these estimates were established based on the best available information, the exact location and amount of soil disturbances for certain activities, such as permanent access roads for maintenance, are currently unknown and would depend on site-specific conditions, landowner negotiations, and the number and type of towers to be installed (steel lattice versus monopole). The primary soil erosion factor is high wind erosion at approximately 1,801 acres. Approximately 407 additional acres of highly wind erodible soils would be disturbed under Alternative B compared to Alternative A. Soils with high K Factor, low T Factor, and where slopes are greater than 15 percent represent relatively small areas for soil erosion but more soils on slopes greater than 15 percent would be disturbed under Alternative B.

**Table 3.2-8. Acres of Potential Soil-Disturbing Activities on Sensitive Soils under Alternative B**

| Disturbance Type | Highly Wind Erodible[a] | High K Factor[b] | Low T Factor[c] | Slopes Greater than 15% |
|---|---|---|---|---|
| Structure work areas | 785 | 25 | 1 | 19 |
| Fly yards/assembly yards | -- | -- | -- | -- |
| Construction yards/staging areas | 203 | -- | -- | -- |
| Pulling and tensioning sites | 279 | 8 | -- | 5 |
| Temporary access | 496 | 5 | -- | 6 |
| Distribution power line moves | 38 | 1 | 0 | 1 |
| **Total acres** | **1,801** | **39** | **1** | **31** |

Source: NPPD (2016b)

[a] Includes wind-erodibility groups equal to and greater than 86 tons per acre per year

[b] Includes K Factors equal to and greater than 0.37 ton per acre per year

[c] Includes T Factors equal to and less than 2 tons per acre per year

***Prime Farmland***—Direct, long-term effects on prime farmland would occur where structure foundations are required in prime farmlands. It may not be possible to completely avoid prime farmlands. The total disturbance by all structure foundations would be minor and subsequently effects on prime farmland are expected to be negligible to minor. Where R-Project structure foundations affect prime farmland, soil resources would be lost and permanently removed from production. However, these losses would constitute a small fraction of total lands in the ROW of the R-Project.

Construction activities associated with the transmission line for Alternative B would have short-term effects on prime farmland soils in portions of the R-Project ROW that would be temporarily closed throughout the duration of construction activity. The temporary loss of these lands would be reversed when construction is completed and these soils would be returned to production.

Table 3.2-9 shows the estimated area of potential temporary soil-disturbing activities associated with R-Project construction activities under Alternative B on prime farmland. While these estimates were established based on the best available information, the exact location and amount of soil disturbances for certain activities, are currently unknown and would depend on site-specific conditions, landowner negotiations.

**Table 3.2-9. Acres of Potential Soil-Disturbing Activities on Prime Farmland**

| Disturbance Type | Prime Farmland | Prime Farmland if Drained | Farmland of Statewide Importance |
|---|---|---|---|
| Structure work areas | 49 | 4 | 9 |
| Fly yards/assembly yards | -- | -- | -- |
| Construction yards/staging areas | -- | -- | -- |
| Pulling and tensioning sites | 24 | 1 | 3 |
| Temporary access | 17 | 2 | 3 |
| Distribution power line moves | 3 | 1 | 1 |
| **Total acres** | **93** | **8** | **16** |

Source: NPPD (2016b)

Overall, approximately 2 additional acres of prime farmland would be disturbed under Alternative B compared to Alternative A. Because the amount of expected permanent disturbance occurring from structure installation would constitute a minimal amount of the total land in the ROW, it is anticipated that a minimal amount of prime farmland would be permanently taken out of production because of such installation. Other permanent impacts, including permanent access and substations, would not be located on prime farmland. As a result, adverse impacts on prime farmland soils under Alternative B would be low.

***Soil Restoration Potential***—The majority of the soils in the Project area are sandy and well drained and are considered droughty, as indicated in Table 3.2-10. Droughty soils can hinder restoration and make revegetation difficult because of their low water-holding capacity, particularly if rainfall is not adequate. Approximately 399 additional acres of droughty soils would be disturbed under Alternative B compared to Alternative A.

Approximately 71 acres of hydric soils (all types) located in Holt, Garfield, and Loup counties occur in the Project area, as indicated in Table 3.2-10. Disturbance of hydric soils may result in decreased water storage capacity of soil, decreased porosity, and decreased ability to replace hydrophytic vegetation.

Droughty and hydric soils would be revegetated and restored resulting in short-term, low-intensity soil restoration impacts.

**Table 3.2-10. Acres of Potential Soil Disturbing Activities on Soils with Restoration Factors**

| Disturbance Type | Highly Compaction Prone[a] | Droughty[b] | All Hydric Soils[c] |
|---|---|---|---|
| Structure work areas | -- | 653 | 31 |
| Fly yards/assembly yards | -- | -- | -- |
| Construction yards/staging areas | -- | 156 | 3 |
| Pulling and tensioning sites | -- | 224 | 17 |
| Temporary access | -- | 414 | 16 |
| Distribution power line moves | -- | 24 | 4 |
| **Total Acres** | **0** | **1,471** | **71** |

Source: NPPD (2016b)

[a] Includes moderately to poorly drained soils with fine-textured soils (sandy, clay, silty clay, clay)

[b] Includes coarse-textured soils (sands and loamy sands) and moderately to excessively well-drained soils

[c] Includes the overlap with NWI wetlands

#### Indirect Effects

No indirect effects on geology and soils are expected as a result of construction, operation, and maintenance, including emergency repairs. NPPD would conduct all Project activities within the Project area and would implement avoidance, minimization, and mitigation measures to ensure that erosion and sedimentation would not occur in adjacent areas.

### 3.2.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on geology and soils:

- Restore grasslands following construction, maintenance, and emergency repairs; revegetate temporary work areas and access; and use physical methods (e.g., matting, jute blankets) and/or vegetative cover to stabilize disturbed areas.
- Implement erosion and sediment control measures during R-Project construction and routine scheduled maintenance, including using stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment before reaching receiving waters. In an emergency situation, the circumstances of the emergency situation, particularly if public safety concerns are involved (lines across roads or railways) would determine the degree to which these measures can be implemented.
- Conduct geotechnical investigations to evaluate potential geologic and geotechnical hazards and avoid placing R-Project structures and other R-Project-related disturbances in areas with such hazards.

- Use helicopters for erecting lattice structures (Alternative A only), stringing sock line, and mobilizing certain equipment.
- Use helical pier foundations for lattice structures in the Sandhills, which require less equipment, a smaller temporary work area, and result in less ground disturbance than traditional steel monopole foundations (Alternative A only).
- Locate construction staging areas and pulling and tensioning sites adjacent to existing roads and in previously disturbed areas where practicable based on availability and landowner approval.
- Use existing roads and two-tracks for access during construction, based on availability and landowner approval; use low-ground-pressure tracked or rubber-tired equipment for overland access to reduce effects on geology and soils (Alternative A only).
- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas, where practicable based on availability and landowner approval, away from sensitive soil and geologic resources.
- Locate new transmission line access parallel to landform contours to minimize ground disturbance and/or reduce land scarring.
- Avoid construction and maintenance activities when soils are too wet to adequately support construction equipment.
- Use matting on wet soils to minimize effects during construction and routine scheduled maintenance.
- Conduct restoration monitoring to document implementation and progress of the restoration efforts, conduct pre-construction and post-construction monitoring to evaluate restoration effectiveness, and implement adaptive management in areas that do not meet success criteria.
- Use temporary improvements for access.
- Avoid blowout habitat to the maximum extent practicable.
- Restrict all construction vehicle movement outside the ROW to designated access routes and established roads other than for emergency situations.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access to each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding

beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.2.4 Effects Summary

The summary of effects on geology and soils from construction, operation, and maintenance activities under Alternative A and Alternative B assumes that restoration activities proposed by NPPD would be successful and that short-term effects on geology and soils would occur only during the construction period, which includes restoration activities.

Alternative A would have both short- and long-term, direct, adverse impacts that would be minimized once temporarily disturbed areas are restored. Therefore, because avoidance, minimization, and mitigation measures would minimize impacts on these resources, Alternative A would not significantly affect geology and soils.

Implementation of Alternative B would have short- and long-term, adverse impacts. These adverse impacts would be minimized once temporarily disturbed areas are restored. Because avoidance, minimization, and mitigation measures would minimize impacts and because a relatively small proportion of the overall geologic and soil resources in the Project area would be permanently affected, implementation of Alternative B would not have significant, adverse impacts on geology and soils.

The overall total disturbance to geology and soils under Alternative B would be greater compared to Alternative A. The placement of additional steel monopoles would involve more sites and minimal disturbance of subsurface rock where drilling and use of augers to prepare foundation holes would occur compared to Alternative A. Temporary access under Alternative B for monopole installation would cause greater impacts. Approximately 407 additional acres of highly wind erodible soils would be disturbed under Alternative B compared to Alternative A and more soils on slopes greater than 15 percent would be disturbed under Alternative B. Approximately 399 additional acres of droughty soils would be disturbed under Alternative B compared to Alternative A and a slight increase in the acres of prime farmland and hydric soils disturbed would occur.

## 3.3 Water Resources

### 3.3.1 Affected Environment

The climate of the Nebraska Sandhills is semi-arid with precipitation ranging from 23 inches per year in the eastern portions to 17 inches per year in the western portion. Approximately 75 percent of precipitation falls between April and September with 50 percent occurring in May, June, and July (Bleed and Flowerday 1998). Average snow accumulation in the Sandhills ranges from 22 inches in the southeastern portion to 45 inches in the northern portions. Snowmelt and rainfall provides an important source of groundwater recharge throughout the region. Temperature varies with cooler temperatures observed in the western portion and warmer temperatures in the eastern portion. The average freeze-free season in the east is 150 days, compared to 120 days in the west (Bleed and Flowerday 1998). Summertime high temperatures average 88°F, and wintertime lows average 9°F (Schneider et al. 2011).

The area inventoried to characterize the affected environment for water resources (i.e., study area) is described in Table 3.1-1.

#### 3.3.1.1 Surface Waters

***Sandhills Ecoregion***

…home to some of the most unaltered rivers and streams in the Great Plains.

Historically, Nebraska had nearly 24,000 miles of rivers and streams. Nebraska's largest rivers experienced large fluctuations in flows, particularly in the spring when snow melt and spring rains occurred. Direct diversion of surface flows and pumping from alluvial wells for irrigation and municipal water supplies has substantially reduced stream flows in many rivers and caused others to dry up completely. Today, most of the state's rivers and streams have been significantly modified by reductions in flows and channelization. However, the Sandhills ecoregion stands out as containing some of the most unaltered rivers and streams remaining in the Great Plains (Schneider et al. 2011). Rivers and streams in the Sandhills ecoregion differ from those of other regions in that they have unique groundwater origins, little to no tributaries, and flow at a remarkably steady rate (Bleed and Flowerday 1998).

Sixteen waterbodies would be crossed by NPPD's final route including, for example, the South Platte, North Platte, Dismal, South Loup, Middle Loup, North Loup, and Calamus rivers (Figure 3.3-1). River flows are consistent with few high or low flows and are generally derived from groundwater discharge, but snowmelt and rainfall run-off can also affect river flows at times. North and South Platte River flows are highly variable and can be influenced by groundwater returns, but flows in these rivers are also affected by upstream processes and actions including snowmelt, rainfall, and water management operations, such as releases of stored waters for irrigation or environmental purposes. Alluvial aquifers present along rivers and streams are recharged during high flows and contribute water to rivers and streams during lower hydroperiods. Southeasterly flowing streams, such as the North Loup, Middle Loup, Calamus, and Dismal rivers drain much of the central and eastern Sandhills (Schneider et al. 2011).

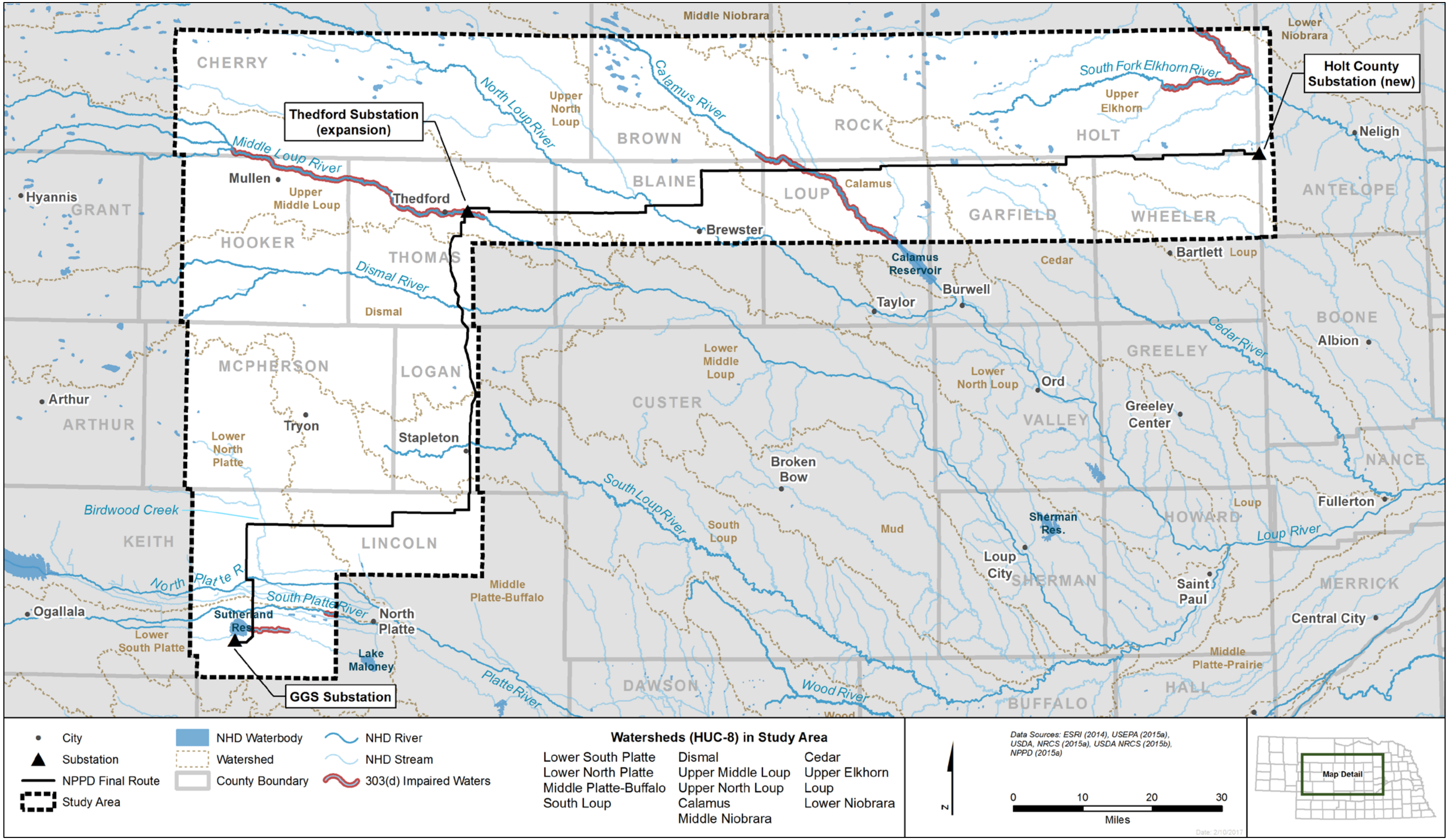



**Figure 3.3-1. Water Resources**

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The South Platte River and North Platte River originate in the Rocky Mountains of Colorado before continuing across the central plains where they join to form the Platte River near North Platte, Nebraska, and eventually flow into the Missouri River. The study area is located approximately 9 miles west of the confluence of the North Platte River and South Platte River. These two rivers flow across the southwestern portion of the study area just to the north and south, respectively, of the towns of Sutherland and Hershey in Lincoln County. These two large prairie rivers consist of shallow, braided channels and are separated by approximately 4 miles of cultivated agricultural lands in the study area. River flows have been greatly depleted from upstream diversion.

The Dismal, South Loup, Middle Loup, North Loup, Calamus, Elkhorn, and Cedar rivers all originate in the Nebraska Sandhills ecoregion, although only the South Loup River and Cedar River originate in the study area. These rivers flow in a southeasterly direction and drain much of the central and eastern Sandhills. The river flows are nearly constant throughout the year because their primary source comes from the consistent groundwater seepage (Schneider et al. 2011). While the Elkhorn and Cedar rivers occur in the study area, Project features would not cross either of these rivers.

The Dismal River flows only 80 miles to its confluence with the Middle Loup River at Dunning. It is the state’s wildest and most undeveloped river and has been identified by NPS in the Nationwide Rivers Inventory (NRI) as worthy of designation in the National Wild and Scenic River System. The river runs deep and fast in places is extremely winding as it flows through narrow, deep-walled canyons in the upper half to a broad valley farther downstream. Springs are common along the river (NGPC 2015a). The Dismal River bisects the western portion of the study area in Hooker and Thomas counties.

The South Loup, Middle, Loup, and North Loup rivers derive their flow from groundwater discharge out of the southern Sandhills and provide a significant source of summer flow to the Platte River. The flows of the North Loup River have been modified by the upstream Taylor Dam and irrigation diversions. The flows on the Middle Loup and Loup rivers have been modified by several irrigation diversions. Though somewhat modified, the South, Middle, and North Loup rivers maintain a fairly constant year-round flow of water because they receive the majority of their input from groundwater and little from run-off from their upper reaches (Schneider et al. 2011). A portion of the South Loup River is located in the study area near the town of Stapleton in Logan County. The Middle Loup River bisects the northwestern portion of the study area close to the towns of Mullen, Seneca, and Thedford in Cherry, Hooker, and Thomas counties. The North Loup River bisects the study area from the town of Brownlee to the town of Brewster in Cherry, Thomas, Blaine, and Loup counties.

The Calamus River headwaters originate in the Sandhills arising from two forks at Moon Lake and Clapper Marsh flowing to the Calamus River Reservoir. The river is meandering for approximately half its length with a gentle flow and wide bends. Near the reservoir, the river bends lengthen and the stream widens becoming shallower allowing more sandbars to form. Because of groundwater received from the Ogallala aquifer, the Calamus River flows during the hottest and driest months (NGPC 2015b). It bisects the central portion of the study area in Brown, Rock, and Loup counties.

> ***Birdwood Creek***
>
> …pristine, coldwater stream that supports several species of rare, coldwater fish.

The Elkhorn River originates in the eastern Sandhills and is one of the largest tributaries of the Platte River, flowing 290 miles and joining the Platte River just southwest of Omaha, Nebraska. The Elkhorn River also has several tributaries, including the North and South forks. A small portion of the Elkhorn River and the entire South Fork Elkhorn River lie in the northeast corner of the study area, both of which are in Holt County. The North Fork of the Elkhorn River is not in the study area. The Project transmission line would not cross the Elkhorn, the South Fork of the Elkhorn River, or the North Fork of the Elkhorn River.

Birdwood Creek, which would be crossed by NPPD's final route, flows southward into the North Platte River from the Sandhills. In its upper reaches, this creek is a fairly pristine, groundwater-fed, coldwater stream with wet meadows in its floodplain that supports several species of rare, coldwater fish (Schneider et al. 2011). NPPD's final route would also cross named and unnamed creeks, canals, sloughs, and ditches.

Table 3.3-1 presents the surface water resources—rivers, creeks, canals, sloughs, and ditches in the study area—that are located in the study area and denotes which of those surface waters would be crossed by NPPD's final route.

**Table 3.3-1. Surface Waters in the Study Area**

| Waterbody | Type | Crossed by the Proposed Route |
|---|---|---|
| Beaver Creek | Not applicable | -- |
| Beer Slough | Intermittent | -- |
| Big Cedar Creek | Intermittent/perennial | X |
| Big Creek | Perennial | -- |
| Big Springs Creek | Intermittent | -- |
| Birdwood Canal | Aqueduct | -- |
| Birdwood Creek | Not applicable | X |
| Bloody Creek | Intermittent/perennial | X |
| Bobtail Creek | Perennial | -- |
| Brush Creek | Perennial | -- |
| Bull Ditch | Intermittent | -- |
| Cache Creek | Intermittent/perennial | -- |
| Calamus River | Perennial | X |
| Calf Creek | Perennial | -- |
| Cedar Creek | Perennial | -- |
| Clearwater Creek | Intermittent/perennial | X |

| Waterbody | Type | Crossed by the Proposed Route |
|---|---|---|
| Dismal River | Perennial | X |
| Ditch Number 3 | Perennial | X |
| Dry Creek | Intermittent/perennial | -- |
| East Clear Creek | Perennial | -- |
| Elkhorn River | Perennial | -- |
| Fremont Slough | Intermittent/perennial | -- |
| Goose Creek | Perennial | -- |
| Gracie Creek | Intermittent/perennial | -- |
| Holt Creek | Intermittent | -- |
| Horse Creek | Perennial | -- |
| Keith Lincoln Canal | Aqueduct | -- |
| Little Cedar Creek | Intermittent/perennial | -- |
| Middle Branch Middle Loup River | Perennial | -- |
| Middle Loup River | Perennial | X |
| North Branch Middle Loup River | Perennial | -- |
| North Fork Birdwood Creek | Intermittent/perennial | -- |
| North Fork Dismal River | Perennial | -- |
| North Loup River | Perennial | X |
| North Platte Canal | Aqueduct | X |
| North Platte River | Perennial | X |
| Outlet Canal | Perennial | X |
| Pass Creek | Perennial | -- |
| Paxton Hershey Canal | Aqueduct | X |
| Skull Creek | Intermittent/perennial | X |
| South Branch Middle Loup River | Perennial | -- |
| South Fork Calamus River | Perennial | -- |
| South Fork Dismal River | Perennial | -- |
| South Fork Elkhorn River | Intermittent/perennial | -- |
| South Loup River | Intermittent/perennial | X |
| South Platte River | Perennial | X |
| Spring Creek | Perennial | -- |
| Squaw Creek | Intermittent/perennial | -- |
| Suburban Canal | Aqueduct | -- |

| Waterbody | Type | Crossed by the Proposed Route |
| --- | --- | --- |
| Sutherland Canal | Not applicable | -- |
| Wamaduze Creek | Perennial | -- |
| West Birdwood Creek | Perennial | -- |
| White Horse Creek | Intermittent/perennial | -- |

Source: USEPA (2014)

**_Lakes and Wetlands_**

Nearly 2,000 shallow lakes and more than 1 million acres of wetlands and wet meadows have formed in the Sandhill valleys

Nearly 2,000 shallow lakes and more than 1 million acres of wetlands and wet meadows have formed where the region's high water table intersects the ground surface in the Sandhill valleys (see Section 3.4, *Wetlands*). The sandy to fine sandy loam soils of freshwater meadows support lush vegetation dominated by sedges (*Carex* spp.), spikerushes (*Eleocharis* spp.), prairie cordgrass (*Spartina pectinata*), and switchgrass (*Panicum virgatum*). These features are all shallow with depths less than 14 feet. The majority of the lakes and large marshes are clustered near stream headwaters and in the western portion of the Sandhills. A few of these lakes and marshes are more than 1,000 acres in size and are some of the Great Plains' largest fens. Fens—groundwater-fed wetlands with saturated, nutrient-rich peat or muck soils, typically with meadow-like vegetation—of the Sandhills are dominated by a meadow-like vegetation of grasses, sedges, and shrubs and contain deep organic soils that support a variety of at-risk plant species (Schneider et al. 2011).

Most of the lakes are small and only a few in the study area approach 1,000 acres. Large named lakes that occur in the study area include Willow Lake, Swan Lake, and Goose Lake, which are relatively shallow depressions and no deeper than 10 feet. Sutherland Reservoir, Fox Bayou, Carson Lake, and Rush Lake occur within 0.5 mile of NPPD's final route. Sandhill lakes such as these typically attract a wide variety of waterfowl during the spring and fall migrations; some of these lakes are managed as State WMAs, while others are privately owned.

The study area is located in portions of the following major watersheds (U.S. Geological Survey [USGS] eighth level hydrologic unit code[3]): Upper North Loup, Upper Middle Loup, Dismal, South Loup, Middle Platte-Buffalo, Lower North Platte, Lower South Platte, Lower Middle Loup, Lower North Loup, Calamus, Upper Elkhorn, and Cedar (Figure 3.3-1).

### Impaired Waters—Total Maximum Daily Loads and Section 303(d) Listed

Section 303(d) of the Federal Clean Water Act (CWA) (33 U.S.C. § 1313(d)) requires states to assess the condition of state waters to determine where water quality is impaired (i.e., does not fully support uses identified in the stream classification or does not meet all water quality standards) or threatened (i.e., is likely to become impaired in the near future). The result of this review is the compilation of a 303(d) list, which states must submit to USEPA biannually.

[3] Hydrologic Unit Code—A unique code, consisting of two to eight digits, used to identify units (watersheds) in USGS's four-level classification system.

Section 303(d) also requires states to establish the total maximum daily load (TMDL) for these impaired waters.

Under 40 CFR § 130.7, states are required to establish TMDL programs, which are approved by USEPA for streams and lakes that do not meet adopted water quality standards. A TMDL includes a quantitative assessment of water quality problems, contributing sources, and load reductions or control actions needed to restore and protect waterbodies. A TMDL budget takes into account loads from point, nonpoint, and natural background sources. National Pollutant Discharge Elimination System (NPDES) permits address point-source pollution to surface waters. Non-point source pollution is addressed by the application of BMPs and mitigation measures.

In compliance with the CWA, the Nebraska Department of Environmental Quality (NDEQ) has identified Section 303(d) water-quality-limited streams and lakes for development of TMDL criteria. A list of impaired waterbodies in the major watersheds on the 303(d) list has been identified for the study area, and Table 3.3-2 and Figure 3.3-1 denote which of those impaired surface waters would be crossed by NPPD's final route. Impaired surface waters crossed by NPPD's final route would be spanned by the transmission line. Contamination or impairment in these waterbodies includes unacceptable levels of the cause of impairment listed.

**Table 3.3-2. Impaired Surface Waters in the R-Project Study Area**

| Watercourse | Cause of Impairment | Impairment Group | Crossed by NPPD's Final Route |
|---|---|---|---|
| South Platte River | Selenium | Metals (other than mercury) | X |
| Middle Loup River | Escherichia coli (E. coli) | Pathogens | X |
| Calamus River | E. coli<br>Temperature | Pathogens<br>Temperature | X |
| Elkhorn River | Fish Consumption Advisory | Fish Consumption Advisory | -- |
| South Fork Elkhorn River | E. coli | Pathogens | -- |
| Outlet Canal | Fish Consumption Advisory | Fish Consumption Advisory | X |
| Sutherland Lake | Fish Consumption Advisory | Fish Consumption Advisory | -- |
| East Hershey Lake (WMA) | Fish Consumption Advisory | Fish Consumption Advisory | -- |
| Hershey Lake (WMA) | Fish Consumption Advisory pH | Fish Consumption Advisory<br>pH/Acidity/Caustic Conditions | -- |

Source: USEPA (2014)

### 3.3.1.2 Groundwater

The Sandhills are geologically young with several major episodes of dune formation occurring over the past 13,000 years. These dunes are poorly developed, having only a thin layer of topsoil that contains little organic matter. Rainwater and snowmelt percolates rapidly downward; the infiltration rates are up to 10 feet per day. Extensive aquifers, up to 900 feet thick, have formed mainly in sand and gravel deposits below the dunes. This underground reservoir contains an estimated 700 to 800 million acre-feet of groundwater and is part of the Ogallala Aquifer, also referred to as the High Plains Aquifer (Schneider et al. 2011). The Ogallala Aquifer extends throughout portions of South Dakota, Nebraska, Wyoming, Colorado, Kansas, Oklahoma, New Mexico, and Texas, where it is a major source of water for agricultural, municipal, and industrial development (Guru and Horne 2000).

Source: USFWS

*Lakes and marshes in the Sandhills, like shown here, are almost entirely groundwater fed*

The Ogallala Aquifer is an unconfined aquifer supplied mostly by rainwater and snowmelt that infiltrates rapidly accumulating on a confining layer. The aquifer is a porous body of complex sediments and sedimentary rock formation composed primarily of unconsolidated, poorly sorted clay, silt, and gravel that conducts groundwater and yields significant quantities of water. The water-saturated part of the aquifer varies in thickness and is more than 1,000 feet thick in places. Both the thickest and the most extensive areas are in Nebraska, which contains two-thirds of the volume of the Ogallala Aquifer groundwater. Because of the presence of such a large source of groundwater, the Sandhills are typically less susceptible to short periods of drought (Schneider et al. 2011). Groundwater at the surface or at shallow depths is present throughout the year with most groundwater recharge occurring during larger precipitation events in the spring (Bleed and Flowerday 1998). Several rivers, such as the Platte River, run below the water level of the aquifer and receive groundwater flow that then carries water out of the region rather than recharging the aquifer.

Groundwater in the study area ranges from at the surface for wetland and lake areas and near the river corridors to depths of greater than 400 feet at the peak of the sand dunes. The generally shallow depth of the water table in the Ogallala Aquifer makes water in the aquifer susceptible to contamination. The sandy soils in the Sandhills region also allow leaching of agrichemicals downward to local water tables. In some locations, groundwater is becoming contaminated with nitrates and pesticides (LaGrange 2005). Nebraska has a long tradition of progressive action in monitoring, managing, and protecting groundwater, so contamination is closely monitored.

#### 3.3.1.3 Floodplains

> ***Complex Mosaic***
>
> Floodplains typically support a complex mosaic of wetland, riparian, and woodland habitats that are spatially and temporally dynamic.

Floodplains are relatively low, flat areas of land that surround some rivers and streams and convey overflow flood events. Floodwater energy is dissipated as flows spread out over a floodplain, and significant storage of floodwaters can occur through infiltration and surficial storage in localized depressions on a floodplain. Functioning floodplains provide flood management, acting as temporary storage of flood water. This storage of water decreases run-off velocity, reduces flood peaks, and distributes storm flows over longer periods, causing tributary and main channels to peak at different times. Floodplains typically support a complex mosaic of wetland, riparian, and woodland habitats that are spatially and temporally dynamic. The extent of the floodplain is dependent on soil type, topography, and water-flow characteristics.

In the study area, high surface-water flows and potential flooding occur in the spring and early summer as the winter snowpack melts. Heavy rains falling during the spring thaw constitute a serious flood threat. Flash floods, although restricted in scope, are probably the most frequent type of flooding and result from locally heavy rainstorms in the spring and summer.

The Federal Emergency Management Agency (FEMA) defines a floodplain as being any land area susceptible to being inundated by waters from any source (FEMA 2014). FEMA defines flood zones according to varying levels of flood risk. FEMA prepares Flood Insurance Rate Maps that delineate flood hazard areas, such as floodplains, for communities. These maps are used to administer floodplain regulations and to reduce flood damage. Typically, these maps indicate the locations of 100-year floodplains, which are areas with a 1-percent chance of flooding occurring in any single year.

FEMA floodplain mapping is available for only part of the study area. FEMA identified one type of floodplain in the study area via the Nebraska Department of Natural Resources: 100-year floodplains (Zone A). Flood Insurance Risk Zone A areas are subject to inundation by the 1-percent-annual-chance flood event, but where no base flood elevation or depths are available, detailed hydraulic analyses have not been performed. Data were available for Lincoln, Custer, Loup, Garfield, and Wheeler counties, but not McPherson, Logan, Hooker, Thomas, Cherry, Blaine, Brown, Rock, and Holt counties. The primary mapped floodplain zones are associated with the North and South Platte rivers, North and South Loup rivers, and Calamus River.

Floodplain vegetation types (Western Great Plains Floodplain System) identified by LANDFIRE (see Section 3.5, *Vegetation*) were also used to map floodplains for the study area and to analyze potential disturbance of floodplains in the Project area. The LANDFIRE-vegetation systems identified as floodplains are included in Figure 3.3-2.

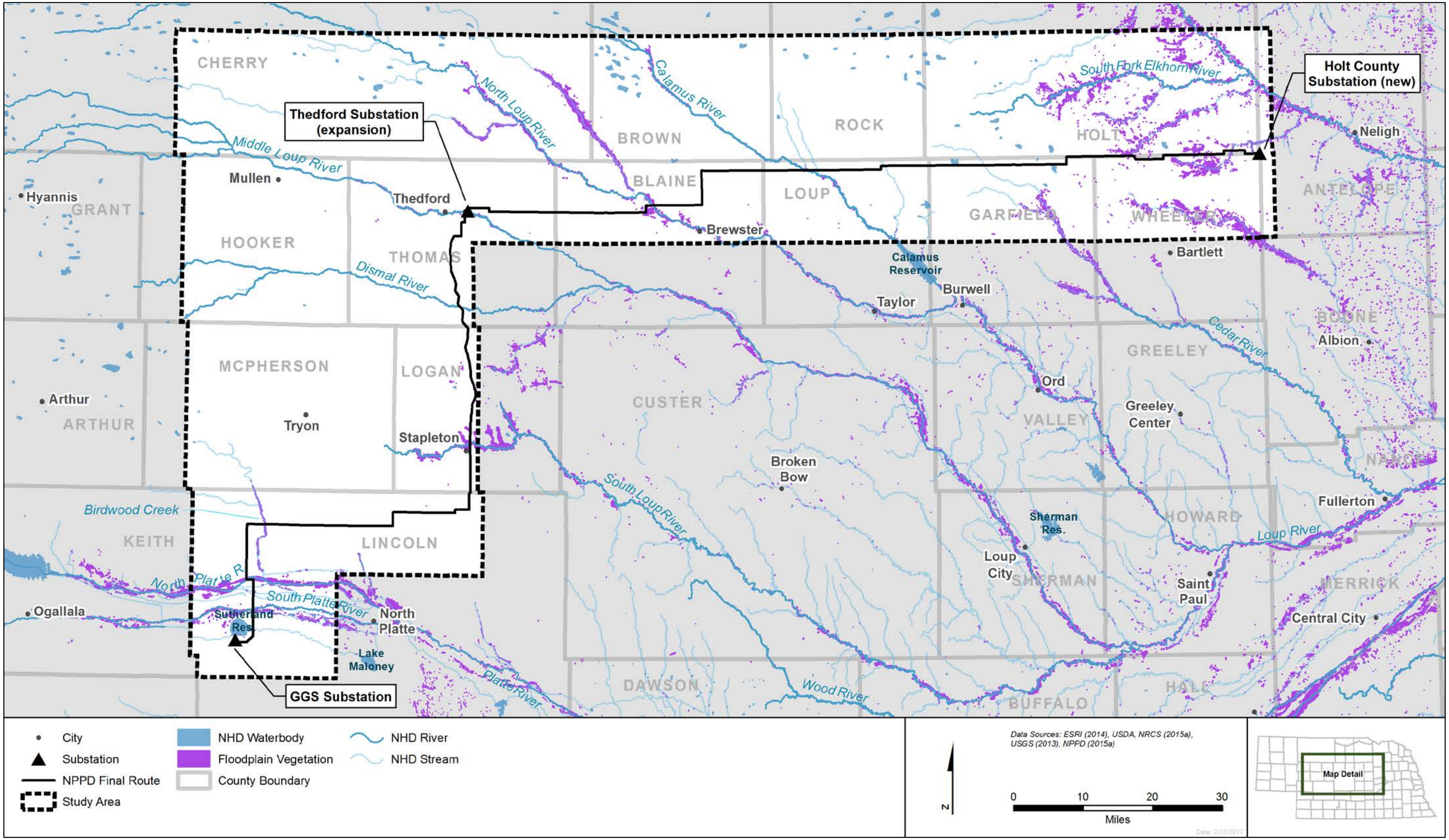


**Figure 3.3-2. Floodplain Vegetation Types in the R-Project Study Area**

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### 3.3.2 Direct and Indirect Effects

The analysis of water resources considered any changes in surface waters, groundwater, and floodplains that could occur as a result of the implementation of Alternative A or Alternative B. Activities related to construction, operation, and maintenance are described in detail in Chapter 2, *Alternative*s. Mitigation practices that would decrease the severity of effects from construction, operation, and maintenance activities are discussed in Section 3.3.3, *Avoidance, Minimization, and Mitigation Measures*. The area inventoried to analyze the effects on water resources (i.e., Project area) is described in Table 3.1-1.

Each alternative was analyzed based on the likelihood of effects on surface waters, groundwater, and floodplains described in the Affected Environment section. For the effects discussion, the area of analysis is where effects resulting from construction, operation, and maintenance activities, including emergency repairs, would occur in the Project area defined in Table 3.1-2 (e.g., land area permanently disturbed at structure bases, regeneration sites, permanent access, and substations; and land area temporarily disturbed at structure work areas; wire-pulling, tensioning, and splicing sites; construction yards/staging areas; fly yards and assembly areas; batch plant sites; borrow areas; and temporary access). The area of analysis may extend beyond the Project area for some indirect impact assessments.

The potential direct and indirect and short- and long-term effects on surface waters, groundwater, and floodplains under Alternative A and Alternative B are described below. Direct, adverse, and beneficial effects on surface waters, groundwater, and floodplains are assessed and measured in terms of areal extent (e.g., acres) where Project activities would occur and could cause the direct loss or changes to water resources or where mitigation measures could protect or minimize effects on water resources. Short-term effects are those that may affect surface waters, groundwater, and floodplains during construction of the Project and long-term effects are those that would persist throughout the life of the Project. The intensity of effects under each alternative is categorized as low, moderate, or high according to the threshold criteria described in Table 3.1-2. Restoration of water resources or areas in proximity to water resources disturbed or affected by construction, operation, and maintenance activities, along with implementation of avoidance and minimization measures, was considered when analyzing effects on surface waters, groundwater, and floodplains. NPPD's planned restoration activities were considered in describing effects of the Project.

The following parameters were considered when assessing effects on water resources:

- The number of surface water and floodplain crossings and whether those waters and floodplains would be spanned
- The amount of surface waters and floodplains that would be lost due to construction, operation, and maintenance activities
- The amount of surface waters, groundwater, and floodplains that would be disturbed temporarily due to construction, operation, and maintenance

- 303(d) impaired surface waters in the analysis area and whether those waters would be spanned
- Adequacy of avoidance, minimization, and mitigation measures for disturbance restoration, sediment control, bank restoration, minimization and control of accidental releases of contaminants
- Changes to the physical and chemical characteristics of surface waters and groundwater
- The use of access roads in proximity to surface waters, groundwater, and floodplains
- The amount of permanent structures and/or ancillary facilities located in floodplain areas with the potential to obstruct overbank flows

Regulations and associated permits and authorizations that could apply to construction, operation, and maintenance of the Project and effects on water resources are discussed below.

The CWA (33 U.S.C. §§ 1251 *et seq*.) is the framework that regulates water quality standards and pollutant discharges into waters of the United States. The CWA was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. Specific sections of the CWA that may apply to the Project are described below as well as other applicable executive orders and regulations, followed by a brief description of the associated permits.

Section 303(d) of the CWA (33 U.S.C. § 1313(d)), described in the Affected Environment section, requires that water quality of streams, rivers, and lakes are assessed on a regular basis; waters found to be in violation of water quality standards are listed as impaired; and priorities are set for actions to improve water quality.

Pursuant to Section 401 of the CWA (33 U.S.C. § 1341), any permit or license issued by a Federal agency for an activity that may result in a discharge into waters of the United States requires certification from the state in which the discharge originates. This requirement allows each state to have input into Federally approved projects that may affect its waters (rivers, streams, lakes, and wetlands) and to ensure the projects comply with state water quality standards and any other water quality requirements of state law. State certification ensures that a project would not adversely affect impaired waters (waters that do not meet water quality standards) and that a project complies with applicable water quality improvement plans (TMDLs). The states must grant, deny, or waive water quality certification for a project before a Federal permit or license can be issued. NDEQ must provide Section 401 Water Quality Certifications for the Federally issued permits, including the 404 permits. NDEQ issued conditional Section 401 Water Quality Certifications for the 2012 Nationwide Permits, so no separate documentation is required to NDEQ, if Alternative A qualifies for a Nationwide Permit and satisfies the conditions in NDEQ’s conditional certification.

To comply with criteria in Section 402 (33 U.S.C. § 1342) of the CWA, all construction-site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more must obtain an NPDES permit for storm water discharges (40 CFR §§ 122.26 and 123.25). The State of Nebraska has been delegated NPDES responsibility. Thus, in Nebraska, NPDES permits for storm water discharges (also called Construction Storm Water General Permits) are processed by NDEQ following submittal of an NOI for construction activities and preparation of a Stormwater Pollution Prevention Plan (SWPPP) that describes how erosion and sediment transport would be minimized to adjacent waterbodies. The NOI must be received by NDEQ at least 7 days in advance of starting land grading and clearing activities.

Waters of the United States, including wetlands, are subject to USACE jurisdiction under Section 404 of the CWA (33 U.S.C. § 1344), which requires a permit for the discharge of dredged or fill material into waters of the United States. The entire study area is in the USACE, Omaha District. The Omaha District would provide regulatory review and permitting services for the Project.

The requirements for all regulatory actions specified in Executive Order 11988, *Floodplain Management*, are summarized in Section 1 from the order:

> Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands, and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Local regulations related to floodplains are discussed in the Direct Effects section.

#### 3.3.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance, including emergency repairs, of the R-Project transmission line would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect surface waters, groundwater, and floodplains, thus water resources in the Project area would not be impacted.

#### 3.3.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent implementation of the Project transmission line along NPPD’s final route under Alternative A would result in direct and indirect effects on water resources in the Project area in the short and long term. Specific effects on water resources resulting from various construction, operation, and maintenance activities under Alternative A are described below.

### Direct Effects

Effects on surface waters, groundwater, and floodplains from construction, operation, and maintenance of Alternative A in and adjacent to the Project area would be short and long term and would vary in intensity from low to moderate. Short-term impacts are those that are temporary in nature and would occur in areas of disturbance and, after construction, would be revegetated if required. Long-term impacts would occur in areas where transmission line structures, substations, and permanent access roads would be located for the duration of the Project. The avoidance, minimization, and mitigation measures discussed below would minimize the short- and long-term effects.

No water resources are located on the GGS Substation expansion, Thedford Substation expansion, or Holt County Substation sites or in proximity to these sites. The watercourse nearest to the Thedford Substation is the Middle Loup River, which is located south of Nebraska Highway 2, which would act as an obstruction to water flow between the substation and the river. Therefore, there is little to no potential for runoff or other effects on the Middle Loup River from construction, operation, or maintenance of the Thedford Substation. The watercourse nearest to the Holt County Substation is Clearwater Creek, located slightly more than 2 miles to the north of the substation site. Because of the distance between the substation site and the creek, construction, operation, or maintenance of the Holt County Substation would result in little or no potential for runoff or other effects on Clearwater Creek. Additionally, an SWPPP would be developed to control stormwater runoff from the substation sites.

The exact location and amount of disturbances for certain temporary activities are currently unknown and would depend on site-specific conditions and landowner negotiations. Similarly, the timing and location of emergency repairs are not known and cannot be predicted other than the 292 acres that NPPD projected would be affected over the life of the Project.

#### *Surface Waters*

Under Alternative A, direct effects on surface water quality could occur as a result of: 1) sediment loads, 2) stream crossings during construction and operation, 3) alterations to surface drainage and surface water flow and volume, 4) stream channel instability, 5) degraded water quality, 6) accidental release of contaminants, and 7) increased water use during construction.

The transmission line would cross seven rivers—the Calamus, Dismal, Middle Loup, North Loup, North Platte, South Loup, and South Platte rivers; five named creeks—Big Cedar, Birdwood, Bloody, Clearwater, and Skull creeks; three canals—the North Platte, Outlet, and Paxton-Hershey canals; and one named ditch—Ditch Number 3. The line would cross the edge of one small lake—Rush Lake. These waterbodies would be spanned by the transmission line and individual structures would be located well outside the banks to avoid potential effects. Three of the transmission line crossings would be over surface waters classified by USEPA and NDEQ as impaired waters (see Table 3.3-2). All stream crossings, including the impaired waters, would be spanned, and no transmission structures would be placed in the streambed. Based on this placement, permanent structures would not change the free-flowing nature or values of streams in the Project area.

Source: Buell et al. (2014); photo by Eric Fowler

*Calamus River*

Direct effects on water quantity from construction, operation, and maintenance include alterations to surface drainage and surface water flow and volume from tree clearing, excavation, grading, and leveling. Construction activities affect surface flow and drainage by removing vegetation, altering topographic contours, and compacting the soil in the Project area. Soil compaction by vehicles and equipment during construction would reduce porosity and infiltration capabilities, resulting in increased surface water yields and peak flows in the watersheds. None of the soils in the Project area are classified as highly compaction prone, so the potential for short-term effects are low given the sandy nature of the soils. During construction, each river, creek, canal, and ditch described above would be approached from each side of the waterbody; they would not be crossed by any type of vehicle. Temporary access would go around Rush Lake. These techniques would avoid disturbance to the water course, and associated soils, riparian and floodplain vegetation, drainage patterns, water quantity and quality, and topographic contours. The only tall riparian vegetation (trees) that would need to be removed are located next to the North and South Platte rivers. If restoration is effectively implemented (i.e., meets the success criteria in the Restoration Management Plan), these direct effects would be short term and of low to moderate intensity.

Areas of erosion-prone soils (see Section 3.2, *Geology and Soils*) are in the Project area. The soils in the Project area are prone to wind erosion, but have low susceptibility to water erosion due to the sandy nature of the soils, except those soils on steep slopes (> 15 percent). Erosion-control design features, such as water bars, cross drains, and vegetation restoration, would minimize upland erosion by directing runoff away from disturbed areas, decreasing velocities, and improving water infiltration. Avoidance, minimization, and mitigation measures, including silt fencing, also would mitigate impacts on receiving surface waters by providing sediment settling locations and engineered water velocity controls. Alternative A would result in the potential for site-specific increases of upland erosion during construction, thereby potentially increasing sediment load to streams. This impact would decrease with successful restoration; however, some continued increases in sedimentation could be expected in areas with poor or low restoration potential during operation and maintenance.

Temporary access to structures during construction could directly affect surface water hydrology by altering drainage patterns. NPPD would avoid temporary surface water crossings, where possible, by using existing road crossings and accessing structures from each side of the surface water crossing. Any temporary crossings, such as bridges and culverts, would be removed upon completion of construction, unless agreed to be left in place at the landowner's request. Culverts would be sized to accommodate calculated drainage, which would any minimize any impacts to surface water hydrology. Access routes could temporarily cut off overland flow and alter the hydrologic regime of the watershed be decreasing retention of flood waters and stormwater runoff travel time. Increases in erosion and decreases in streamside bank vegetation during construction could potentially affect channel stability beyond the construction phase of the Project. If restoration is effectively implemented, the temporary construction effects would not influence the long-term productivity of streams.

Temporary access routes that cross streams can alter surface runoff patterns and streamflow, including volume and velocity, resulting in channel instability, increased erosion, turbidity, and sediment deposition. NPPD would avoid crossings where possible by using existing roads and approaching streams from each side. Sedimentation effects from using existing roads are anticipated to be significantly less than effects from constructing new roads. None of the river crossings, named creek crossings, canal crossings, and one ditch crossing (all 16 crossings listed on Table 3.3-1) would be crossed by temporary access or any equipment because they would be approached from each side of the water course to reduce any adverse effects from construction activities on these water courses. Operation and maintenance of roads could also result in some erosion through stormwater runoff leading to sediment discharge to streams at more localized areas where long-term disturbance occurs or where permanent access roads are constructed or widened at stream crossings, drainage ways, or in proximity to streams. NPPD would complete a final Access Plan and submit it to the Service for review and approval once ground-based inspection of potential access is completed. The final Access Plan would delineate the location and types of access for each structure, including identification of necessary surface water crossings, and the type of equipment allowed to travel on each type of access. Access routes would be designed and constructed to minimize disruption of natural drainage patterns and waterbodies, including rivers, streams, ephemeral waterways, ponds, lakes, and reservoirs. Wherever needed, temporary culverts, bridges, or low-water crossings would be used to accommodate estimated peak flows of waterways (e.g., 10-year or 50-year flow event). Stream crossings and culvert installations would be monitored for the life of the access route and maintained as necessary to preserve water quality. Surface water crossings would be built as near as possible at right angles (perpendicular) to the streams and waterways. Implementation of avoidance, minimization, and mitigation measures would minimize adverse effects from construction, operation, and maintenance of roads, resulting in short-term, low-intensity effects on surface waters.

The potential for accidental releases of contaminants in the Project area could degrade water quality in nearby surface waters. The risk would be greatest during construction; however, this risk also would be present during operation and maintenance to a lesser extent. Construction, operation, and maintenance equipment and vehicles are potential sources of contaminants. Avoidance, minimization, and mitigation measures that NPPD would implement include performing refueling and maintenance activities in designated construction zones located approximately 100 yards from surface waters and implementing other prevention and containment measures as needed. A Spill Prevention, Control, and Countermeasure (SPCC) Plan would be developed as required by Federal law that store more 1,320 gallons of oil such as the three substations associated with the R-Project. While the risk of accidental release of contaminants would not be completely eliminated, the measures described above would minimize the risk of occurrence. Herbicides, if they are used to control noxious weeds and vegetation growth in the ROW and along permanent access roads, could also degrade water quality in nearby surface waters and shallow aquifers, but the risk would be minimal as long as application is done following labeled directions for use.

After the final Project design, NPPD would conduct additional surface water delineations and mapping to identify waters of the U.S. in areas not previously inventoried or field verified. However, any unavoidable impacts on potentially jurisdictional waters, whether temporary or permanent, would be discussed with USACE prior to construction to determine the permitting requirements and conditions necessary for construction involving surface waters in the Project ROW. NPPD would identify specific avoidance, minimization, and mitigation measures in consultation with USACE during the 404 permitting process and after final design is complete.

Following construction, temporary work areas and access improvements would be removed and the area restored to its original condition in accordance with the avoidance, minimization, and mitigation measures outlined below. The topsoil may be bladed back across temporary access routes in disturbed areas. In these areas, seeds and roots contained in the topsoil layer normally provide a natural source for new vegetation regrowth. Other temporary disturbed areas would be restored and revegetated to similar conditions as the surrounding area. The Project's restoration planning team, private landowners, local NRCS offices, and other rangeland experts would be consulted regarding the appropriate techniques, seed mix, and rate to revegetate areas disturbed during construction. If restoration of temporarily disturbed areas is successful, effects would not alter the physical or water quality characteristics of affected surface waters in the Project area. Overall short-term, direct effects on surface waters would be of low intensity. In the event restoration activities take longer to achieve success and the overall effects on surface waters occur for a longer term, effects would likely be of low to moderate intensity because previous restoration efforts likely would have achieved some results even prior to meeting the success criteria and stipulations of the Restoration Management Plan would apply.

Through the implementation of Alternative A, the direct effects would be greatest for short periods during construction and until successful revegetation has occurred. Avoidance and minimization measures would be developed prior to construction and included in an SWPPP to be implemented at work areas and receiving surface waters.

#### *Groundwater*

Shallow or near-surface groundwater is present in the Project area and, therefore, could be affected by construction activities. Groundwater quality degradation occurs mainly through infiltration at the recharge location. Shallow, unconfined aquifers, such as the Ogallala Aquifer located throughout most of Nebraska, with a high rate of recharge are generally more susceptible to contamination than are deep aquifers with an overlying confining unit and a low rate of recharge. In an area where land disturbance has occurred, contamination can be introduced to groundwater directly through the leaching of soils and infiltration of spills or leaks at the surface, or indirectly through recharge by a surface waterbody that has been contaminated.

Shallow groundwater aquifers would not be dewatered during excavation activities. Casing and/or drilling slurry installation methods would be used in areas with a shallow water table. Therefore, dewatering during excavation would not occur. The helical pier foundations used for lattice tower structures would not require excavation, so effects would be low intensity and short term for installation of lattice tower structures.

The relocation of five existing wells (number may change depending upon final negotiations with landowners) that serve livestock watering tanks and irrigation pivots along the transmission line centerline would have negligible impacts on groundwater resources. Existing wells would be capped and new wells drilled approximately 150 feet from their current location.

Implementation of avoidance, minimization, and mitigation measures—including properly maintaining equipment, storing fuels and petroleum away from excavated areas, and cleaning any spills before they enter a water resource—would result in localized short-term, low-intensity effects on groundwater resources.

#### *Floodplains*

In general, the direct effects on floodplains during construction would be short term and there would be a low-intensity to no increase in risk of flood loss or change to natural and beneficial floodplain values.

As discussed under the Affected Environment section, floodplain mapping and Flood Insurance Rate Maps are only available for a portion of the study area. Therefore, floodplain vegetation identified by LANDFIRE (see Section 3.5, *Vegetation*) was used to analyze potential disturbance of floodplains in the Project area. The potential disturbance to LANDFIRE-identified floodplain vegetation is described in Table 3.3-3.

**Table 3.3-3. Acres of Potential Disturbance to Floodplain Vegetation Types under Alternative A**

| Disturbance Type | Floodplain Vegetation Types |
|---|---|
| Structure work areas | 5.2 |
| Fly yards/assembly yards | 6.5 |
| Construction yards/staging areas | 13.9 |
| Pulling and tensioning sites | 5.9 |
| Temporary access | 2.7 |
| Distribution power line moves | 3.6 |
| **Total Acres** | **37.8** |

Source: NPPD (2015a)

Areas of potential disturbance occur in floodplain vegetation of the North and South Platte rivers, the North and South Loup rivers, Calamus River, Big Cedar Creek, Birdwood Creek, and Clearwater Creek (see Figure 3.3-2). The only tall floodplain vegetation (trees) that would be removal is located next to the North and South Platte rivers. These trees would need to be removed within the ROW to allow for adequate transmission line clearance. Watercourses that convey natural flows, whether mapped as floodplains or flood hazard areas or not, could have some level of floodplain effect.

To protect floodplains, some cities or counties have floodplain and drainage regulations for floodplain development. Where established, these regulations typically prohibit floodplain development that would result in flooding of the development (i.e., in a 100-year floodplain), and prohibit floodplain development that would result in adverse flooding impacts to other properties (i.e., those that raise water levels on other property or diversions and concentrations of flow). Flood-zone permits are required for Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, Blaine, Rock, Loup, Holt, Garfield, Antelope, and Wheeler counties. For sites in the Project area that fall in the 100-year floodplain, any Project structures located in these areas would need to meet the development criteria for building in a floodplain.

NPPD indicates that placing structures in floodplains would be avoided with approximately 1,350-foot spans (average ruling span) between structures. However, any floodplain requiring longer spans could require larger spans between structures or siting of structures in the floodplain. Structures located in floodplains have the potential to obstruct overbank flood flows and to increase the risk of damage to the structures from debris in the water colliding with structures or by flows scouring around structure foundations.

Although transmission line structures may be necessary in floodplains, due to their design and minimal footprint (monopole structures—7- to 11-foot-diameter foundation; steel lattice towers—3 to 4 foundations per tower depending on type, approximately 7- to 12-inch-diameter each), and through adherence to the permit requirements, they are not expected to impede or redirect flood flows, adversely affect the capacity of the floodplains, or affect the pattern and magnitude of flood flows. Furthermore, because the span lengths (i.e., 1,350 feet) could allow for placement of towers at distances of hundreds of feet from active river channels, no scour is expected to result in structural or property damage or to affect the stability of the bed and banks of a waterway.

Alternative A would span most of the floodplain areas, transmission line structures would be set back from channel banks to avoid effects, and avoidance, minimization, and mitigation measures would be followed; therefore, short-term, low-intensity effects on floodplains are expected during construction, operation, and maintenance of the Project. Excavated spoils not used for backfill would be hauled offsite and disposed of in non-floodplain and nonsensitive environmental areas. Any debris such as trees or brush generated during construction would be removed from the floodplain or other areas subject to flooding.

### Indirect Effects

Indirect, short- and long-term effects in association with construction, operation, and maintenance of the Project from tree clearing, soil disturbance, and use of potential contaminants outside surface waters could include the following: 1) increased erosion and sedimentation transport into surface waters outside the Project area, 2) changes in downstream channel geomorphology and stability, 3) decreased infiltration and groundwater recharge, and 4) accidental release of contaminants into surface waters outside the Project area.

Under Alternative A, indirect effects on surface waters could occur as a result of increased erosion and corresponding sediment transport into down-gradient surface waters in preparing for transmission structure installation and construction of communication regeneration sites; construction, operation, and maintenance of temporary access routes; and other temporary disturbances during construction, operation, and maintenance.

Indirect effects on water quality could occur from ground disturbance in upland areas when precipitation events cause overland runoff to erode bare soils and transport sediment to off-site surface waters, and create changes in channel geomorphology and stability.

Vegetation naturally functions to hold soils in place; once vegetation is removed from a site, the potential for soil erosion and surface runoff increases as does the potential for increasing sediment loading in nearby surface waters. As surface runoff increases, infiltration rates and groundwater recharge rates are reduced. Removing vegetation would also reduce the natural rates of evapotranspiration, which transfers groundwater to the atmosphere. In general, effects associated with vegetation clearing during construction are expected to be temporary in nature and mitigated. Clearing of vegetation would likely not be needed in the majority of the ROW because it occurs in areas previously used for agriculture and in areas with short vegetation, such as grasslands/prairies or pastures. However, traversing areas, especially those with 15 percent slopes could have negative effects through vegetation disturbance.

Temporary access route construction would remove vegetation, disturb and expose soils, and increase the potential for erosion and sediment loading to adjacent surface waters. Design features such as water bars across the roads would decrease this impact by diverting water to undisturbed areas, thus, limiting the distance that water would run down disturbed areas and slowing the runoff once it reached the undisturbed, vegetated areas. Access route culverts should be designed with capacity to carry the existing stream flow. However, if a culvert is sized inappropriately, flow concentration at a culvert can have downstream effects such as channel incision and streambank erosion.

Once restoration is complete in the temporary work areas, the vegetative cover would be reestablished, thereby decreasing erosion. As the vegetative cover approaches desired density levels, the erosion rate also would approach pre-construction levels. However, areas of low restoration potential (see Section 3.2, *Geology and Soils*) and periods of minimal precipitation might extend this time frame for successful vegetation restoration.

Accidental release of contaminants from vehicles and equipment and the use of herbicides could impact off-site surface waters in the same manner as discussed under direct effects.

Overall short- and long-term, indirect effects on surface waters would be of low intensity. In the event restoration activities are not successful, and the overall effects on water resources would be long-term and of low to moderate intensity.

#### 3.3.2.3 Alternative B: Tubular Steel Monopole Structures Only

Effects on water resources under Alternative B would be similar to Alternative A with differences from increases in the area of ground disturbance associated with access improvements and tower foundations associated with monopole construction. However, NPPD's final route under Alternative B would be the same as under Alternative A and crossings of water resources would occur at the same locations. Specific effects on water resources as a result of the various construction, operation, and maintenance activities associated with implementation of Alternative B are described below.

**Direct Effects**

Direct effects on water resources under Alternative B would generally be the same as or similar to those under Alternative A. Effects on surface waters, groundwater, and floodplains under Alternative B from construction, operation, and maintenance in and adjacent to the Project area would be short and long term and would vary in intensity from low to moderate.

***Surface Waters***

Under Alternative B, direct effects on surface water quality would be the same as Alternative A and could occur as a result of: 1) sediment loads, 2) stream crossings during construction and operation, 3) alterations to surface drainage and surface water flow and volume, 4) stream channel instability, 5) degraded water quality, 6) accidental release of contaminants, and 7) increased water use during construction.

Crossings of rivers, creeks, canals, ditches, lakes, and impaired waters would be the same under Alternative B (listed in Table 3.1-1) as Alternative A and would be spanned by the transmission line. Individual structures would be located well outside the banks to avoid potential effects. Based on this placement, permanent structures would not change the free-flowing nature or values of streams in the Project area.

Direct effects on water quantity under Alternative B from construction, operation, and maintenance that would include alterations to surface drainage and surface water flow and volume from tree clearing, excavation, grading, and leveling are similar to those described for Alternative A. The amount of ground disturbance at each steel monopole location and for permanent access associated with the substations, operations and maintenance, or roads left at landowner's request overall, would be greater compared to Alternative A. The increase in permanent disturbance would cause increased alterations to surface drainage and surface water flow compared to Alternative A.

Erosion-control design features and avoidance, minimization, and mitigation measures under Alternative B, such as water bars, cross drains, silt fencing, and vegetation restoration, would be the same as under Alternative A and would mitigate impacts on receiving surface waters by providing sediment settling locations and engineered water velocity controls. Avoidance, minimization, and mitigation measures are designed to reduce effects on surface waters but may not fully eliminate those effects. Implementation of Alternative B would result in the potential for site-specific increases of upland erosion during construction, thereby potentially increasing sediment load to streams. This impact would decrease with successful restoration; however, some continued increases in sedimentation could be expected in areas with poor or low restoration potential during operation and maintenance.

Temporary access to structures during construction under Alternative B that could directly affect surface water hydrology by altering drainage patterns would be greater compared to Alternative A. Temporary access under Alternative B for monopole installation would require using Access Scenario 2 to travel to structure locations, resulting in an increase in temporary disturbance. Access Scenario 2 would require some improvement to existing trails and overland travel with large or heavy equipment that may require improvements for access, potentially resulting in greater alteration of drainage patterns. The disturbance in structure work areas would be greater, approximately twice as much under Alternative B compared to Alternative A.

NPPD would avoid temporary surface water crossings under Alternative B, where possible, by using existing road crossings and accessing structures from each side of the surface water crossing. Any temporary crossings under Alternative B would follow the same requirements as under Alternative A. Access routes could temporarily cut off overland flow and alter the hydrologic regime of the watershed by decreasing retention of flood waters and stormwater runoff travel time. Increases in erosion and decreases in streamside bank vegetation during construction could potentially affect channel stability beyond the construction phase of the Project. These impacts would be greater under Alternative B because of the need for more temporary access for steel monopole installation. If restoration is effectively implemented, the temporary construction effects would not influence the long-term productivity of streams.

Effects on surface waters from temporary access routes that cross streams under Alternative B would be the same as Alternative A and would include potential alteration of surface runoff patterns and streamflow, including volume and velocity, resulting in channel instability, increased erosion, turbidity, and sediment deposition. As described for Alternative A, NPPD would avoid crossings where possible by using existing roads and approaching streams from each side. Operation and maintenance of roads would be the same as under Alternative A and could result in some erosive action through stormwater runoff leading to sediment discharge to streams at more localized areas where long-term disturbance occurs or where permanent access roads are constructed or widened at stream crossings, drainage ways, or in proximity to streams.

As described for Alternative A, a final Access Plan would be completed for the Project once ground-based inspection of potential access is completed and submitted to the Service for review. Access routes would be designed and constructed to minimize disruption of natural drainage patterns and waterbodies, including rivers, streams, ephemeral waterways, ponds, lakes, and reservoirs. Wherever needed, temporary culverts, bridges, or low-water crossings would be used to accommodate estimated peak flows of waterways (e.g., 10-year or 50-year flow event). Stream crossings and culvert installations would be monitored for the life of the access route and maintained as necessary to preserve water quality. Surface water crossings would be built as near as possible at right angles (perpendicular) to the streams and waterways. Implementation of avoidance, minimization, and mitigation measures would minimize adverse effects from construction, operation, and maintenance of roads, resulting in short-term and low-intensity effects on surface waters.

#### *Groundwater*

Direct effects on groundwater under Alternative B would generally be the same as or similar to those described for Alternative A. Shallow groundwater aquifers would not be dewatered during excavation activities. Casing and/or drilling slurry installation methods would be used in areas with a shallow water table; therefore, dewatering during excavation would not occur. The effects of excavation for the installation of steel monopole foundations would be greater under Alternative B from the increase in the number of steel monopoles, resulting in long-term effects of moderate intensity.

Implementation of avoidance, minimization, and mitigation measures—including properly maintaining equipment, storing fuels and petroleum away from excavated areas, and cleaning any spills before they enter a water resource—would result in localized short-term, low-intensity effects on groundwater resources.

#### *Floodplains*

In general, the direct effects during construction under Alternative B of the Project on floodplains would be short term and there would be a low-intensity to no increase in risk of flood loss or change to natural and beneficial floodplain values.

As discussed in the Affected Environment section, floodplain mapping and Flood Insurance Rate Maps are only available for a portion of the study area. Therefore, floodplain vegetation identified by LANDFIRE (see Section 3.5, *Vegetation*) was used to analyze potential disturbance of floodplains in the Project area. The potential disturbance to LANDFIRE-identified floodplain vegetation is described in Table 3.3-4. Overall, under Alternative B, approximately 1.0 acre less of floodplain vegetation would be disturbed because of the removal of temporary fly yards and assembly areas. However, more acres of floodplain vegetation would be temporarily disturbed in structure work areas, pulling and tensioning sites, and in temporary access areas compared to Alternative A.

**Table 3.3-4. Acres of Potential Disturbance to Floodplain Vegetation Types under Alternative B**

| Disturbance Type | Floodplain Vegetation Types |
|---|---|
| Structure work areas | 8.6 |
| Fly yards/assembly yards | - |
| Construction yards/staging areas | 13.9 |
| Pulling and tensioning sites | 6.7 |
| Temporary access | 4.0 |
| Distribution power line moves | 3.6 |
| **Total Acres** | **36.8** |

Source: NPPD (2016b)

NPPD indicates that placing structures in floodplains would be avoided with approximately 1,350-foot spans (average ruling span) between structures; however, any floodplain requiring longer spans could require larger spans between structures or siting of structures in the floodplain. Structures located in floodplains have the potential to obstruct overbank flood flows and to increase the risk of damage to the structures from debris in the water colliding with structures or by flows scouring around structure foundations.

Although transmission line structures may be necessary in floodplains, because of their design and minimal footprint (monopole structures require a 7- to 11-foot-diameter foundation) and through adherence to the permit requirements, the transmission line structures are not expected to impede or redirect flood flows, adversely affect the capacity of the floodplains, or affect the pattern and magnitude of flood flows. Furthermore, because the span lengths (i.e., 1,350 feet) could allow for placement of towers at distances of hundreds of feet from active river channels, no scour is expected to result in structural or property damage or to affect the stability of the bed and banks of a waterway.

Alternative B would span most of the floodplain areas; transmission line structures would be set back from channel banks to avoid effects; and avoidance, minimization, and mitigation measures would be followed; therefore, short-term, low-intensity effects on floodplains are expected during construction, operation, and maintenance of the Project. Excavated spoils not used for backfill would be hauled offsite and disposed of in non-floodplain and nonenvironmentally sensitive areas. Any debris such as trees or brush generated during construction would be removed from the floodplain or other areas subject to flooding.

### Indirect Effects

The indirect, short- and long-term effects from tree clearing, soil disturbance, and use of potential contaminants in association with construction, operation, and maintenance of the Project under Alternative B would be similar to those described for Alternative A and could include the following: 1) increased erosion and sedimentation transport into surface waters outside the Project area, 2) changes in downstream channel geomorphology and stability,

3) decreased infiltration and groundwater recharge, and 4) accidental release of contaminants into surface waters outside the Project area.

Once restoration is complete in the temporary work areas, NPPD would reestablish the vegetative cover, thereby decreasing erosion. As the vegetative cover approaches desired density levels, the erosion rate also would approach pre-construction levels. However, areas of low restoration potential (see Section 3.2, *Geology and Soils*) and periods of minimal precipitation might extend this time frame for successful vegetation restoration. If restoration is not effective, stipulations outlined in the Project escrow agreement would apply.

Overall short- and long-term, indirect effects on water resources would be of low intensity. In the event restoration activities are not successful, the overall effects on water resources would be long term and of low to moderate intensity.

### 3.3.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on water resources:

- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas, where practicable based on availability and landowner approval, outside proximity to water resources.
- Use helicopters for erecting lattice structures (Alternative A only), stringing sock line, and mobilizing certain equipment.
- Use temporary improvements for access, including temporary bridges, culverts, and matting at stream and wetland crossings; remove fill material and geofabric and revegetate disturbed areas following construction.
- Restrict all construction vehicle movement outside the ROW to designated access routes and established roads other than for emergency situations.
- Install culverts in a manner to maintain the existing hydrology of the landscape and place them at existing stream bed elevation to avoid drainage.
- Span rivers and streams by transmission lines.
- Avoid in-water work during construction and maintenance of the Project.
- Use existing river and stream crossings for construction access where available; use temporary bridges or culverts that do not alter stream flow or the channel to minimize effects where existing crossings cannot be used.
- Use overland travel routes to access opposite banks and avoid stream crossings, when possible.
- Implement erosion and sediment controls throughout construction, including stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment before reaching receiving waters.

- Avoid placing permanent structures in surface waters; delineate, map, and field verify surface waters along NPPD's final route for the final design of the Project.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access to each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.3.4 Effects Summary

Implementation of Alternative A would result in both short- and long-term, direct and indirect, adverse and beneficial impacts. These adverse impacts would be minimized once temporarily disturbed areas are successfully restored. Therefore, because avoidance, minimization, and mitigation measures would minimize impacts on this resource, Alternative A would not have potential for significant, adverse impacts on water resources.

Implementation of Alternative B would have both short- and long-term, direct and indirect, and adverse impacts. Adverse impacts would be minimized once temporarily disturbed areas are restored. Because avoidance, minimization, and mitigation measures would minimize impacts on this resource, Alternative B would not have potential for significant, adverse impacts on water resources.

The amount of ground disturbance at each steel monopole location and for permanent access associated with the substations, operation, and maintenance under Alternative B would be greater than Alternative A. The increase in permanent disturbance would cause increased alterations to surface drainage and surface water flow compared to Alternative A. Temporary access to structures during construction under Alternative B that could directly affect surface water hydrology by altering drainage patterns would be greater compared to Alternative A. The disturbance in structure work areas would be greater, approximately twice as much under Alternative B compared to Alternative A. The effects of excavation for the installation of steel monopole foundations would be greater under Alternative B from the increase in the number of steel monopoles that would result in long-term, effects of moderate intensity. Under Alternative B, approximately 1.0 acre less of floodplain vegetation would be disturbed because of the removal of temporary fly yards and assembly areas. However, more acres of floodplain vegetation would be temporarily disturbed in structure work areas, pulling and tensioning sites, and in temporary access areas compared to Alternative A.

## 3.4 Wetlands

### 3.4.1 Affected Environment

Wetlands are defined for regulatory purposes in the CWA. USEPA and USACE administer the permit program outlined in Section 404 of the CWA. Wetlands under USACE jurisdiction are defined as: "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of wetland vegetation typically adapted for life in saturated soil conditions" (USACE 1987). Executive Order 11990, *Protection of Wetlands*, requires Federal agencies to minimize the destruction, loss, or degradation of wetlands when providing Federally undertaken, financed, or assisted construction and improvements, as well as other activities. Wetlands in the study area that are non-jurisdictional wetlands under the CWA would not require mitigation. Executive Order 11990 includes a broader definition of wetlands than the CWA and protects wetlands that may not be considered jurisdictional under the CWA, such as wet meadows. Wetlands in the study area would also receive protection under the Swamp Buster Provisions of the Food Security Act. Farmers and ranchers who participate in the Farm Program cannot drain or fill wetlands and continue to remain in the farm program and third party conversions are prohibited. The area inventoried to characterize the affected environment for wetlands (i.e., study area) is described in Table 3.1-1.

Source: NGPC

*Palustrine emergent wetland*

The hydrologic regime, which affects the frequency, depth, and duration of flooding or soil saturation, greatly influences the type of plant communities that develop in wetlands. Some wetlands, such as lakes, ponds, or perennial streams, are associated with relatively permanent water sources. Many of these wetlands, particularly river corridors and lake margins, support deciduous forest or woodland communities with species such as cottonwood, aspen, willow, green ash, elm, or box elder. Many wetlands, however, have seasonal or intermittent sources of water, resulting in inundation or saturation near the soil surface for part of the growing season, usually in the spring. Riparian communities occur along perennial and intermittent streams, rivers, and reservoirs. These communities form a zone along the water margin with a species composition and density that are distinct from the adjacent upland area. These may be emergent marsh, scrub-shrub, or forest communities. Riparian communities may include wetlands; however, the upper margins of riparian zones may be inundated only infrequently and include non-wetland plant species. Wetlands supported predominantly by groundwater flow include fens, springs, and seeps.

The disparity of precipitation from east to west in Nebraska, as shown in Figure 3.4-1, can be directly observed by noting the density of wetlands in the eastern portion of the study area versus the relatively dry areas of Sandhills ecoregion located in the western portion of the study area (Chapman et al. 2001). Many of the valleys in the northwestern portion of the study area contain lakes, marshes, wet meadows, and fens (Schneider et al. 2011). Farther east in the study area, sub-irrigated meadows and wetlands and low-profile rolling sand dunes with interspersed marshes and lakes, which are scattered throughout the area, dominate the flatter areas (Schneider et al. 2011). Nebraska is broken up into fourteen major wetland complexes—Eastern Saline, Western Alkaline, Rainwater Basin, Missouri River, Elkhorn, Niobrara, Central Table Playas, Southwest Playas, Todd Valley, Central Platte, Lower North Platte, Lower Platte, Loup/Platte River Sandhills, and Sandhills (Gersib 1991). The Project is located in the Sandhills major wetland complex. Wetland communities in the study area and their dominant vegetation are described in detail under Section 3.5, *Vegetation*.

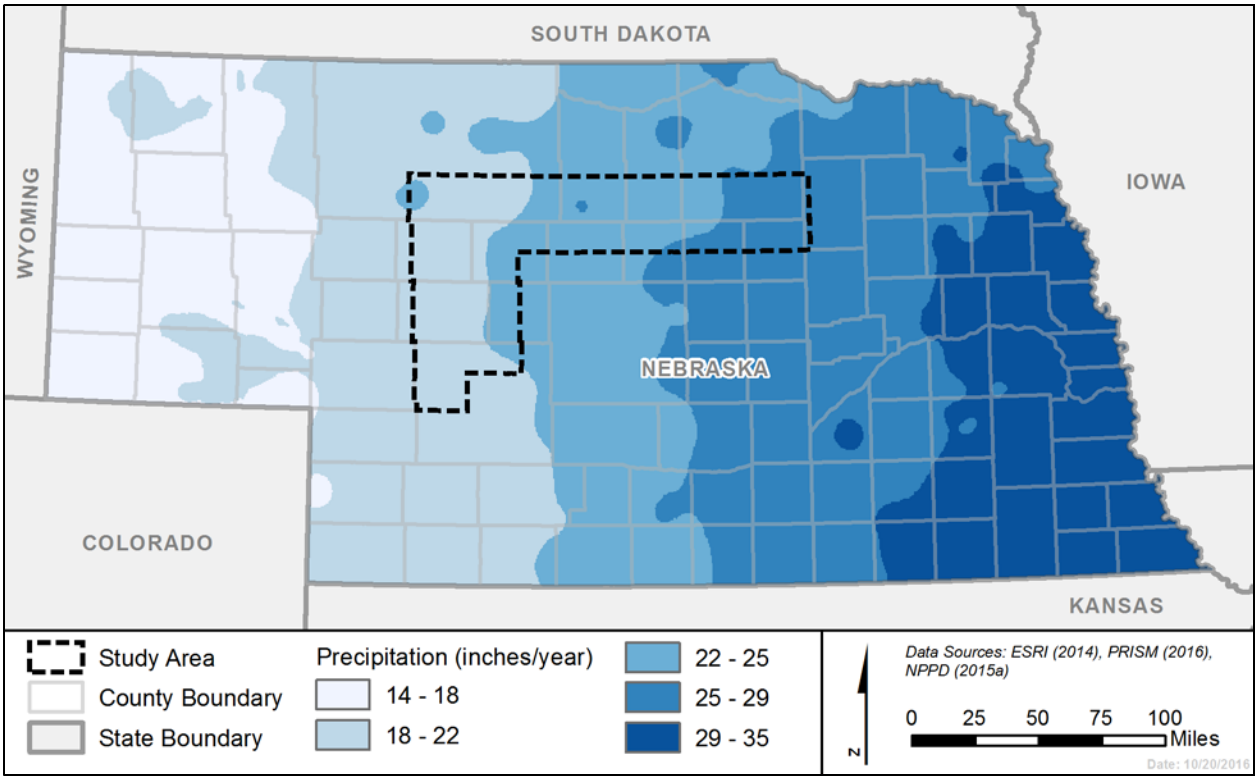



**Figure 3.4-1. Nebraska Precipitation**

Numerous wetlands have formed where the Nebraska Sandhills ecoregion's high water table meets the ground surface in valleys and sub-irrigated meadows. Approximately 1.3 million acres of wetlands are located in the Nebraska Sandhills ecoregion, ranging in size from less than 1 acre to 2,300 acres with greater than 80 percent of all wetlands estimated to be 10 acres or less in size (Wolfe 1984). These shallow wetlands occur in depressions where surface drainage is poor and the water table is high. They are fed by precipitation from melting snow and spring rains as well as the underlying aquifer. Although precipitation is low and evaporation rates are high, the Ogallala Aquifer provides a water table at or

***Wetlands***

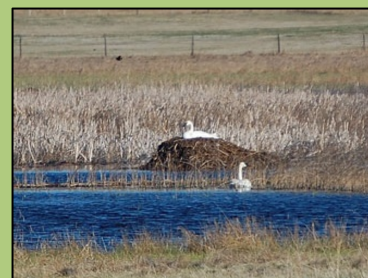
The Nebraska Sandhills has approximately 1.3 million acres of wetlands. Many of these receive little protection under the CWA but do receive protection under Executive Order 11990 and Swampbuster Provisions of the Food Security Act.

near the surface for discharge into a vast array of wetlands, even during drought (LaGrange 2005).

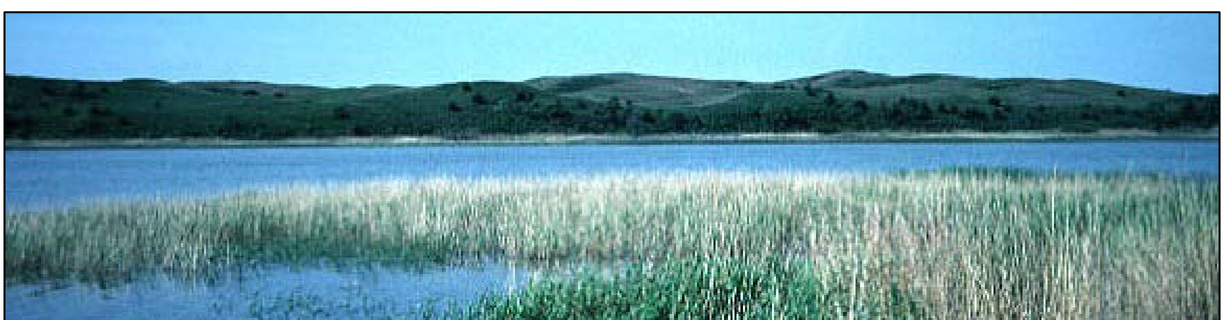
Wetlands provide many benefits to the human, biological, and hydrological environment, including water quality improvement, flood flow and attenuation maintenance, shoreline stabilization, recharge, sediment removal and nutrient cycling, and aquatic productivity (USEPA 2002). The Sandhills wetlands are extremely valuable to the region's ranchers and the ranching economy. These wetlands, especially the wet meadows provide abundant and nutritious forage that is used as winter cattle feed. Wetlands also offer grazing sites and a source of water to livestock. Many common and special status wildlife and plant species occur in the wetlands in the study area. See Sections 3.5, 3.6, and 3.7 for a full review of species that may use wetland habitat.

***Birds and Wetlands***

More than 300 species of birds have been recorded in the Sandhills, and more than 125 show an ecological affinity to wetland habitats as do this pair of nesting tundra swans.



Wetland loss in the Sandhills has occurred primarily from draining to increase hay production and filling activities to facilitate row crop production. With the introduction of the center-pivot irrigation system to the Sandhills in the early 1970s, land leveling/shaping resulted in extensive wetland loss or long-term effects by lowering the water table in some areas (LaGrange 2005). Threats and stresses to wetlands in Nebraska include conversion to other uses, alterations in the watershed, siltation, invasive species, woody invasion, extended rest from disturbance that leads to loss of native plant diversity (e.g., areas that are not used for foraging by livestock), fragmentation of wetlands by roads or other factors that increase edge effect, repetitive management at the same time each year that reduces plant diversity and increases non-native plant invasion, and overgrazing (LaGrange 2010). Increased sedimentation can alter the natural depths and hydro-periods of wetlands and encourage the dominance of invasive plant species. Invasive species can form dense monotypic stands in wetlands reducing habitat and wildlife diversity. Fragmentation of wetlands increases the edge effect often leading to increased invasion



Source: NGPC

*Palustrine emergent/unconsolidated bottom Sandhills lake and wetland* by non-native and aggressive species, a loss of genetic diversity, and degradation of wildlife habitat (LaGrange 2010).

Wetlands in the study area were inventoried using NWI data from the Service (USFWS 2015a). The NWI classifies wetlands according to the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), which defines wetlands as: "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water." For the purposes of this classification wetlands must have one or more of the following three attributes:

1. The land supports more than 50 percent cover of hydrophytic (living in water-logged conditions) plant species at least periodically during the growing season.
2. The substrate is predominantly undrained hydric soil.
3. The substrate is a non-soil and is annually saturated with water or covered by shallow water at some time during the growing season.

Source: Louis Berger Team

*Wetlands near Birdwood Creek along the actual R-Project route*

NWI maps are designed to assist in identifying potential wetlands and wet areas, however, most wetlands identified have not been field verified to determine if they meet the regulatory definition of a wetland promulgated by USACE and USEPA (40 CFR § 232.2) or Executive Order 11990. The Cowardin Classification System defines wetlands based on major classes of wetlands, including estuarine, riverine, lacustrine, and palustrine. In addition to wetlands, some lakes, ponds, or rivers may include deepwater habitats, the margins of which are typically located 6.6 feet below the water level (Cowardin et al. 1979).

Three wetland systems, as defined by Cowardin et al. (1979), occur in the study area: lacustrine, palustrine, and riverine. Lacustrine wetland systems are situated in a topographic depression or a dammed river channel; lack trees, shrubs, persistent emergent vegetation, emergent mosses, or lichens with greater than 30 percent areal coverage; and have a total area exceeding 20 acres (Cowardin et al 1979). Palustrine wetlands are dominated by trees, shrubs, emergent, mosses, or lichens, and if lacking such vegetation, are less than 20 acres, do not have an active wave-formed or bedrock shoreline feature, and have at low water a depth less than 6.6 feet in the deepest part of the basin (Cowardin et al. 1979). Riverine wetland systems include all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or that form a connecting link between the two bodies of standing water (Cowardin et al. 1979).

According to the NWI, the study area contains approximately 119,667 acres of wetlands, including 7,740 acres of lacustrine (6 percent of the wetlands in the study area), 101,560 acres of palustrine (85 percent of the wetlands in the study area), and 10,367 acres of riverine (9 percent of the wetlands in the study area) (Table 3.4-1).

**Table 3.4-1. NWI Wetlands in the R-Project Study Area**

| U.S. Fish and Wildlife Service's Mapping Code | Description | Total NWI Acreage | Percentage of NWI Acres of Wetland Types in the Study Area |
|---|---|---|---|
| **Lacustrine** | | **7,740** | **6.4** |
| L1UB | Lacustrine limnetic unconsolidated bottom | 3,344 | 2.8 |
| L2AB | Lacustrine littoral aquatic bed | 4,396 | 3.6 |
| **Palustrine** | | **101,560** | **84.9** |
| PEM | Palustrine emergent | 87,251 | 72.9 |
| PSS | Palustrine scrub-shrub | 2,300 | 1.9 |
| PFO | Palustrine forested | 1,726 | 1.4 |
| PAB | Palustrine aquatic bed | 1,804 | 1.5 |
| PUB | Palustrine unconsolidated bottom | 216 | 0.2 |
| PUS | Palustrine unconsolidated shore | 89 | <0.1 |
| PEM/PSS | Palustrine emergent/Palustrine scrub-shrub | 1,524 | 1.3 |
| PEM/PFO | Palustrine emergent/Palustrine forested | 108 | <0.1 |
| PEM/AB | Palustrine emergent/Palustrine aquatic bed | 1,374 | 1.2 |
| PEM/PUS | Palustrine emergent/Palustrine unconsolidated shore | 4 | <0.1 |
| PSS/PEM | Palustrine scrub-shrub/Palustrine emergent | 2,580 | 2.2 |
| PSS/PFO | Palustrine scrub-shrub/Palustrine forested | 1 | <0.1 |
| PSS/PUS | Palustrine scrub-shrub/Palustrine unconsolidated shore | 15 | <0.1 |
| PFO/PEM | Palustrine forested/Palustrine emergent | 136 | 0.1 |
| PFO/PSS | Palustrine forested/Palustrine scrub-shrub | 8 | <0.1 |
| PAB/PEM | Palustrine aquatic bed/Palustrine emergent | 2,424 | 2.0 |

| U.S. Fish and Wildlife Service's Mapping Code | Description | Total NWI Acreage | Percentage of NWI Acres of Wetland Types in the Study Area |
|---|---|---|---|
| PUS/PEM | Palustrine unconsolidated shore/Palustrine emergent | <1 | <0.1 |
| **Riverine** | | **10,367** | **8.7** |
| R2UB | Riverine lower perennial unconsolidated bottom | 8,228 | 6.9 |
| R2US | Riverine lower perennial unconsolidated shore | 2,075 | 1.7 |
| R4US | Riverine intermittent | 64 | 0.1 |
| **Total** | | **119,667** | **100** |

Source: USFWS (2015a)

NWI mapped the following general types of wetlands in the three wetland systems (USFWS 2015a) in the study area, as described below (Figure 3.4-2 and Table 3.4-1):

- Lacustrine limnetic wetlands (L1) are open water lakes, and lacustrine littoral wetlands (L2) are situated on the lake shore. Plant species along lake shores typically support ripgut sedge (*Carex lacustris*), common reed (*Phragmites australis*), smartweeds (*Polygonum* spp.), hard-stem bulrush (*Schoenoplectus acutus*), broad-leaf cattail (*Typha latifolia*), duckweeds (*Lemna* spp.), arrowheads (*Sagittaria* spp.), and hornworts (*Ceratophyllum* spp.).
- Palustrine emergent wetlands (PEM) have a dominance of erect rooted herbaceous (not woody) wetland plants. This vegetation is usually dominated by perennial plants for most of the growing season in most years. In the prairies of the central United States, above normal climatic fluctuations cause PEM wetlands to revert to an open water phase in some years. Common plant species include sedges, spikerushes, common reed, reed canary grass (*Phalaris arundinacea*), prairie cordgrass, switchgrass, swamp milkweed (*Asclepias incarnata*), cattails (*Typha* spp.), and bulrushes (*Schoenoplectus* spp.).
- Palustrine scrub-shrub wetlands (PSS) are wetlands that have vegetation that is less than approximately 20 feet (6 meters) tall. Common plants might include shrubs, saplings, or stunted trees including sandbar willow (*Salix interior*), false indigo-bush (*Amorpha fruticosa*), peach-leaf willow (*Salix amygdaloides*), coyote willow (*Salix exigua*), and chokecherry (*Prunus virginiana).* Scrub-shrub wetlands may represent a successional stage leading to a forested wetland or they may be relatively stable communities.

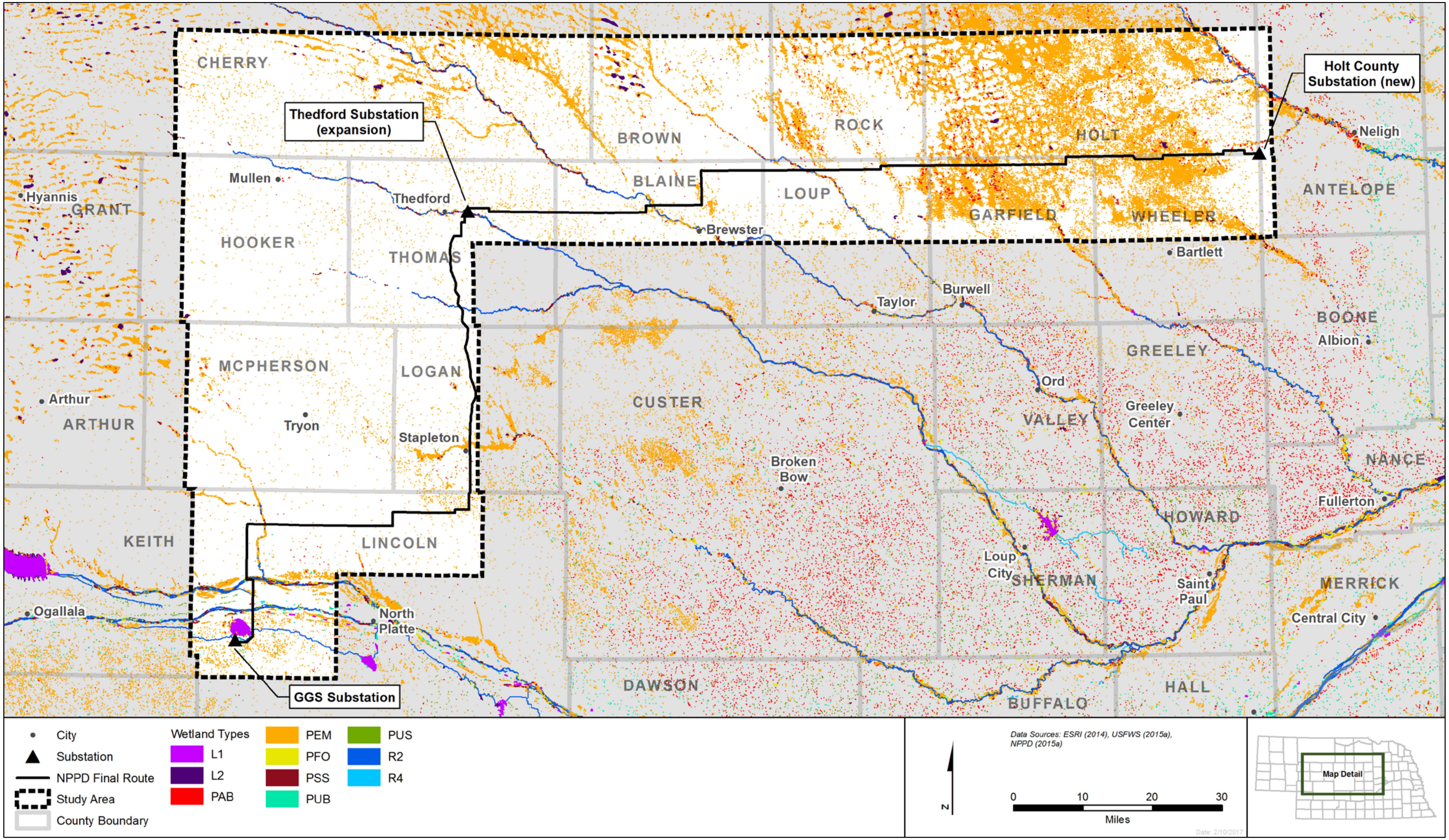



**Figure 3.4-2. NWI Wetland Types in the R-Project Study Area**

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- Palustrine forested wetlands (PFO) have woody vegetation that is approximately 20 feet (6 meters) tall or more. Forested wetlands normally possess an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer. Common species in forested wetlands are plains cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*), hackberry (*Celtis occidentalis*), eastern red cedar (*Juniperus virginiana*), American plum (*Prunus americana*), and American elm (*Ulmus americana*). Bur oak (*Quercus macrocarpa*), basswood (*Tilia americana*), black walnut (*Juglans nigra*), and green ash typically occur on south-facing bluffs. Tallgrass species grow underneath the trees and may include switchgrass and big bluestem (*Andropogon gerardii*).
- Palustrine aquatic bed wetlands (PAB) are generally permanently flooded areas that are vegetated by plants growing principally on or below the water surface. Common plant species include curly pondweed (*Potamogeton crispus*), milfoil (*Myriophyllum* spp.), buttercup (*Ranunculus* spp.), two-leaf waterweed (*Elodea bifoliata*), watercress (*Nasturtium officinale*), and star duckweed (*Lemna trisulca*).
- Palustrine unconsolidated bottom wetland (PUB) are generally permanently flooded areas, such as freshwater or manmade ponds, and palustrine unconsolidated shore wetlands (PUS) are situated on the shore of ponds. Plant species along pond shores are similar to plants along lake shores. The unconsolidated bottom class of wetlands includes all wetlands and deep-water habitats that have “at least 25 percent cover of particles smaller than stones (less than approximately 3 inches) and a vegetative cover of less than 30 percent” (Cowardin et al. 1979).
- Riverine, lower perennial wetlands (R2) and riverine, intermittent wetlands (R4) are found in river and stream channels and are strongly influenced by seasonal runoff patterns. Riverine vegetation typically includes a mixture of PSS and PFO plant species.

The primary lacustrine wetlands in the study area include Carson Lake, Willow Lake, Swan Lake, Goose Lake, Calamus Reservoir SRA and WMA and Sutherland Reservoir SRA. PEM wetlands are primarily located in the north to northeastern portion of the study area, as are most of the PAB wetlands. The PFO wetlands are primarily associated with the North Platte River, South Platte River, Elkhorn River, South Fork of the Elkhorn River, and adjacent to PEM wetlands in the eastern portion of the study area. The PSS wetlands are primarily located near permanent water, near lakes, and along river bottoms in association with riverine wetlands. The riverine wetlands are primarily associated with the South Platte River, North Platte River, Dismal River, South Loup River, Middle Loup River, North Loup River, Calamus River, Cedar River, and Birdwood Creek. In some areas, natural wetlands identified in the study area occur as wetland complexes composed of two or more types of wetlands (i.e., PSS/PFO) (USFWS 2015a). Table 3.4-1 summarizes the wetland habitat types in the study area and their acreage based on the NWI.

Cowardin et al. (1979) uses modifiers to further describe wetlands, including water regime modifiers and special modifiers. Hydrological characteristics of wetlands in the study area vary and include a suite of water regime modifiers as described in Cowardin et al. (1979). The water regime modifiers in the study area include permanently flooded, intermittently exposed, semi-permanently flooded, seasonally flooded, saturated, and temporarily flooded wetlands. Special modifiers apply to wetlands and deepwater habitats that are man-made and natural wetlands and deepwater habitats that have been modified to some degree by the activities of man or beaver. These modifications often greatly influence the character of wetlands and deepwater habitats. Less than 1 percent of the wetlands in the study area are man-made or natural wetlands that have been altered. Special modifiers for wetlands in the study area include wetlands that have been excavated, diked/impounded, or partially ditched and drained.

Hydric soils are formed under saturation, flooding, or ponding for a sufficient period to develop anaerobic characteristics in the upper soil horizons. Hydric soils, combined with surface water or shallow groundwater and indicative vegetation species, are necessary indicators of wetlands. Hydric soil data were obtained from the NRCS Soil Survey Geographic database for counties in the study area. The soils in the study area are predominantly classified as not hydric (97 percent). Hydric soils in the study area are described in Section 3.2, *Geology and Soils*.

Under the CWA, an inventory of wetlands and other waters of the United States is required to identify potential effects from the R-Project on waters of the United States. Information gathered during the inventories would be used to complete notification and permitting requirements under Sections 401 and 404 of the CWA, as managed by USACE and applicable state agencies under the review of USEPA. Information would also be used to ensure compliance under Executive Order 11990 and the Swamp Buster Provisions of the Food Security Act. Wetlands in the transmission line ROW of NPPD's final route were identified by completing a desktop inventory followed by a field inventory and delineation. NPPD performed a desktop inventory of potential wetlands using available wetland indicator data including NWI data (USFWS 2011), hydric soils data (NRCS 2012), river channels digitized from aerial imagery, and National Hydrography Dataset waterbodies. Approximately 355 acres of wetlands were identified through the desktop inventory in the proposed transmission line ROW.

Wetlands identified in the desktop inventory were field verified by NPPD and documented in July 2015 and June through October 2016 using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), the 1987 *Corps of Engineers Wetlands Delineation Manual* (USACE 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (Version 2.0) (USACE 2010).

The field inventory and delineation consisted of an onsite inspection of the approximate Project ROW and areas outside the ROW based on preliminary design for identification of jurisdictional and non-jurisdictional wetlands, riparian corridors or drainages, and any other waterbodies. Wetlands next to public roads were surveyed visually from the vehicle and by foot. Wetlands that were not located next to a public road were inventoried by foot and ATV. Portions of the

ROW were not inventoried because the property owners did not grant right-of-entry for wetland field surveys or the areas could not be accessed because of lack of public roads, land use activities, or other obstructions.

Hydric soil characteristics were identified using methods described in the *Field Indicators of Hydric Soils in the United States* (NRCS 2010) as well as the USACE's Regional Supplement. The area was inspected for field indicators of hydrology using methods described in the USACE's Regional Supplement. In addition, dominant plant species were recorded to assess the vegetation component of each sample plot.

Non-wetland areas (e.g., streams or creeks), if observed, were inventoried, in accordance with measurements of the ordinary high-water mark. The ordinary high-water mark is defined as the line on the shore established by the fluctuations of water and indicated by physical characteristics or by other appropriate means that consider the characteristics of the surrounding areas. Wetland boundaries and sample data points were surveyed using a sub-meter accuracy Trimble Global Positioning System unit.

The field inventory in 2015 identified 352.8 acres of PEM wetlands, only 1.7 acres less than the 354.5 acres of desktop inventoried wetlands. However, 77 acres of wetland identified from the desktop inventory could not be field verified and would require field verification when right-of-entry is obtained for these areas (NPPD 2015b). A small number of NWI-identified PSS wetlands were either not accessible or were clearly being spanned by the transmission line, and access was not available to the properties with NWI-identified PFO wetlands; therefore, data were not collected. The field inventory in 2016 identified 132.8 acres of wetlands. Approximately 80.3 acres of wetlands identified from the desktop inventory could not be field verified and would require field verification when right-of-entry is obtained for these areas (NPPD 2016d).

### 3.4.2 Direct and Indirect Effects

The analysis of wetlands considered changes in wetland size, function, type, integrity, hydrology, or connectivity that could occur as a result of the implementation of various Project activities. Activities related to construction, operation, and maintenance, including emergency repairs, are described in detail in Chapter 2, Alternatives. Mitigation practices that would decrease the severity of effects from construction, operation, and maintenance activities are discussed in Section 3.4.3, *Avoidance, Minimization, and Mitigation Measures*. Table 3.1-1 presents the area inventoried to analyze the effects on wetlands (i.e., Project area).

Each alternative was analyzed based on the likelihood of effects on wetlands overall and effects on individual wetland types described in the Affected Environment section. For the effects discussion, the area of analysis is where effects resulting from construction, operation, and maintenance activities would occur in the Project area (i.e., tree clearing within the 200-foot transmission line ROW; land area permanently disturbed including structure bases, regeneration sites, permanent access, and substations; and land area temporarily disturbed including structure work areas, wire-pulling, tensioning, and splicing sites, construction yards/staging areas, fly yards and assembly areas, batch plant sites, borrow areas, and temporary access). The area of analysis may extend beyond the Project area boundaries for some indirect impact assessments.

The potential direct and indirect, short- and long-term effects on wetlands under Alternative A and Alternative B are described below. Direct, adverse effects on wetlands are assessed and measured in terms of areal extent (e.g., acres) where Project activities occur and could cause the direct loss from fill activities or conversion of wetlands from tree clearing. Short-term effects are those that may affect wetlands for a duration of one or two years and long-term effects are considered those that would persist beyond two years. The intensity of effects under each alternative is categorized as low, moderate, or high according to the intensity definitions in Table 3.1-2. Restoration of wetlands disturbed or affected by construction, operation, and maintenance activities were considered when analyzing effects on wetlands in addition to beneficial effects on wetlands from protection of lands to mitigate effects from the take of the beetle. Both the success and failure of restoration activities were considered in describing effects of the Project.

The following parameters were considered when assessing effects on wetlands:

- The areal extent and relative abundance or rarity of the wetland type in the Project area and in the region
- The amount of wetland, if any, that would be lost because of construction, operation, and maintenance activities
- The amount of wetland that would be disturbed temporarily because of construction, operation, and maintenance
- The amount of permanent conversion of forested or scrub-shrub wetland to maintained emergent wetland
- Loss of wetland function and integrity

#### 3.4.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect wetlands including changes in wetland size, function, type, integrity, or connectivity.

#### 3.4.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent implementation of the Project along NPPD's final route under Alternative A would result in direct and indirect effects on wetlands in the Project area (described in Section 3.1.1 above) in the short and long term. Potential effects on wetlands as a result of the construction, operation, and maintenance activities under Alternative A are described below.

#### Direct Effects

Alternative A would result in direct effects on wetlands through the removal of wetland vegetation within the ROW at transmission structure work areas; fill placement in a wetland during construction; placement of temporary crossings for access to structures during construction; permanent conversion of forested or scrub-shrub wetlands to herbaceous wetlands; and other temporary disturbances during construction, operation, and maintenance.

If a wetland was encountered and could not be avoided, short- or long-term, moderate-intensity effects could occur on the wetland depending on the proximity of the disturbance, the size of the impact, and effects on wetland function until the time when the wetland functions are returned to a pre-disturbance state.

Table 3.4-2 shows the estimated area of permanent and temporary disturbance of NWI wetlands and hydric soils associated with Project construction activities under Alternative A. While these estimates were established based on the best available information, the exact location and amount of wetland disturbances for certain activities are currently unknown. However, NPPD would avoid and minimize temporary and permanent wetland impacts in its final design based on field-verified wetland locations. Similarly, the timing and location of emergency repairs are not known and cannot be predicted.

NPPD indicates that placing structures in wetlands, including sub-irrigated meadows, would be avoided with approximately 1,350-foot spans (average ruling span) or longer between structures. However, some wetlands, including sub-irrigated meadows, could require siting of structures in the wetland or sub-irrigated meadow. Foundations for steel monopoles installed in wetlands would be a permanent disturbance, but structure work areas would be a temporary disturbance. Work areas would be located to minimize disturbance, as much as practicable. Lattice tower structures with helical pier foundations would be used in areas without existing access to avoid permanent wetland disturbance and minimize temporary disturbance. Helical pier foundations for lattice structures require fewer pieces of equipment, a smaller temporary structure work area, and less improved access to each structure that traditional foundations on steel monopole structures. Helical pier foundations do not require excavation or concrete footings and are not considered fill by USACE (see 33 CFR § 323.3(c), indicating that placement of pilings for power line structures does not require a Section 404 permit). The proposed Thedford and Holt County Substation sites are located in uplands and would not affect wetlands. Effects on wetlands from any loss of wetlands at structure locations would be long term and moderate due to the small amount of expected permanent fill of wetlands. NPPD estimates that 0.006 acre of permanent fill of wetlands from structure foundations would occur, however, this fill would affect less than the 0.5 acre required under a Nationwide Permit. Wetlands in the Project area that are non-jurisdictional wetlands under the CWA would not require mitigation. Executive Order 11990 includes a broader definition of wetlands than the CWA and protects wetlands that may not be considered jurisdictional under the CWA, such as wet meadows. Wetlands in the Project area would also receive protection under the Swamp Buster Provisions of the Food Security Act.

**Table 3.4-2. Estimated Acres of Project Disturbances on NWI Wetlands and Hydric Soils under Alternative A[a]**

| Project Activity | NWI Wetland Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | L1 and L2 | PAB | PEM | PFO | PSS | PUB and PUS | R2 and R4 | Hydric Soils | Total |
| **Temporary Construction** | | | | | | | | | |
| Temporary Access | -- | -- | 2.2 | 0.2 | -- | -- | 0.1 | 7.6 | **10.1** |
| Structure work areas | -- | -- | 8.3 | 1.3 | -- | -- | 0.3 | 20.9 | **30.8** |
| Pulling and tensioning sites | -- | 0.2 | 1.6 | -- | -- | -- | 1.3 | 14.9 | **18.0** |
| Distribution power line moves | -- | -- | 0.7 | -- | -- | -- | -- | 3.4 | **4.1** |
| **Total Temporary** | **0.0** | **0.2** | **12.8** | **1.5** | **0.0** | **0.0** | **1.7** | **46.8** | **63.0** |
| **Permanent Construction** | | | | | | | | | |
| ROW tree clearing | -- | -- | -- | 1.5 | | -- | -- | -- | **1.5** |
| Structure foundations | 0.006 | | | | | | | | **0.006** |
| Permanent access | -- | | | | | | | | **0.0** |
| Thedford Substation | -- | | | | | | | | **0.0** |
| Holt County Substation | -- | | | | | | | | **0.0** |
| **Total permanent** | | | | | | | | | **1.506** |
| **Total potential disturbance to wetlands and hydric soils** | | | | | | | | | **64.5** |

Source: NPPD (2016b)

[a] Calculations are based on preliminary design. The final design will further avoid wetlands through siting temporary work areas and access outside of field verified and delineated wetlands.

Farmers and ranchers who participate in the Farm Program cannot drain or fill wetlands and continue to remain in the farm program and third party conversions are prohibited.

NPPD would prepare a final Access Plan for the Project once ground-based inspection of potential access is completed and submitted to the Service for review. The final Access Plan would delineate the location and types of access for each structure, including identification of necessary wetland crossings and the type of equipment allowed to travel on each type of access. Any wetland impacts would be avoided, minimized, and mitigated according to Executive Order 11990, *Swampbuster Provisions*, and/or requirements of permits issued under Section 404(a) of the CWA. Mitigation required for the effects on wetlands from the Project and implementation of avoidance, minimization, and mitigation measures described below would minimize the potential for long-term effects on wetlands.

Short-term wetland effects that may occur include temporary disturbance at structure work areas and pulling and tensioning sites along the ROW. Temporary access to structures and distribution power line moves could also disturb wetlands. These short-term effects would be distributed along the route at work areas, pulling and tensioning sites, locations of temporary access, and along distribution power line moves. Short-term effects on wetlands would include localized disturbance on wetlands caused by construction equipment and vehicles during site preparation. These effects would be minimized through the use of low-ground-pressure equipment and matting placed on wetlands. Approximately 63 acres of wetlands would be temporarily disturbed.

Short-term, construction-related activities could potentially reduce habitat suitability and water quality function in wetlands. Construction equipment can compact soils, temporarily affecting groundwater percolation and increasing potential for soil erosion. However, areas where temporary construction impacts occur would be restored in accordance with the avoidance, minimization, and mitigation measures described below. Additionally, these effects would be minimized through the use of low-ground-pressure equipment and matting in wetlands. If restoration of disturbed areas is needed and is successful, short-term effects would not functionally reduce the size, integrity, or connectivity of affected wetlands in the Project area. Overall short-term effects on wetlands would be low to moderate. In the event restoration activities take longer to achieve or are not successful and the short-term effects continue longer than the expected restoration period, the overall effects on wetlands could be long term and of high intensity.

Forested wetlands could be affected by clearing activities in the ROW. Long-term effects on forested wetlands would be localized and limited to conversion of woody vegetation to non-woody vegetation. Approximately 1.5 acres of NWI forested wetlands (PFO) are located in the Project ROW. The NWI forested wetlands have not been field verified because right-of-entry has not been granted by the landowner. Moderate intensity effects on forested wetlands would occur from a loss of integrity and function from the conversion from forested to herbaceous wetlands.

After the final design of the Project is completed, NPPD would conduct additional wetland delineations to identify wetlands in areas of temporary and permanent disturbance. However, any unavoidable impacts on potentially jurisdictional wetlands, whether temporary or permanent, would be discussed with USACE prior to construction to determine the permitting requirements and conditions. Mitigation requirements would be determined in consultation with USACE during the permitting process.

Overall, the amount of wetland disturbance under Alternative A includes approximately 63.0 acres of temporary disturbance and 1.506 acres of permanent disturbance from conversion of forested wetland to herbaceous wetland (1.5 acres) and fill where structure foundations would occur (0.006 acre) under Alternative A.

An escrow account would be established for the R-Project, and an escrow agreement would be submitted to USFW for review and approval for provisions governing restoration of disturbed beetle habitat. A Restoration Management Plan would include stipulations for successful reclamation criteria and steps that would be taken in the event reclamation does not meet the stipulations. Following construction, temporary work areas and access routes would be removed and the area restored to its original condition in accordance with the avoidance, minimization, and mitigation measures outlined below and the stipulations in the Restoration Management Plan. Large sub-irrigated meadows could be temporarily disturbed during Project construction. These areas are difficult to access with standard equipment (e.g., tractor pulled equipment, pickups) and require the use of light ATVs. Separate restoration methods would be developed by the Project's restoration planning team for these areas. Additionally, at least 500 acres of beetle habitat would be protected as compensatory mitigation required for the take of the beetle to offset temporary and permanent impacts on beetle habitat. Beetle habitat could include wetlands because this is the species' preferred habitat. Short-term, low to moderate intensity effects on wetlands would occur but would be offset by beneficial effects from wetland preservation.

Operation and maintenance would have low-intensity to no effect on wetlands. To access structures for maintenance, NPPD would use the avoidance and minimization measures listed below including low-ground-pressure equipment, matting, etc. when crossing wetlands, and little vegetation maintenance would be needed in converted forested wetland areas along the ROW. All vegetation management would be conducted in accordance with NPPD's vegetation management practices, which would limit potential effects on nearby wetlands. Low-growing vegetation would be maintained in the ROW, which would result in the long-term control of vegetation in a small portion of previously forested wetlands.

### Indirect Effects

Indirect effects on wetland vegetation and soils would be similar to those described in Section 3.5, *Vegetation*, and Section 3.2, *Geology and Soils*. Indirect, short- and long-term effects in association with construction, operation, and maintenance of the Project from vegetation clearing and soil disturbance outside wetlands could include the following: 1) decreased infiltration due to soil compaction, 2) changes in wetland hydro-period due to fluctuations of surface runoff and groundwater levels, 3) potentially increased erosion and sedimentation transport and deposition into wetlands, 4) contaminants, 5) establishment of noxious and invasive weeds, and 6) use of herbicides. All of these results could adversely affect the water quality and habitat conditions in wetlands in and adjacent to the Project area. Overall, because most of the vegetation clearing, soil disturbance, and operation and maintenance activities would be conducted at a sufficient distance from wetlands, these indirect effects would be short-term and of low to moderate intensity.

Long-term, moderate-intensity effects could occur on wetland communities near construction areas affected by hydrologic changes, such as reduced infiltration, and increased runoff from exposed or compacted soils, altering natural hydrologic patterns, inhibiting seed germination, or increasing siltation; temporary increase in turbidity and changes in wetland hydrology and water quality; and permanent alteration in water-holding capacity due to alteration or breaching of water-retaining substrates. Reduced infiltration could result in lowered soil moisture, and with increased runoff can result in greater fluctuations in wetland water levels. Improperly designed and sized road culverts can either restrict or increase water flow altering the hydro-period of a wetland. These hydrologic changes could result in long-term changes in wetland plant community composition and integrity, including the establishment or increase of invasive species. Biodiversity may be reduced in wetland communities as sensitive species are displaced by species more tolerant of disturbance. However, because of regulatory requirements and Project avoidance, minimization, and mitigation measures, it is likely that effects on wetlands from these factors would be localized, short term, and of low to moderate intensity. The effects of the invasion of noxious and invasive species are discussed in detail in Section 3.5, *Vegetation*.

Construction in the ROW and of temporary access and work areas outside the ROW could affect wetlands during construction in the short-term from erosion of exposed soils resulting in sedimentation of wetlands near construction areas or of downstream receiving wetlands. Operation and maintenance activities would periodically disturb areas adjacent to or near wetlands, potentially resulting in erosion of exposed soils and sedimentation of wetlands near disturbed areas or downstream of receiving wetlands. These potential, long-term, adverse effects would continue throughout the life of the Project. Standard maintenance of the R-Project is not expected to begin until 30 years after construction of the transmission line and is expected to only occur at 10-year intervals after that. Assuming that restoration of exposed areas disturbed during the previous construction phase is successful, and vegetative cover becomes established, sedimentation impacts on wetlands during the operation and maintenance phase would generally be low-intensity. Temporary construction access would be designed to avoid, minimize, and mitigate effects on wetlands.

Accidental release of contaminants during construction, operation, and maintenance could impact wetland communities located down gradient from the Project area. Contaminants that enter groundwater could affect wetlands that receive groundwater discharge. However, an uncontained spill of hazardous materials would likely be relatively small and affect a limited area because the volume of these materials would likely be relatively small, and there would be no long-term storage of hazardous materials at construction locations. In addition, the implementation of required spill prevention and response plans would limit potential effects from a spill, should one occur.

The licensed application of herbicides may be used in addition to, or instead of, mowing to control trees and woody vegetation in the ROW and potential control of noxious weeds in restoration areas. Herbicide applications could result in impacts to non-target wetland vegetation from aerial drift during application or from herbicides transported by surface water runoff. However, requirements that herbicides be applied by licensed applicators in accordance with label and application permit directions make it unlikely that such effects would occur.

Although the indirect effects of activities associated with Project construction, operation, and maintenance may not be widespread, they could result in long-term effects on local wetland communities in certain circumstances; however, because of regulatory requirements and Project avoidance, minimization, and mitigation measures, it is likely that effects on wetlands from these factors would be localized, short term, and of low to moderate intensity.

#### 3.4.2.3 Alternative B: Tubular Steel Monopole Structures Only

Issuance of a permit and subsequent implementation of the Project along NPPD's final route under Alternative B would result in short- and long-term, direct and indirect effects on wetlands in the Project area. Effects on wetlands under Alternative B would be similar to Alternative A with differences from increases in the area of ground disturbance associated with access improvements and tower foundations associated with monopole construction. Potential effects on wetlands as a result of the construction, operation, and maintenance activities associated with implementation of the Project transmission line under Alternative B are described below.

##### Direct Effects

Direct effects on wetlands under Alternative B would generally be the same or similar to those described for Alternative A. Direct effects on wetlands could occur as a result of removal of wetland vegetation in the ROW at transmission structure work areas; fill placement in a wetland during construction; placement of temporary crossings for access to structures during construction and for distribution power line moves; permanent conversion of forested or scrub-shrub wetlands to herbaceous wetlands; and other temporary disturbances during construction, operation, and maintenance.

If a wetland was encountered and could not be avoided, short- or long-term, moderate-intensity effects could occur on the wetland depending on the proximity of the disturbance, the size of the impact, and effects on wetland function until the time when the wetland functions are returned to a pre-disturbance state.

Table 3.4-3 shows the estimated area of permanent and temporary disturbance of NWI wetlands and hydric soils associated with Project construction activities under Alternative B. While these estimates were established based on the best available information, the exact location and amount of wetland disturbances for certain activities are currently unknown. However, NPPD will avoid and minimize temporary and permanent wetland impacts in its final design based on

**Table 3.4-3. Estimated Acres of Project Disturbances on NWI Wetlands and Hydric Soils under Alternative B[a]**

| Project Activity | NWI Wetland Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | L1 and L2 | PAB | PEM | PFO | PSS | PUB and PUS | R2 and R4 | Hydric Soils | Total |
| **Temporary Construction** | | | | | | | | | |
| Temporary access | -- | -- | 4.5 | 0.2 | -- | -- | 0.1 | 14.0 | **18.8** |
| Structure work areas | -- | - | 12.3 | 1.3 | - | -- | 0.3 | 26.5 | **40.4** |
| Pulling and tensioning sites | -- | 0.2 | 1.8 | -- | -- | -- | 1.3 | 15.1 | **18.4** |
| Distribution power line moves | -- | -- | 0.7 | -- | -- | -- | -- | 3.4 | **4.1** |
| **Total Temporary** | **0.0** | **0.2** | **19.3** | **1.5** | **0.0** | **0.0** | **1.7** | **59.0** | **81.7** |
| **Permanent Construction** | | | | | | | | | |
| ROW tree clearing | -- | -- | -- | 1.5 | | -- | -- | -- | **1.5** |
| Structure foundations | 0.047 | | | | | | | | **0.047** |
| Permanent access | -- | | | | | | | | **0.0** |
| Thedford Substation | -- | | | | | | | | **0.0** |
| Holt County Substation | - | | | | | | | | **0.0** |
| **Total permanent** | | | | | | | | | **1.6** |
| **Total potential disturbance to wetlands and hydric soils** | | | | | | | | | **83.3** |

Source: NPPD (2016b)

[a] Calculations are based on preliminary design. The final design will further avoid wetlands through siting temporary work areas and access outside of field verified and delineated wetlands.

field-verified wetland locations. Similarly, the timing and location of emergency repairs are not known and cannot be predicted. Additionally, specific avoidance, minimization, and mitigation measures for effects on wetlands from emergency repairs would need to be determined at the time of the emergency in coordination with the Service and USACE.

Similar to Alternative A, under Alternative B, NPPD indicates that placing structures in wetlands, including sub-irrigated meadows, would be avoided with approximately 1,350-foot spans (average ruling span) or longer between structures. However, some wetlands, including sub-irrigated meadows, could require siting of structures in the wetland or sub-irrigated meadow. Foundations for steel monopoles installed in wetlands will be a permanent disturbance, but structure work areas will be a temporary disturbance. Work areas will be located to minimize disturbance, as much as practicable. However, larger work areas are required for steel monopoles (i.e., 0.25 acre per structure for lattice towers and 1 acre per structure for steel monopoles).

The use of only steel monopoles versus both steel monopole and lattice towers would result in more permanent impacts in wetlands under Alternative B compared to Alternative A. Steel monopole structures require excavation and concrete footings and helicopters would not be used to place steel monopole structures, requiring more temporary access routes. The proposed Thedford and Holt County Substation sites are located in uplands and would not affect wetlands. Effects on wetlands from any loss of wetlands at structure locations would be long term and moderate due to the small amount of expected permanent fill of wetlands. NPPD estimates that 0.047 acre of permanent fill of wetlands from structure foundations would occur; however, this impact would affect less than the 0.5 acre.

As described for Alternative A, NPPD would prepared a final Access Plan for the Project once ground-based inspection of potential access is completed and submitted to the Service for review. Any wetland impacts would be mitigated according to the requirements of permits issued under section 404(a) of the CWA.

Short-term effects on wetlands may include temporary disturbance at structure work areas and pulling and tensioning sites along the ROW. The disturbance in structure work areas would be greater, approximately twice as much overall (i.e., 486 acres under Alternative A and 824 under Alternative B) under Alternative B compared to Alternative A. Temporary access to structures and distribution power line moves could also disturb wetlands. Temporary access under Alternative B for monopole installation would require using Access Scenario 2 to travel to structure locations. Access Scenario 2 would require some improvement to existing trails and overland travel with large or heavy equipment that may require improvements for access. These short-term effects would be distributed along the route at work areas, pulling and tensioning sites, locations of temporary access, and along distribution power line moves. Short-term effects on wetlands would include localized disturbance on wetlands caused by construction equipment and vehicles during site preparation. These effects would be minimized through the use of matting overlaying wetlands.

The effects from short-term, construction-related activities under Alternative B that could potentially reduce habitat suitability and water quality function in wetlands would be the same as under Alternative A. However, areas where temporary construction impacts occur would be restored using the avoidance, minimization, and mitigation measures described below. Additionally, these effects would be minimized through the use of matting in wetlands. If restoration of disturbed areas is needed and is successful, short-term effects would not functionally reduce the size, integrity, or connectivity of affected wetland in the Project area. Overall short-term effects on wetlands would be low to moderate. In the event restoration activities take longer to achieve or are not successful and the short-term effects continue longer than the expected restoration period, the overall effects on wetlands could be long term and high intensity. The effects on forested wetlands from clearing activities in the ROW under Alternative B would be the same as under Alternative A.

After the final design of the Project is completed, NPPD would conduct additional wetland delineations to identify wetlands in areas of temporary and permanent disturbance. Approximately 81.7 acres of temporary disturbance and 1.6 acres of permanent disturbance from conversion of forested wetland to herbaceous wetland (1.5 acres) and fill where steel monopole foundations would occur (0.047 acre) under Alternative B.

An escrow account would also be established under Alternative B to ensure restoration of disturbed beetle habitat. The Restoration Management Plan under Alternative B would include the same stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet the stipulations as those described for Alternative A. Overall short-term effects on wetlands would be low to moderate and would be offset by beneficial effects from wetland preservation.

Operation and maintenance would have low-intensity to no effect on wetlands. To access structures for maintenance, NPPD would use the avoidance and minimization measures listed below including low-ground-pressure equipment, matting, etc. when crossing wetlands, and little vegetation maintenance would be needed in converted forested wetland areas along the ROW. All vegetation management would be conducted in accordance with NPPD’s vegetation management practices, which would limit potential effects on nearby wetlands. Low-growing vegetation would be maintained in the ROW, which would result in the long-term control of vegetation in a small portion of previously forested wetlands.

#### Indirect Effects

Indirect effects on wetland vegetation and soils under Alternative B would be similar to those described in Section 3.5, *Vegetation,* and Section 3.2, *Geology and Soils*. Indirect effects would be similar to those described for Alternative A and could include the following: 1) decreased infiltration due to soil compaction, 2) changes in wetland hydro-period due to fluctuations of surface runoff and groundwater levels, 3) potentially increased erosion and sedimentation transport into wetlands, 4) contaminants, 5) establishment of noxious and invasive weeds, and 6) use of herbicides. Overall, because most of the vegetation clearing, soil disturbance, and operation and maintenance activities would be conducted at a sufficient distance from wetlands, these indirect effects would be short-term low to moderate intensity.

However, because of regulatory requirements and the same Project avoidance, minimization, and mitigation measures under Alternative B as those described for Alternative A, it is likely that effects on wetlands from these factors would be localized and short-term and of low to moderate intensity.

Although the indirect effects of activities associated with Project construction, operation, and maintenance may not be widespread, they could result in long-term effects on local wetland communities in certain circumstances; however, because of regulatory requirements and Project avoidance, minimization, and mitigation measures, it is likely that effects on wetlands from these factors would be localized and short-term of low to moderate intensity.

### 3.4.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on wetlands:

- Span wetlands when siting structures to the maximum extent practicable.
- Use low-ground-pressure equipment and temporary matting or other measures to cross wetlands and sub-irrigated meadows to avoid or minimize temporary impacts and remove upon completion of construction.
- Use helicopters for erecting lattice structures (Alternative A only), stringing sock line, and mobilizing certain equipment.
- Use helical pier foundations for lattice structures in the Sandhills, which require less equipment, a smaller temporary work area, and result in less ground disturbance than traditional steel monopole foundations (Alternative A only).
- Use existing roads and two-tracks for access during construction, based on availability and landowner approval; use low-ground-pressure tracked or rubber-tired equipment for overland access to reduce effects on wetlands where possible (Alternative A only).
- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas, where practicable based on availability and landowner approval, and outside wetlands and sub-irrigated meadows.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Restrict all construction vehicle movement outside the ROW to designated access and established roads other than for emergency situations.

- Install culverts in a manner to maintain the existing hydrology of the landscape, including installation at existing stream bed elevations to avoid drainage of adjacent wetland and wet meadows.
- Implement erosion and sediment controls throughout construction, including stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment before reaching receiving waters.
- Delineate and map field-verified wetlands for the final design of the Project to avoid locating permanent structures in wetlands where possible and minimize impacts from temporary disturbance.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.4.4 Effects Summary

Alternative A would result in both short- and long-term, direct and indirect, adverse effects. These adverse effects would be minimized after temporarily disturbed areas are successfully restored; therefore, because avoidance, minimization, and mitigation measures would minimize effects on this resource, Alternative A would not have potential for significant, adverse impacts on wetlands.

Alternative B would result in both short- and long-term, direct and indirect, adverse effects. These adverse effects would be minimized after temporarily disturbed areas are successfully restored. Because avoidance, minimization, and mitigation measures would minimize effects on this resource, Alternative B would not have potential for significant adverse impacts on wetlands. The total disturbance to wetlands under Alternative B would be greater compared to the Alternative A.

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## 3.5 Vegetation

Almost the entire study area occurs in USEPA's Nebraska Sandhills Level III ecoregion, which covers approximately 20,000 square miles of central Nebraska (Chapman et al. 2001; Schneider et al. 2011). Portions of the study area also occur in the Northwestern Glaciated Plains, Central Great Plains, and Western High Plains Level III ecoregions (Chapman et al. 2001). Vegetation cover is an important component in the classification of ecoregions and reflects differences in ecosystem quality and integrity (USEPA 2015b). Ecoregions are described through analysis of patterns and composition of geology, physiography, native vegetation, climate, soils, land use, wildlife, and hydrology. Variations in temperatures and precipitation, and differences in soils and parent materials affect the variation in vegetation communities (USEPA 2015b). The area inventoried to characterize the affected environment for vegetation is described in Table 3.1-1.

### 3.5.1 Affected Environment

The Sandhills ecoregion includes the largest stabilized dune system in the Western Hemisphere and one of the largest intact native grasslands in North America. Tall and short rhizomatous grasses, bunchgrasses, and numerous species of forbs are present throughout the Sandhills. Bare soil is typically visible between plants because the species are not as dense here as in adjacent regions of tallgrass and mixed-grass prairies (Kaul et al. 2006). The Sandhills ecoregion is generally devoid of irrigated row crop agriculture, and except for some riparian areas in the north and east. The region has few trees. More than 90 percent of the Sandhills ecoregion is in large ranches (1,000 or more acres), most of which support native grasses grazed by livestock (USDA 2006). Tracts along streams and in sub-irrigated valleys are used mainly for hay. The rolling hills and dry valleys are grazed.

The Sandhills ecoregion consists of highly permeable sand dunes on top of sand and gravel deposits, contributing to a pattern of dry toeslope dune prairie habitats adjacent to wet meadows and prairies, marshes, and shallow lakes where the water table remains near the surface throughout the year (Bleed and Flowerday 1998). The wet meadow and prairies, marshes, and shallow lakes consist of a flat, sandy plain occurring on sand sheets and dunes located in the eastern and northern portions of the study area in the Wet Meadow and Marsh Plain and Lakes Area Level IV ecoregions, in the Sandhills Level III ecoregion.

The eastern portions of the study area begin to transition away from the typical dunes of the Sandhills into more flat and non-gravelly soils. Plant species restricted to pure sand soils are typically absent. The Northwestern Glaciated Plains ecoregion located in the northeastern portion of the study area includes areas of cropland on more level tablelands with grasslands in areas of greater relief.

The North and South Platte rivers flow across the southwestern portion of the study area approximately 9 miles west of their confluence. These two large prairie rivers consist of shallow, braided channels and are separated by approximately 4 miles of irrigated and cultivated agricultural lands in the study area. The Platte River Valley Level IV ecoregion, in the Central Great Plains Level III ecoregion, consists of the wide flat alluvial valley of the Platte River located mainly below the confluence of the North and South Platte rivers. The North and South Platte Valley and Terraces Level IV ecoregion, in the Western High Plains Level III ecoregion, includes the area above the confluence. The valleys and terraces of these two Level IV ecoregions are composed of extensive cropland with irrigated cropland in the river valleys and dryland croplands on terraces. Native rangelands and haylands occur on uplands, while the eastern portion of the North and South Platte Valley and Terraces ecoregion contains a greater abundance of trees, mainly cottonwoods, but with scattered stands of hackberry, ash, boxelder, and cedar.

Figure 3.5-1 presents the vegetation types that occur in the study area. Vegetation types, grouped for mapping purposes, include a suite of vegetation systems described in Table 3.5-1 and discussed in the sections below.

**Table 3.5-1. Vegetation Types in the R-Project Study Area**

| Vegetation Type | Acres | % of Study Area[a] |
|---|---|---|
| Dune vegetation | 3,389,087 | 75.1 |
| Wetlands[b] | 438,114 | 9.7 |
| Pasture/hay | 43,419 | 1.0 |
| Row Crops | 241,087 | 5.3 |
| Grassland/prairie[c] | 170,264 | 3.8 |
| Developed/barren/old field/urban | 147,340 | 3.3 |
| Floodplain | 31,756 | 0.3 |
| Forest/woodland/shrubland/savanna | 13,996 | 0.3 |
| Open water[d] | 37,129 | 0.8 |

Source: USGS (2013)

[a] Percentages do not total 100 due to rounding.

[b] Wetlands include wet meadow, subirrigated wet meadows, wet prairie, seeps, fens, marshes, playas, and riparian areas.

[c] Grassland/prairie includes shortgrass prairie, mixed-grass prairie, and tallgrass prairie.

[d] Open water includes ponds, lakes, reservoirs, sloughs, canals, streams, and rivers.

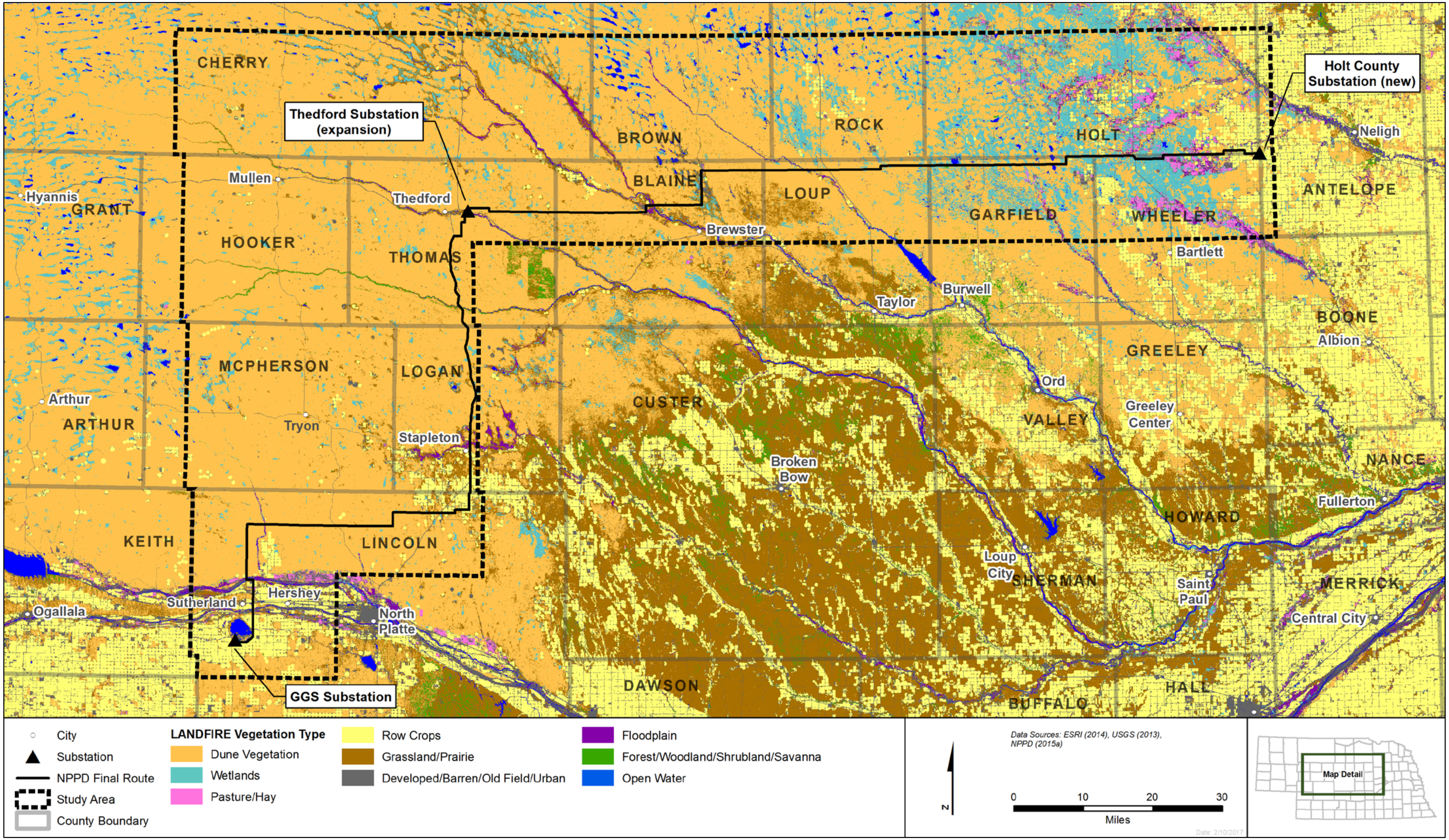


**Figure 3.5-1. Vegetation Types in the R-Project Study Area**

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#### 3.5.1.1 Dune Vegetation

Source: Louis Berger in 2016

*Dune vegetation*

Two dune vegetation systems—dune prairie and shrubland vegetation—are included under the dune vegetation type comprising 75.1 percent of the study area (Table 3.5-1) (LANDFIRE 2006; LANDFIRE 2007a; USGS 2013). The dune prairie vegetation type consists of a mixture of grasses adapted to the sandy conditions and may include sand bluestem (*Andropogon hallii*), prairie sandreed (*Calamovilfa longifolia*), little bluestem (*Schizachyrium scoparium*), and hairy grama (*Bouteloua hirsuta*). Shrubland habitats may include sand cherry (*Prunus pumila*), leadplant (*Amorpha canescens*), dwarf prairie rose (*Rosa arkansana*), yucca (*Yucca glauca*), and sand sage (*Artemisia filifolia*). Common forbs that may be present are stiff sunflower (*Helianthus pauciflorus*), bush morning glory (*Ipomoea leptophylla*), gilia (*Gilia* spp.), annual wild-buckwheat (*Eriogonum annuum*), and gayfeather (*Liatris* spp.) (Kaul et al. 2006; NatureServe 2015b; Schneider et al. 2011).

Source: Clarence A. Rechenthin, hosted by the USDA, NRCS PLANTS Database

*Gayfeather*

The primary land use in the dune vegetation systems is livestock grazing, which constitutes one of the primary disturbances along with wind and fire (Kaul et al. 2006). Invasive species may dominate heavily grazed areas, and most of the problematic invasive plant species are associated with hayed areas with Kentucky bluegrass (*Poa pratensis*) likely the most abundant. Smooth brome (*Bromus inermis*) and downy brome (*Bromus tectorum*) are often abundant in areas peripheral to these dune vegetation systems (Rolfsmeier and Steinauer 2010). The sandy soils are highly permeable and susceptible to wind erosion, which creates wind-sculpted features such as blowouts and sand draws (NatureServe 2015b).

**Western Great Plains Sand Prairie**

Vegetation communities in the Western Great Plains Sand Prairie system include a mix of sand prairie grasslands and shrublands. Well-drained sites in this vegetation system are usually dominated by mixed-grass prairie with an open to moderate cover that includes tall grasses, mid grasses, and short graminoids. Predominate grasses are well adapted to the coarse-textured soil conditions. The tallgrass prairies are typically found in areas with rolling topography primarily on sandy and sandy loam soils that are highly permeable and relatively undeveloped. Dominant vegetation includes prairie sandreed, sand bluestem, little bluestem, blue grama (*Bouteloua gracilis*), hairy grama, needle-and-thread (*Hesperostipa* spp.), and sand dropseed (*Sporobolus cryptandrus*). Somewhat poorly drained sites may contain tall-grass prairie in which big bluestem or Indian grass (*Sorghastrum nutans*) are usually dominant with switchgrass and an array of plants associated with tall-grass prairie and sand prairie of the United States (LANDFIRE 2006; 2007a; Rolfsmeier and Steinauer 2010).

The sand prairies contain a significant shrub component on north-facing slopes and small protected areas on choppy dunes. Primary shrub species include plums (*Prunus* spp.) and smooth sumac (*Rhus glabra*), which can resprout vigorously after fire. Eastern red cedar is also becoming common on north-facing dunes in this vegetation system where surface soil moisture is more favorable for germination and establishment of seed distributed by birds. As cedars become established, seedlings begin to establish in other landscape positions (LANDFIRE 2007a). Sand sage forms in an open to dense shrub layer along the western portions of this system, while sand cherry and yucca are common on uplands throughout. Other short shrubs that may be locally common eastward include leadplant, dwarf prairie rose, and western poison ivy (*Toxicodendron rydbergii*). Taller shrubs, such as American plum, chokecherry, and wolfberry (*Symphoricarpos occidentalis*), are sometimes associated with steep, north-facing dune slopes. An array of annual and perennial forb species typical of both tall-grass prairie and mixed-grass prairie communities of the Great Plains are commonly present, including prairie spurge (*Euphorbia missurica* var. *petaloidea*), stiff sunflower, bush morning-glory, hairy puccoon (*Lithospermum caroliniense*), and Missouri goldenrod (*Solidago missouriensis*), among many others (Rolfsmeier and Steinauer 2010).

The distribution, species richness, and productivity of plant species in the sand prairie vegetation system are controlled primarily by environmental conditions, in particular, the temporal and spatial distribution of soil moisture and topography. Blowouts and sand draws are some of the unique wind-driven disturbances that can profoundly affect vegetation composition and succession in this community. Fire, grazing, wind, and drought historically were the primary disturbances in this vegetation community likely affecting both species and the stability of soil in the Sandhills. These conditions can contribute to the development of blowouts, making it difficult for vegetation to reestablish quickly. The presence of blowout penstemon, a species endemic to blowouts, indicates that bare sand in some form has been present in the area for some time. Uplands today support more herbaceous vegetation than in pre-settlement times as a result of fire suppression and local range-management practices that encourage establishment of adequate grass cover to prevent wind disturbance of the soil during the winter months (LANDFIRE 2007a).

#### Western Great Plains Sandhill

Vegetation communities in the Western Great Plains Sandhill system include a mix of Sandhill grasslands and shrublands primarily found in southwestern Nebraska that are very similar to the Western Great Plains Sand Prairie system. This system differs from the Western Great Plains Sand Prairie system in that it is dominated almost entirely by sand sage with little presence of understory species and less total vegetation production overall. The system is distinguished by a sparse to moderately dense shrub layer dominated by sand sage. These shrubs do not grow as clumps but as individuals, and the intervening ground is most often dominated by a sparse to moderately dense layer of tall, mid-or short grasses. Other shrub species, such as yucca, skunkbush sumac (*Rhus aromatic* var. *trilobata*), and plum species may be present. Associated species can vary with geography, precipitation, disturbance, and soil texture. The communities in this system in the later stages of development currently consist primarily of sand sage and perennial grasses with blue grama as the dominant grass species (LANDFIRE 2006).

Grazing, drought, and fire historically were the primary disturbances that determined the distribution, species composition, and productivity of plant species in this system. Today, fires are infrequent and grazing and drought are the primary disturbances. Blowouts and sand draws characterize some of the wind driven disturbances of the system, and when disturbed, the fragile nature of the soils can profoundly affect vegetation composition and succession in this system (LANDFIRE 2006).

#### 3.5.1.2 Wetlands

Two wetland vegetation systems—eastern great plains wet meadow-prairie- marsh and western great plains depressional systems—are included under the wetland vegetation type comprising 9.7 percent of the study area (Table 3.5-1) (LANDFIRE 2009, 2007b; USGS 2013). These wetland vegetation systems include wet meadows and wet prairies, marshes, seeps and fens, riparian and depressional wetlands where the water table remains near the surface throughout the year (LANDFIRE 2009, 2007b; Schneider et al. 2011). These systems, which are characterized by wetland vegetation devoid of trees in depressions and riparian vegetation along creeks and streams or adjacent to floodplain systems, typically have poorly drained, silty, dense clay, and hydric soils and are often classified as Vertic Haplaquolls (NatureServe 2015b). Wetlands are also described in detail under Section 3.4, *Wetlands*.

Moist prairies occur in valleys and commonly support species such as switchgrass, big bluestem, Indiangrass, white sagebrush (*Artemisia ludoviciana*), false indigo-bush, dwarf prairie rose, western wild rose (*Rosa woodsii*), and leadplant. Wet meadows typically occur in riparian valleys where the water table is at the surface. Wet meadows have sandy to fine sandy loam soils and commonly dominated by sedges, spikerushes, prairie cordgrass, switchgrass, wooly sedge (*Carex pellita*), bulrush, ironweed (*Vernonia fasciculata*), sawtooth sunflower (*Helianthus grosseserratus*), sandbar willow, and false indigo-bush. Alkaline wet meadows, characterized by salts and carbonates, are more prevalent west of the study area and are indicated by species such as inland saltgrass (*Distichlis spicata*), foxtail barley (*Hordeum jubatum*), alkali sacaton (*Sporobolus airoides*), bluegrass (*Poa* spp.), and scratchgrass (*Muhlenbergia asperifolia*) where there are alkaline soils, prevalent to the west of the study area. Fens—groundwater-fed wetlands with saturated, nutrient-rich peat or muck soils, typically with meadow-like vegetation—support many sensitive plant species and are associated with stream headwaters and the upper end of lakes and marshes. Freshwater marshes are shallow waters occurring near lakes or streams, typically support ripgut sedge, common reed, smartweeds, hard-stem bulrush, broad-leaf cattail, duckweeds, arrowheads, and hornworts. Saline marshes have less vegetation cover and are dominated by saline-tolerant species such as cosmopolitan bulrush (*Schoenoplectus maritimus)* (Kaul et al. 2006; NatureServe 2009; Rolfsmeier and Steinauer 2010; Schneider et al. 2011).

### Eastern Great Plains Wet Meadow-Prairie-Marsh

This wetland vegetation system includes herbaceous seeps and fens, wet meadows, wet prairies, and marsh communities associated primarily with creeks, streams, and rivers in the glaciated eastern portion of Nebraska. Most areas are flooded temporarily in the spring, though marshes may remain inundated through most of the growing season, often drawing down in mid- to late summer or during prolonged drought (LANDFIRE 2009; Rolfsmeier and Steinauer 2010).

#### *Seeps and Fens*

The seep and fen communities are saturated much of the year but are only temporarily flooded. Seeps occur on slopes of hills, in valleys, at bases of bluffs, and occasionally on bluffs associated with streams. Seep vegetation, which varies greatly with hydrology, substrate, and exposure to sunlight, typically comprises herbaceous species commonly including sedges, willow herb (*Epilobium* spp.), common scouring rush (*Equisetum hyemale*), fowl mannagrass (*Glyceria striata*), watercress, bulrushes, and cattails. Seep communities are still abundant in the Sandhills. Pollution from agricultural runoff and livestock could affect certain species that are sensitive to water quality (LANDFIRE 2009; Rolfsmeier and Steinauer 2010).

Source: Jennifer Anderson, hosted by the USDA, NRCS PLANTS Database

*Softstem bulrush (Schoenoplectus tabernaemontani)*

Fens are typically dominated by meadow species and are associated with stream headwaters and the upper end of lakes and marshes. Prairie fens occur mid to lower slopes of hillsides and terraces in ravines and canyons, and Sandhills fens occur in interdunal valleys in the north-central Sandhills and in low, rolling dune areas in the eastern Sandhills. Sandhill fens are typically found at the headwaters of Sandhills stream valleys or at the upper ends of lakes and marshes. Prairie fen vegetation consists primarily of hydrophytic graminoids and are usually dominated by several species of sedges and bald spikerush (*Eleocharis erythropoda*). Scattered shrubs are present, primarily willows (*Salix* spp.). Species composition is likely related to depth and composition of organic soils, water chemistry and quality, and level of disturbance. Sandhills fen vegetation is patchy and species diversity is relatively high and includes two phases—fern meadow fen and sedge fen. High quality Sandhill fens have been affected because of ditching and conversion to hay meadows (LANDFIRE 2009; Rolfsmeier and Steinauer 2010).

#### *Marshes*

The wetland communities in this system are commonly freshwater cattail shallow marsh. Cattail shallow marshes occur in shallow backwater areas and in basin-like depressions that are semi-permanently inundated to seasonally flooded on level uplands. Soils are saturated throughout the year with the water table either above or near the surface throughout the growing season. The vegetation consists primarily of emergent hydrophytic macrophytes with a sparse submerged aquatic layer. Cattails dominate this community because of their ability to persist under wet conditions. Other emergent species may be present and species composition varies depending on the amount of disturbance, water depth, and water chemistry. These communities can be degraded by headcutting streams, ditching, agricultural conversion, and urban development (LANDFIRE 2009; Rolfsmeier and Steinauer 2010).

### *Wet Meadows*

Sedge wet meadow communities occur on nearly level floodplains, often in bands surrounding marshy channels that are seasonally flooded for a major part of the year. Vegetative cover is fairly dense and is often quite patchy. Graminoids are the dominant species and common species include crested sedge (*Carex cristatella*), fox sedge (*Carex vulpinoidea*), dark-green bulrush, pale bulrush (*Scirpus pallidus*), spikerushes, Torrey's rush (*Juncus torreyi*), and rice cutgrass (*Leersia oryzoides*). Perennial herbs are also common and noticeable. This community may transition into a shallow cattail marsh on wetter sites and to eastern cordgrass wet meadow on drier sites. Wet meadows have been drained and converted to cropland or heavily grazed (LANDFIRE 2009; Rolfsmeier and Steinauer 2010).

Source: Doug Goldman, hosted by the USDA, NRCS PLANTS Database

*Crested sedge*

### *Wet Prairies*

Eastern cordgrass wet prairie communities are commonly found on nearly level floodplains of rivers and streams, often as strips or bands along stream channels. Prairie cordgrass is the dominant species in this community but is often intermixed with sedges and other grass species. Scattered perennial forbs are usually present. Wet prairies can be drained and converted to cropland or heavily grazed and exotic species are often abundant in mowed areas (LANDFIRE 2009; Rolfsmeier and Steinauer 2010).

### *Playa and Riparian Wetlands*

Playa wetlands may include flatsedge (*Cyperus* spp.), nodding smartweed (*Polygonum lapathifolium*), spikerush, cattails, river bulrush (*Bolboschoenus fluviatilis*), and plains coreopsis (*Coreopsis tinctoria*). Submersed or floating plant communities may be characterized by greater bladderwort (*Utricularia macrorhiza*), floating-leaf pondweed (*Potamogeton nodosus*), and duckweed. Riparian wetlands include switchgrass, scouring-rush (*Equisetum* spp.), and bedstraw (*Galium* spp.) (Kaul et al. 2006; Schneider et al. 2011).

### Western Great Plains Depressional Wetland Systems

**Depressional Wetland Systems**

…include saturated seep and fen communities, submergent and emergent marshes, and subirrigated wet meadows, and wet prairies.

This wetland vegetation system includes herbaceous wetland communities found primarily in grasslands/prairies that are generally in contact with the water table through much of the season. This system includes saturated seep and fen communities, submergent and emergent marshes, and subirrigated wet meadows, and wet prairies. The system is most abundant in the Sandhills but may be found in other unglaciated portions of the state. Most of these communities are found in depressions in grassland/prairie but may also be found along the margins of lakes and ponds as well. A variety of aquatic and hydrophytic species may dominate including submersed pondweeds (*Potamogeton* spp.), cattails, bulrushes, sedges, prairie cordgrass, and northern reedgrass (*Calmagrostis stricta*). Woody communities may also be present in small patches. Drainage and conversion to hay meadows may have affected many sites. The most extensive communities in this system are the native hay meadows and wet prairies, which are dominated by sod-forming grasses. Sedges may dominate the wetter areas (LANDFIRE 2007b; Rolfsmeier and Steinauer 2010).

#### 3.5.1.3 Agricultural (Pasture/Hay and Row Crops)

Agricultural vegetation types consist of pasture/hay and row crops and make up 6.3 percent of the study area (Table 3.5-1). These vegetation types include lands predominantly used for supporting pasture, hay, corn, soybeans, alfalfa, small grains, sorghum, and dry edible beans, and fallow/idle cropland (CALMIT 2007; USGS 2013). The row crops are generally irrigated after planting during late April to May, reach full cover by late July, and are harvested September through October (CALMIT 2007).

#### 3.5.1.4 Grassland/Prairie

The grassland/prairie vegetation type makes up 3.8 percent of the study area (Table 3.5-1) (LANDFIRE 2007c, 2007d, 2007e; USGS 2013). The grassland/prairie vegetation type is further divided based on the dominant vegetation found growing in mixed-grass, shortgrass, and tallgrass prairies, as described below (LANDFIRE 2007c, 2007d, 2007e; USGS 2013).

Source: Louis Berger in 2016

*Prairie vegetation*

### Western Great Plains Shortgrass Prairie

| Ustic |
|---|
| Soils in which moisture is present, but limited during plant growth. |

This vegetation system occurs primarily on flat to rolling uplands with loamy, ustic soils ranging from sandy to clayey. Dominant species include blue grama, western wheatgrass (*Elymus smithii*), needlegrasses (*Hesperastipa* spp.), and buffalograss (*Buchloë dactyloides*) with intermingled forbs. The shortgrasses that dominate this system are extremely drought- and grazing-tolerant. These species evolved with drought and large herbivores, and because of their stature, they are relatively resistant to overgrazing. Although tallgrass and mixed-grass species may be present especially on more mesic soils, they are secondary in importance to the sod-forming short grasses. Shrub species may also be present such as sand sage, big sagebrush (*Artemisia tridentata*), and rabbitbrush (*Chrysothamnus* spp.) that dominate shrubland systems in the Western Great Plains. Because the vegetation system spans a wide range, some differences in the species might occur from north to south and from east to west. High variation in amount and timing of annual precipitation influences the presence of cool- and warm-season herbaceous species (LANDFIRE 2007d).

Source: Jennifer Anderson, hosted by the USDA, NRCS PLANTS Database

*Big bluestem*

### Central Mixed-grass Prairie

The mixed-grass prairie system includes elements of the shortgrass prairies on its drier western edge and tallgrass prairies in moist sites to the east (Kaul et al. 2006). The central mixed-grass prairie vegetation system occurs on gentle to steep hills and plains in the eastern portions of the study area where there is a transition away from the typical dunes of the Sandhills (LANDFIRE 2007c; USGS 2013). This system is characterized by a mixture of upland herbaceous communities composed of grasses and forbs and is usually somewhat densely vegetated by warm season grasses with big bluestem being the most noticeable tall grass species.

Source: Clarence A. Rechenthin, hosted by the USDA, NRCS PLANTS Database

*Prairie coneflower*

Diagnostic species in this area may include species characteristic of the tallgrass prairie such as big bluestem, Indiangrass, switchgrass, and Canada wildrye (*Elymus canadensis*) in moist, lower elevation habitats; shortgrass prairie species such as buffalo grass and blue grama on prairie hilltops; and medium-height grasses such as sideoats grama (*B. curtipendula*), little bluestem, western wheatgrass, and sand dropseed on side-slope habitats. Other prairie grasses such as hairy grama, Junegrass (*Koeleria macrantha*), needle-and-thread, and alkali sacaton may also be present. Associated forbs may include prairie-clover (*Dalea* spp.), Illinois bundleflower (*Desmanthus illinoensis*), wild alfalfa (*Psoralidium tenuiflorum*), leadplant, and prairie coneflower (*Ratibida columnifera*)

(Kaul et al. 2006; NatureServe 2009). Shrub species are often those associated with tallgrass prairie to the east, and some Great Plains shrubs and yucca are often conspicuous. Species composition is strongly tied to soil moisture with a higher percentage of tall grasses on moderate and north-facing slopes, and mid and short grasses on steep and south exposures (LANDFIRE 2007c; Rolfsmeier and Steinauer 2010).

#### Western Great Plains Tallgrass Prairie

This vegetation system includes the upland herbaceous communities of the glaciated portions and loess-mantled unglaciated portions of eastern Nebraska. This system is found primarily on loam and moderately deep and rich Mollisols throughout the western Great Plains. The dominant species are grasses 1 to 2 meters tall, including big bluestem, Indiangrass, and switchgrass on more mesic sites and prairie cordgrass on the wet sites. In some silty clay prairies, porcupine grass (*Hesperostipa spartea*) and prairie dropseed (*Sporobolus heterolepis*) may be abundant. In dry tallgrass prairie on very steep slopes or in coarse soils, mid grasses such as little bluestem and sideoats grama may be abundant, sometimes with scattered short grasses including blue grama and hairy grama. Several short shrubs are associated with these communities, most commonly leadplant, dwarf prairie rose, and redroot New Jersey tea (*Ceanothus herbaceus*). Larger shrubs and trees commonly encroach on all but the driest sites. A variety of herbaceous perennials occurs in tall-grass prairie with goldenrods and asters (*Symphyotrichum* spp.) being among the most noticeable, including Missouri goldenrod, heath aster (*Symphyotrichum erioides*), purple cone-flower (*Echinacea angustifolia*), compassplant (*Silphium laciniatum*), and many-flowered scurfpea (*Psoralidium floribundum*) (LANDFIRE 2007e; Rolfsmeier and Steinauer 2010).

> ***Mollisols***
>
> Deep soils formed in semi- to semi-humid areas with high organic matter and a nutrient-enriched surface soil.

Many of the remaining tallgrass prairies in the eastern portion of the study area are overgrazed or formerly plowed and abandoned and are often dominated by invasive species. Smooth brome is the most problematic invader with other widespread invasive plant species, including Kentucky bluegrass, sweetclovers (*Melilotus* spp.), and cheatgrasses (*Bromus japonicus*, *B. tectorum*) (LANDFIRE 2007e; Rolfsmeier and Steinauer 2010).

### 3.5.1.5 Developed/Barren/Old Field/Urban

Developed/barren/old field/urban lands make up 3.3 percent of the study area (Table 3.5-1) (USGS 2013). The developed/barren/old field/urban vegetation type includes low-, medium-, and high-intensity developed lands; roads; quarries, mines, and open pits; disturbed grassland, shrubland, and forest; barren and sparsely vegetated lands; introduced grassland and forbland; and urban vegetation.

### 3.5.1.6 Floodplain

One floodplain vegetation system, the Western Great Plains Floodplain, is included under the floodplain vegetation type comprising 0.3 percent of the study area (Table 3.5-1) (LANDFIRE 2007f; USGS 2013). This vegetation type is associated with the floodplains of medium and large rivers, including the North and South Platte rivers, the Loup River system, and other large rivers in the Sandhills that have hydrology largely driven by mountain snowmelt and rainfall. Sandy to dense clay soils are primarily alluvial and typically sustain flooding every 5 to 25 years. Dominant trees and shrubs that may occur include plains cottonwood, peachleaf willow (*Salix amygdaloides*), sandbar willow, and coyote willow. Bur oak, basswood, black walnut, and green ash typically occur on south-facing bluffs. Tallgrass species grow underneath the trees and may include switchgrass and big bluestem. Noxious weeds such as saltcedar (*Tamarix* spp.) and less desirable grasses and forbs may invade degraded areas (Kaul et al. 2006; NatureServe 2009; Schneider et al. 2011). A description of this system and the floodplain communities found in the system are included below.

#### Western Great Plains Floodplain

The Western Great Plains Floodplain system includes woody and herbaceous communities that range from seasonally flooded to temporarily inundated following high water flows and those that are subject to at least occasional seasonal inundation, usually following spring snowmelt but also rarely after very heavy rain events. The herbaceous communities are seasonally or intermittently flooded following spring floods and heavy rains. Most woodlands are flooded only temporarily, while sandbar areas are frequently seasonally inundated.

> ***Seral Stages***
>
> The series of plant communities or age classes that develop during ecological succession.

Communities range from sandbars, mudflats, and gravel flats; sandbar willow shrubland; cottonwood-peachleaf willow riparian woodland; and wet prairie. Cottonwood and willows make up the dominant woody vegetation and may sometimes occur with an understory of tall grass prairies such as switchgrass and scattered upland shrubs including snowberry (*Symphoricarpos occidentalis*) and buffaloberry (*Shepherdia argentea*). Rapidly drained communities such as gravel flats may also be home to xerophytic species typically associated with uplands, but the bulk of the herbaceous vegetation is typical of Great Plains wetlands. These communities represent most early seral stages typical of floodplains in central and western Nebraska; however, more mature forest communities may be found in places (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010). Flooding is an important process allowing pioneer woody species to regenerate (Rolfsmeier and Steinauer 2010).

Past and current overgrazing by livestock, land clearing, and excavating sand and gravel represent important ongoing threats to natural diversity. Several invasive species, including Eurasian phragmites (*Phragmites australis* ssp. *australis*), purple loosestrife (*Lythrum salicaria*), Russian olive (*Elaeagnus angustifolia*), and narrow-leaf cattail (*Typha angustifolia*), also represent a serious threat to natural diversity, and all of these species severely affect native communities (Rolfsmeier and Steinauer 2010).

#### ***Sandbars, Mudflats, and Gravel Flats***

> ***Mid-channel Bar***
>
> A sand bar that forms in the middle of the river.

This community occurs on sandbars, mudflats, and islands; in the channel of braided streams and rivers; and along shorelines of streams and rivers. It includes point bars and mid channel bars. Bars are formed when receding floodwaters deposit substrates from boulders to clay, silt, and cobbles in the streambed and on the shoreline or when water levels fall during low-flow periods in late summer/fall and during droughts. Sandbars are usually first formed in June and are highly vulnerable to undercutting and erosion throughout the year with vegetative sub-communities often short-lived because of disturbance by flooding or from succession. Many early successional sandbars survive only to the following spring and then are eroded away. The vegetation, which is quite variable depending on soil texture and level of inundation, typically is dominated by cottonwood and willow saplings, shrubs, and herbaceous species. Recently exposed sandbars are devoid of vegetation but are soon colonized with herbaceous vegetation and tree seedlings that succeed to sparsely vegetated sandbars and to a sandbar willow community or a cottonwood riparian woodland. Sparsely vegetated gravel flats dominated by annual and perennial forbs occur on low terraces above the river banks along the North Platte and South Platte rivers upstream from their confluence (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010).

#### ***Sandbar Willow Shrubland***

The sandbar willow shrubland community occurs on newly deposited sediments on sandbars, islands, shorelines, and occasionally lower floodplain terraces that are frequently flooded for long to short durations, particularly along the Platte and Loup rivers. Sandbar willow shrublands are an early successional community dominated by shrubs and sapling trees with sandbar willow, the dominant species interspersed with other willow species. The understory is highly variable because of the early successional nature of the community. The community is relatively short-lived, and in the absence of high-flow events, it will succeed to cottonwood riparian woodland, typically within 10 to 20 years (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010).

#### ***Cottonwood-peachleaf Willow Riparian Woodland***

The cottonwood-peachleaf riparian community includes areas dominated by cottonwood and communities with a mix of both cottonwood and peachleaf willow. This community is found on banks, in floodplains, sandbars, and on low terraces of streams and rivers. Recently deposited alluvial sandbars are colonized by seedlings of cottonwood, while the older alluvial bars and terraces at higher elevation contain the pole (i.e., 4 to 10 inches diameter breast height) to mature stages (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010). In areas dominated by cottonwoods, the community is dominated by a very open canopy of cottonwoods with, at most, a few scattered short subcanopy trees. Shrubs are generally absent or confined to streambanks. Herbaceous understory is quite variable in response to moisture regime but is generally dominated by mid-height to tall warm season grasses. Species diversity is relatively low (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010).

In areas where cottonwood and peachleaf willow are mixed, the canopy is open with fairly tall cottonwoods and slightly shorter peachleaf willow. In areas where the subcanopy is poorly developed, scattered small trees occur including boxelder and green ash with Russian olive and junipers (*Juniperus* spp.) often invading to a large extent. Patches of shrubs are generally present under the canopy with sandbar willow the most common shrub on lower ground and wild plum, chokecherry, and buffaloberry on higher terraces and banks. The herbaceous layer varies from sparse to dense, depending on drainage and shade. Flooding often creates open patches in this layer that nearby species often colonize (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010).

***Wet Prairie***

Wet prairies in this system are found in depressions on nearly level floodplains and terraces of rivers and streams where the water table is close to the surface and the soil is saturated for most of the growing season. Prairie cordgrass is an early colonizer and dominates most areas because of its vigorous nature but under disturbance other hydrophytic grasses and perennial forbs may be present. Shrubs may be scattered to patchy, commonly composed of willow species, false indigobush, and red osier (*Cornus sericea*) (LANDFIRE 2007f; Rolfsmeier and Steinauer 2010).

### 3.5.1.7 Forest/Woodland/Shrubland/Savanna

The forest/woodland/shrubland/savanna vegetation type is further described based on dominant vegetation. The forest/woodland/shrubland/savanna vegetation type is predominantly upland vegetation composing only 0.3 percent of the study area (Table 3.5-1). Communities are typically inhabited by bur oak and conifer species such as ponderosa pine (*Pinus ponderosa*) and eastern red cedar (LANDFIRE 2007g; 2007h; 2007i; USGS 2013).

Wooded areas in the study area are largely limited to planted shelterbelts and forested riparian areas along the rivers, although many of the rivers do not supported densely forested riparian areas. Trees and shrubs in wooded riparian areas include plains cottonwood, green ash, hackberry, and eastern red-cedar. These species grow with shrubs such as sandbar willow, peachleaf willow, rough-leaf dogwood (*Cornus drummondii*), chokecherry, American plum, and western snowberry (*Symphoricarpos occidentalis*) (Kaul et al. 2006; Schneider et al. 2011).

### 3.5.1.8 Open Water

Open water comprises 0.8 percent of the study area (Table 3.5-1) and includes surface water such as rivers, streams, lakes, and ponds (USGS 2013).

### 3.5.1.9 Noxious Weed Species

Noxious weeds are legally defined by a given jurisdictional entity for prioritizing weed prevention and control efforts to those species that are considered to have the greatest adverse economic and ecological effects. Species included on these lists are almost always both non-native and invasive. Adverse effects from noxious weeds include habitat degradation of native prairies, wetland, and riparian habitats; decreased crop and livestock production; and land devaluation and associated tax revenue loss. Nebraska’s Noxious Weed Control Act delegates to the Nebraska Department of Agriculture and Nebraska's counties the authority to require landowners to effectively control noxious weeds on their lands. Table 3.5-2 lists all noxious weed species for counties that the Project would cross.

**Table 3.5-2. Noxious Weeds and Occurrence in the R-Project Counties**

| Common Name[a] | Scientific Name[a] | Status[a] | Project County Occurrence[b] |
|---|---|---|---|
| Musk thistle | *Carduus nutans* | State noxious | Blaine, Brown, Cherry, Garfield, Holt, Lincoln, Logan, Loup, Rock, and Wheeler (Roeth et al. 2003) |
| Diffuse knapweed | *Centaurea diffusa* | State noxious | Brown, Holt, Rock, and Wheeler (Gaussoin et al. 2010) |
| Spotted knapweed | *Centaurea stoebe* ssp. *micranthos* | State noxious | Brown, Holt, Rock, and Wheeler (Gaussoin et al. 2010) |
| Canada thistle | *Cirsium arvense* | State noxious | All Project counties, except Blaine (Wilson 2009) |
| Bull thistle | *Cirsium vulgare* | County noxious – Rock | Blaine, Cherry, Loup, and Wheeler |
| Houndstongue | *Cynoglossum officinale* | State Watch List (Category 2) | Holt |
| Leafy spurge | *Euphorbia esula* | State noxious | All Project counties (Sandell and Knezevic 2001) |
| Japanese knotweed (cultivars and hybrids) | *Fallopia japonica* and hybrids | State noxious | Garfield (NWCA 2012) |
| Yellow bedstraw | *Galium verum* | County noxious – Cherry; State Watch List (Category 2) | Cherry |
| Broadleaf pepperwort/ Perennial pepperweed | *Lepidium latifolium* | State Watch List (Category 2) | Hooker and Lincoln |
| Purple loosestrife (cultivars and hybrids) | *Lythrum salicaria* | State noxious | Brown, Cherry, Holt, Lincoln, and Rock (Knezevic 2003) |
| Eurasian water-milfoil | *Myriophyllum spicatum* | State Watch List (Category 2) | Wheeler |
| Eurasian common reed (Phragmites) | *Phragmites australis* ssp. *australis* | State noxious | Blaine, Brown, Cherry, Garfield, Holt, Lincoln, Rock, Thomas, and Wheeler (Knezevic et al. 2008) |
| Sulphur cinquefoil | *Potentilla recta* | State Watch List (Category 2) | Blaine, Brown, Cherry, Garfield, Holt, and Wheeler |
| Saltcedar | *Tamarix ramosissima* and hybrids | State noxious | Lincoln and Rock (Wilson and Knezevic 2006) |

[a] Sources: NPPD (2015a)

[b] Kaul et al. (2006) in addition to any citations listed

### 3.5.2 Direct and Indirect Effects

The analysis of vegetation considered changes in the cover of vegetation types, fragmentation of vegetation, degradation of natural vegetation types, and/or spread of noxious plants that could occur as a result of the implementation of various Project activities. The area analyzed to determine effects on vegetation includes the areal extent of vegetation types in the Project area, defined in Table 3.1-1, and the areal extent of woody vegetation (i.e. trees, tall brush, and shelterbelts) in the ROW. Activities related to construction, operation, and maintenance, including emergency repairs that could occur are described in detail in Chapter 2, *Alternatives*. Mitigation practices that would decrease the severity of effects from construction, operation, and maintenance activities are discussed in Section 3.5.3, *Avoidance, Minimization, and Mitigation Measures*. The assessment of effects on vegetation communities that are considered wetlands are discussed under Section 3.4, *Wetland*s.

Each alternative was analyzed based on the likelihood of effects on vegetation overall, and the estimated total disturbance to individual vegetation types described in the Affected Environment section was quantified. The LANDFIRE database (USGS 2013) was used to analyze vegetation cover baseline conditions and composition in the Project area. The effects discussion focuses on effects resulting from construction, operation, and maintenance activities that would occur in the Project area defined in Table 3.1-1. The area of analysis may extend beyond the Project area boundaries for some indirect effect assessments.

Potential direct and indirect, short- and long-term effects on vegetation are described below. Direct, adverse impacts on vegetation were assessed and measured in terms of areal extent (e.g., acres) where Project activities occur and could cause the direct loss of vegetation as a result of clearing, trampling, and/or crushing. Short-term effects are those that may affect vegetation for a duration of three to five growing seasons, and long-term effects are those that would persist beyond five growing seasons or where vegetation is permanently removed. NPPD anticipates that vegetation restoration would be completed in 3 to 5 years, but if it takes longer, NPPD would continue restoration efforts until success is achieved. The intensity of effects under each alternative is categorized as low, moderate, or high according to the threshold criteria described in Section 3.1. Restoration of vegetation disturbed or affected by construction, operation, and maintenance activities was considered when analyzing effects on vegetation.

The following parameters were considered when assessing potential effects and effects unique to individual vegetation types:

- Amount of vegetation that would be lost from construction, operation, and maintenance, including emergency repairs
- Amount of vegetation that would be disturbed temporarily from construction, operation, and maintenance
- Amount of woody vegetation that would be permanently replaced by maintained herbaceous vegetation
- Potential for spread of noxious weeds in or adjacent to the Project area

#### 3.5.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect vegetation in the study area.

#### 3.5.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent implementation of Alternative A along NPPD's final route would result in direct and indirect effects on vegetation in the Project area in the short and long term. Specific effects on vegetation overall and individual vegetation communities as a result of the various construction, operation, and maintenance activities associated with implementation of Alternative A are described below.

**Direct Effects**

Potential effects on vegetation would be short- and long-term varying in intensity from low to moderate to high. In the ROW, direct effects from surface disturbances would consist of temporary site preparation and construction activities for transmission structure installation. Impacts would include localized disturbance to vegetation, which includes individual plants and the seedbank, caused by construction equipment and vehicles during site preparation, including damage to vegetation from vehicle tires, trampling/crushing, excavation, grading, soil compaction, and soil stockpiling.

Long-term impacts on vegetation would be limited to conversion of woody vegetation to non-woody vegetation and loss of vegetation resulting from permanent conversion to developed areas. Vegetation would be permanently removed at each structure foundation location, the Thedford and Holt County substations, and permanent access associated with the substations, operations and maintenance, or roads left at a landowner's request. Approximately 1.2 acres of permanent disturbance would occur combined at all structure foundations and 26 acres at permanent access roads. Construction of the proposed Thedford and Holt County substations would require the permanent removal of all vegetation because the sites would be converted to utility use. Approximately 13 acres of the grassland/prairie vegetation type are at the Thedford Substation site and 12 acres of cultivated agriculture field at the Holt County Substation, both of which would be permanently lost. Impacts on vegetation at structure locations, along permanent access roads, and within the substation boundaries would be long-term and of moderate intensity.

Woody vegetation (i.e., forest/woodland/shrubland/savanna, forested floodplain vegetation, and woody vegetation in shelterbelts and fence lines) would be cleared in the ROW where necessary to ensure safe and reliable operation of the transmission line. Clearing of woody vegetation typically includes removal of mature trees and low woody vegetation. Approximately 49 acres of woody vegetation is located in the ROW. Depending on the vegetation adjacent to these wooded areas, cleared woody areas would likely be converted to pasture/hay or to vegetation similar to vegetation found in adjacent areas. Clearing woody vegetation would have a long-term, high-intensity, localized effect because it would result in permanent vegetation conversion.

Short-term impacts associated with the construction of the Project would also include the disturbance of herbaceous vegetation (i.e., dune vegetation, grassland/prairie, and floodplain areas) and in agricultural areas along temporary construction access routes/trails, and temporary disturbance of vegetation for access during construction. Grassland/prairie (hereafter also collectively referred to as grasslands) represent the most acreage in the Project area, although the total amount of disturbance of these areas during construction would be small. In agricultural areas, row crops would be temporarily disturbed in the Project area during construction, but it would be replanted when construction is completed. Further information on effects in agricultural areas is presented in Section 3.8, *Land Use*. Vegetation effects in the ROW and along temporary access routes would be short term and of low intensity in areas that are not being permanently developed. Specified portions of the R-Project where existing roads are not available would be accessed by drive-and-crush overland travel for lattice tower construction. This type of overland travel would not require improvements under Alternative A. Vegetation would be crushed by equipment but the root system and seed bank would remain in place.

Other direct effects outside the ROW include vegetation removal and blading in temporary work areas (i.e., construction yards/staging areas, fly yards and assembly areas), temporary access, distribution power line moves, and well relocations. Construction yards/staging areas and fly yards and assembly areas would be located in previously disturbed areas based on availability. Construction crews would gain access to the ROW from existing roads and two tracks, overland travel, and temporary access. Distribution power line moves would include 22 miles of overhead line and 6 miles of underground line relocation. Underground relocation would require excavation of a 6-inch trench. If restoration is effectively implemented (i.e., meets the success criteria in the Restoration Management Plan), vegetation effects in areas outside the ROW would be short term and of low intensity in areas that are not being permanently developed.

Direct, long-term, low- to moderate-intensity impacts on vegetation from operation and maintenance of the Project would result in the potential for loss or degradation of vegetation related to the use of access paths for repair and maintenance activities and vegetation management. Impacts associated with operation and maintenance activities would involve several of the same types of effects discussed for construction activities. Direct impacts from operation and maintenance would result from ROW vegetation management activities. ROW vegetation management would only be required in areas where tall vegetation may encroach on the transmission line. NPPD has developed a TVMP that directs operation and maintenance personnel on how to manage vegetation to ensure the safety of transmission lines. The TVMP is used as a program to prevent outages from vegetation (trees) located on transmission ROW. Grasslands require little or no ROW vegetation management because grassland vegetation does not interfere with transmission lines. These activities are not anticipated to have any long-term impacts on vegetation outside the transmission ROW along the length of NPPD’s final route.

However, it may occasionally be necessary to trim or remove trees adjacent to the ROW that pose a hazard to the safe and reliable operation of the transmission line. Management of trees would be infrequent and would have little if any effect on adjacent vegetation communities.

NPPD would routinely (twice a year) inspect the transmission line using helicopter fixed-wing aircraft or ground patrol. Ground patrols typically would be conducted using ATVs or foot patrol. Routine maintenance and repair activities would not begin until 30 years after the in-service date and would occur once every 10 years for the remainder of the life of the transmission line. NPPD would use ATVs, light vehicles, and low-ground-pressure equipment where possible to complete routine maintenance and repairs. Improvements to access paths required to reach each structure would not be required for routine maintenance and repairs.

Table 3.5-3 shows the estimated area of permanent and temporary vegetation disturbance associated with Project construction, operation, and maintenance activities under Alternative A. While these estimates were established based on the best available information, the exact location and amount of vegetation disturbances for certain activities, such as construction yards/staging areas, fly yards and assembly areas, permanent access roads for maintenance needs, are currently unknown and would depend on site-specific conditions, and landowner negotiations. Similarly, the timing and location of emergency repairs are not known and cannot be predicted. The same avoidance and minimization measures for effects on vegetation from construction would be applied to emergency repairs.

An escrow account would be established for the Project and an escrow agreement would be submitted to the Service for review and approval governing the restoration of disturbed beetle habitat. The Restoration Management Plan includes stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet the stipulations. Following construction, temporary work areas and temporary access improvements would be removed and the area would be restored to its original vegetation condition in accordance with the avoidance, minimization, and mitigation measures outlined below and the Restoration Management Plan. The topsoil may be bladed back across temporarily disturbed areas. In these areas, seeds and roots contained in the topsoil layer normally provide a natural source for new vegetation regrowth. Other temporarily disturbed areas would be restored and revegetated to similar conditions as the surrounding area. The Project's restoration planning team, private landowners, local NRCS offices, and other rangeland experts would be consulted regarding the appropriate techniques, seed mix, and rate to revegetate areas disturbed from construction. Seed mixes would be determined by the existing land use surrounding the disturbed area to be restored. Areas used as grassland range would be reseeded with a native seed mix.

Additionally, at least 500 acres would be protected through mitigation measures required for the take of the beetle to offset temporary and permanent impacts on beetle habitat.

**Table 3.5-3. Estimated Acres of R-Project Disturbances on Vegetation under Alternative A[a]**

| Project Activity | Vegetation Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dune Vegetation | Wetland | Agriculture (pasture/hay and row crops) | Grassland/ Prairie | Developed/ Barren/ Old Field/ Urban | Floodplain | Forest/ Woodland/ Shrubland/ Savanna | Open Water | Total |
| **Temporary Construction** | | | | | | | | | |
| Access | 155.4 | 19.6 | 12.2 | 18.3 | 49.8 | 2.7 | 0.2 | 0.5 | **258.7** |
| Structure work areas | 256.3 | 50.0 | 45.4 | 28.5 | 98.7 | 5.2 | 0.9 | 1.2 | **486.2** |
| Fly yards/assembly yards | 114.6 | 31.6 | 1.7 | 31.3 | 7.4 | 6.5 | -- | -- | **193.1** |
| Construction yards/staging areas | 96.4 | 8.6 | -- | 63.1 | 20.9 | 13.9 | 0.2 | -- | **203.1** |
| Pulling and tensioning sites | 165.0 | 22.0 | 21.0 | 14.5 | 46.0 | 5.9 | 0.1 | 0.5 | **275.0** |
| Distribution power line moves[b] | 10.8 | 3.5 | 1.4 | 2.0 | 21.5 | -- | -- | 0.1 | **39.3** |
| **Total Temporary** | **798.5** | **135.3** | **81.7** | **157.7** | **244.3** | **34.2** | **1.4** | **2.3** | **1,455.4** |
| **Permanent Construction** | | | | | | | | | |
| ROW tree clearing | | | | | | | 49.0 | | **49.0** |
| Structure base | 1.2[c] | | | | | | | | **1.2** |
| Access | 26.0[c] | | | | | | | | **26.0** |
| Thedford Substation[d] | -- | -- | -- | 13.0 | -- | -- | -- | -- | **13.0** |
| Holt County Substation[e] | -- | -- | 12.0 | -- | -- | -- | -- | -- | **12.0** |
| **Total permanent** | | | | | | | | | **101.2** |
| ***Construction subtotal*** | | | | | | | | | **1,556.6** |

| Project Activity | Vegetation Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dune Vegetation | Wetland | Agriculture (pasture/hay and row crops) | Grassland/ Prairie | Developed/ Barren/ Old Field/ Urban | Floodplain | Forest/ Woodland/ Shrubland/ Savanna | Open Water | Total |
| **Operation and Maintenance** | | | | | | | | | |
| ***Temporary*** | | | | | | | | | |
| Emergency repairs | 293.0[b] | | | | | | | | **293.0** |
| ***Operation and maintenance subtotal*** | | | | | | | | | **293.0** |
| **Total disturbance to vegetation** | | | | | | | | | **1,849.6** |

Source: NPPD (2015a) and USGS (2013).

Notes: Vegetation types described in the Routing and Environmental Report (NPPD 2015a) were cross-referenced to the vegetation types described in the Affected Environment section. The cross reference, listed by vegetation type in the Routing and Environmental Report, equal to the Affected Environment vegetation type, includes: Dune Prairie and Shrubland = Dune Vegetation; Valley Wetlands = Wetland; Agricultural = Agriculture; Mixed-grass Prairie = Grassland/Prairie; Developed/Barren/Ruderal = Developed/Barren/Old Field/Urban; Floodplains = Floodplain; Forested Uplands = Forest/Woodland/Shrubland/Savanna; Open Water = Open Water

[a] Calculations are based on preliminary design.

[b] Disturbance estimate refined for detailed resource analysis.

[c] The exact location and vegetation type disturbed are currently unknown and would depend on site-specific conditions, landowner negotiations, and/or the number and type of towers to be installed (steel lattice versus monopole). Permanent access roads are estimated at 10% of temporary access improvements. Emergency repairs is estimated at 20% of all temporary disturbance.

[d] Current land use of the site is pasture/rangeland.

[e] Current land use of the site is center-pivot irrigated cropland.

These direct, short- and long-term effects during construction, operation, and maintenance on natural vegetation types in the Project area would occur to a relatively small proportion of these vegetation types in the study area. Individual vegetation communities would remain functional at both the local and regional scale. Additionally, these impacts would be minimized through the appropriate avoidance, minimization, and mitigation measures. Therefore, direct short- and long-term effects on vegetation from construction, operation, and maintenance would be low to moderate.

#### Indirect Effects

Indirect effects on vegetation from construction and/or operation and maintenance of the Project could include: 1) increased erosion and sedimentation; 2) accumulation of fugitive dust on vegetation; 3) establishment of noxious and invasive weed species; 4) habitat fragmentation; 5) loss of pollinators; and, 6) herbicide use. Typically, indirect impacts on plants occur in areas near or adjacent to the construction impact but could affect vegetation farther away.

Construction activities may increase erosion and sedimentation, causing indirect short-term impacts on nearby vegetation in the Project area or outside and downstream of construction activities. These indirect, short-term impacts would be minimized through erosion and sediment controls implemented throughout the construction of the Project. Indirect short- and long-term effects could occur on vegetation from fugitive dust accumulation from construction, operation, and maintenance vehicle and equipment use. Fugitive dust accumulation may adversely affect photosynthesis, respiration, transpiration, water use efficiency, leaf conductance, growth rate, gas exchange, and growth vigor. Fugitive dust tends to be a greater issue in sparsely vegetated areas and sandy soils.

Localized surface disturbances may facilitate the invasion of noxious and invasive weeds by removing native vegetative cover, creating areas of bare ground (Burke and Grime 1996; Watkins et al. 2003), and increasing light and nutrient availability (Stohlgren et al. 2003, 1999). Construction access and other ground-disturbing activities create opportunity for noxious and invasive weeds to establish or for pre-existing sites to spread. Construction equipment and vehicles could carry and disperse weed seeds by using soil, gravel, and other fill materials brought in by outside sources. Noxious and invasive weeds compete with native plants, degrade and modify native communities, and reduce resources for native species (e.g., moisture, soil nutrients, and light). Noxious weed management is addressed in the Restoration Management Plan to prevent and control the spread of noxious and invasive weeds during construction of the Project. Examples of noxious and invasive weed control measures that would be implemented by NPPD during construction of the Project include avoiding driving through weed-infested areas to prevent spread, inspecting material sources used on the construction site to ensure they are weed-free before use and transport, and cleaning construction equipment and vehicles to prevent weeds from spreading or invading, and restoring the disturbed area before aggressive, noxious weeds can become established.

Indirect, long-term effects could occur from habitat fragmentation as a result of the long-term surface disturbance from transmission structures and permanent facilities. Fragmentation of individual vegetation communities can result in more isolated, smaller vegetation communities, adverse impacts to pollinators, decreased reproductive success of individual plants, increased edge effects, and increased competition from noxious and invasive weeds. Access would include use of low-pressure tracked or rubber tired equipment in grassland habitats to the extent practicable, which would minimize the effect of fragmentation.

Where pollinators occur in or adjacent to the ROW, temporary access routes, and permanent access roads, pollinator and host species may experience a localized effect. Reduced pollination of individual plants could reduce flower and seed production and impede gene flow between populations. Given the lack of pollinator data associated with species dominating the various potential habitats in the Project area, the intensity and extent of this potential impact are unknown. The use of herbicides for noxious-weed management could result in drift, causing damage to pollinators on non-target vegetation in nearby areas. Measures that would be followed to minimize herbicide drift include strictly following herbicide label directions, using the appropriate spray nozzle, keeping nozzle close to target, avoiding application during high winds, and use of buffer zones around sensitive features. Only state-licensed pesticide applicators following all local regulations would apply pesticides for weed treatment.

These indirect, short- and long-term effects during construction, operation, and maintenance on each vegetation type are a relatively small proportion of each type’s total land area throughout the region. Vegetation overall and individual vegetation communities would remain functional at both the local and regional scale. Additionally, the likelihood of these impacts would be minimized through the appropriate avoidance, minimization, and mitigation measures for vegetation. Therefore, indirect short- and long-term effects on vegetation overall and individual vegetation communities as a result of construction would be of low intensity. In the event restoration activities take longer to achieve success, and the effects continue longer than the construction period, the indirect effects on vegetation would be for a longer term, but would likely remain low to moderate intensity, since previous restoration efforts would have achieved some results even prior to meeting the success criteria.

#### 3.5.2.3 Alternative B: Tubular Steel Monopole Structures Only

Effects on vegetation under Alternative B would be similar to those described for Alternative A, and differences would be associated with increases in the area of ground disturbance resulting from access route improvements and structure work areas, increased duration of ground equipment operation from monopole construction, and the elimination of fly yards for helicopter erection of structures. Specific effects on vegetation overall and individual vegetation communities as a result of the various construction, operation, and maintenance activities associated with implementation of Alternative B are described below.

#### Direct Effects

The types of direct effects on vegetation under Alternative B would generally be the same or similar as those described for Alternative A. Potential effects on vegetation would be short term and long term and would vary in intensity from low to moderate to high.

Long-term, high-intensity impacts on vegetation from conversion of woody vegetation to non-woody vegetation and loss of vegetation resulting from permanent conversion to developed areas would be the same as under Alternative A and would occur in the same locations and in the same amount. The amount of vegetation that would be permanently removed at each structure foundation location would be slightly less under Alternative B. Permanent access associated with operations and maintenance or roads left at landowner's request would likely be slightly higher under Alternative B. Approximately 1.0 acre of permanent disturbance would occur at structure foundations and 51 acres for permanent access. The amount of permanent disturbance for substations would be the same under Alternative B as Alternative A. Impacts on vegetation at structure locations, for permanent access, and within the substation boundaries would be long term and of moderate intensity.

Short-term impacts associated with the construction of the Project would also include the disturbance of herbaceous vegetation (i.e., dune vegetation, grassland/prairie, agricultural, and floodplain areas) along temporary construction access routes. Temporary access under Alternative B for monopole installation would require using more Access Scenario 2 to travel to structure locations, resulting in an increase from 258 acres to 506 acres of temporary disturbance. Access Scenario 2 would require some improvement to existing trails and overland travel with large or heavy equipment that may require improvements for access, resulting in greater damage to vegetation traversed by construction equipment. Improvements may require blading and the placement of fill material on geofabric where required. The disturbance in structure work areas would be greater by approximately twice as much (i.e., 486 acres under Alternative A and 824 under Alternative B) under Alternative B compared to Alternative A. As described for Alternative A, these areas would be revegetated when construction is completed. Helicopters would not be used for structure erection under Alternative B, resulting in the elimination of 193 acres of temporary fly yards and assembly areas.

Vegetation effects in the ROW and along temporary access routes would be considered short-term, low-intensity, adverse impacts in areas that are not being permanently developed if restoration is effectively implemented (i.e., meets the success criteria in the Restoration Management Plan). Table 3.5-4 shows the estimated area of permanent and temporary vegetation disturbance associated with Project construction, operation, and maintenance activities under Alternative B.

The number of acres protected under Alternative B through mitigation measures required for the take of the beetle to offset temporary and permanent impacts on beetle habitat would be greater (at least 660 acres) compared to Alternative A (at least 500 acres).

**Table 3.5-4. Estimated R-Project Disturbances on Vegetation under Alternative B[a]**

| Project Activity | Vegetation Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dune Vegetation | Wetland | Agriculture (Pasture/Hay and Row Crops) | Grassland/ Prairie | Developed/ Barren/ Old Field/ Urban | Floodplain | Forest/ Woodland/ Shrubland/ Savanna | Open Water | Total |
| **Temporary Construction** | | | | | | | | | |
| Access | 354.6 | 46.1 | 12.4 | 34.6 | 52.3 | 4.0 | 0.6 | 1.1 | **505.7** |
| Structure work areas | 549.7 | 73.2 | 45.5 | 41.1 | 101.8 | 8.6 | 1.6 | 3.2 | **824.7** |
| Fly yards/assembly yards | -- | -- | -- | -- | -- | -- | -- | -- | **0.0** |
| Construction yards/staging areas | 96.4 | 8.6 | -- | 63.1 | 20.9 | 13.9 | 0.2 | -- | **203.1** |
| Pulling and tensioning sites | 179.6 | 24.0 | 21.0 | 15.3 | 46.3 | 6.7 | 0.1 | 0.5 | **293.5** |
| Distribution power line moves[b] | 10.8 | 3.5 | 1.4 | 2.0 | 21.5 | -- | -- | 0.1 | **39.3** |
| **Total temporary** | **1191.1** | **155.4** | **80.3** | **156.1** | **242.8** | **33.2** | **2.5** | **4.9** | **1866.3** |
| **Permanent Construction** | | | | | | | | | |
| ROW tree clearing | | | | | | | 49.0 | | **49.0** |
| Structure foundations | 1.0[c] | | | | | | | | **1.0** |
| Access | 51[c] | | | | | | | | **51.0** |
| Thedford Substation[d] | -- | -- | -- | 13 | -- | -- | -- | -- | **13.0** |
| Holt County Substation[e] | -- | -- | 12 | -- | -- | -- | -- | -- | **12.0** |
| **Total permanent** | | | | | | | | | **126.0** |
| ***Construction subtotal*** | | | | | | | | | **1,992.3** |

| Project Activity | Vegetation Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dune Vegetation | Wetland | Agriculture (Pasture/Hay and Row Crops) | Grassland/ Prairie | Developed/ Barren/ Old Field/ Urban | Floodplain | Forest/ Woodland/ Shrubland/ Savanna | Open Water | Total |
| **Operation and Maintenance** | | | | | | | | | |
| ***Temporary*** | | | | | | | | | |
| Emergency repairs | 374[b] | | | | | | | | **374.0** |
| ***Operation and maintenance subtotal*** | | | | | | | | | **374.0** |
| **Total disturbance to vegetation** | | | | | | | | | **2,366.3** |

Source: NPPD (2015a) and USGS (2013).

Notes: Vegetation types described in the Routing and Environmental Report (NPPD 2015a) were cross-referenced to the vegetation types described in the Affected Environment section. The cross reference, listed by vegetation type in the Routing and Environmental Report, equal to the Affected Environment vegetation type, includes: Dune Prairie and Shrubland = Dune Vegetation; Valley Wetlands = Wetland; Agricultural = Agriculture; Mixed-grass Prairie = Grassland/Prairie; Developed/Barren/Ruderal = Developed/Barren/Old Field/Urban; Floodplains = Floodplain; Forested Uplands = Forest/Woodland/Shrubland/Savanna; Open Water = Open Water

[a] Calculations are based on preliminary design.

[b] Disturbance estimate refined for detailed resource analysis.

[c] The exact location and vegetation type disturbed are currently unknown and would depend on site-specific conditions, landowner negotiations, and/or the number and type of towers to be installed (steel lattice versus monopole). Permanent access roads are estimated at 10% of temporary access improvements. Emergency repairs is estimated at 20% of all temporary disturbance.

[d] Current land use of the site is pasture/rangeland.

[e] Current land use of the site is irrigated cropland.

Overall, the amount of ground disturbance under Alternative B would include an additional 517 acres of total disturbance to vegetation. These direct, short- and long-term effects during construction, operation, and maintenance on natural vegetation types in the Project area would occur to a relatively small proportion of these vegetation types in the study area. Individual vegetation communities would remain functional at both the local and regional scale to absorb the loss of the disturbed areas on a temporary basis. Impacts would be minimized through the appropriate avoidance, minimization, and mitigation measures. Therefore, direct short- and long-term effects on vegetation from construction, operation, and maintenance would be low to moderate.

#### Indirect Effects

Indirect effects on vegetation from construction and/or operation and maintenance of the Project under Alternative B would be similar to Alternative A and could include: 1) increased erosion and sedimentation, 2) accumulation of fugitive dust on vegetation, 3) establishment of noxious and invasive weed species, 4) habitat fragmentation, 5) loss of pollinators, and 6) herbicide use.

Indirect, short-term effects on nearby vegetation in the Project area or outside and downstream of construction activities could occur and would be minimized by implementing erosion and sediment controls during construction. Fugitive dust accumulation from construction, operation, and maintenance vehicle and equipment use could cause indirect, short-term effects on vegetation because it may adversely affect photosynthesis, respiration, transpiration, water use efficiency, leaf conductance, growth rate, gas exchange, and growth vigor.

Localized surface disturbances that facilitate the invasion of noxious and invasive weeds by removing native vegetative cover, creating areas of bare ground (Burke and Grime 1996; Watkins et al. 2003), and increasing light and nutrient availability (Stohlgren et al. 2003, 1999) would be greater under Alternative B than under Alternative A. The same avoidance, minimization, and mitigation measures implemented, including noxious weed management as addressed in the Restoration Management Plan, under Alternative A would be implemented under Alternative B.

These indirect, short- and long-term effects on each vegetation type during construction, operation, and maintenance are a relatively small proportion of each type's total land area throughout the region. Vegetation overall and individual vegetation communities would remain functional at both the local and regional scale. Additionally, the likelihood of these impacts would be minimized through the appropriate avoidance, minimization, and mitigation measures for vegetation. Therefore, indirect short- and long-term effects on vegetation overall and individual vegetation communities as a result of construction would be low intensity. In the event restoration activities take longer to achieve success, and the effects continue longer than the construction period, the indirect effects on vegetation would be for a longer term, but would likely remain low to moderate intensity, since previous restoration efforts would have achieved some results even prior to meeting the success criteria.

### 3.5.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on vegetation:

- Locate construction staging areas and pulling and tensioning sites adjacent to existing roads where practicable based on availability and landowner approval.
- Use helicopters for erecting lattice structures (Alternative A only), stringing sock line, and mobilizing certain equipment.
- Use helical pier foundations for lattice structures in the Sandhills, which require less equipment, a smaller temporary work area, and result in less ground disturbance than traditional steel monopole foundations (Alternative A only).
- Use existing roads and two-tracks for access during construction; use low-ground-pressure tracked or rubber-tired equipment to reduce effects on vegetation for overland access (Alternative A only).
- Use temporary improvements for access.
- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas, where practicable based on availability and landowner approval.
- Restrict all construction vehicle movement outside the ROW to designated access routes and established roads other than for emergency situations.
- Restore temporary disturbance areas by relieving compaction, if necessary; hauling away excess spoils; and reseeding with an approved seed mix or one suitable to the use of the area and restore cultivated agricultural lands to their previous contour and condition.
- Use existing river and stream crossings for construction access, where available; where new crossings cannot be avoided, use temporary bridges or culverts to minimize impacts and install culverts in such a way as to maintain the existing hydrology of the landscape.
- Implement erosion and sediment controls throughout construction, including stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment before reaching receiving waters.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.
- Conduct restoration monitoring to document implementation and progress of the restoration efforts, conduct post-construction monitoring to evaluate restoration effectiveness, and implement adaptive management where needed.
- Consult with the Project's restoration planning team, private landowners, local restoration experts, Natural Resources Districts (NRDs), and the local NRCS office regarding the appropriate techniques, seed mix, and rate to revegetate areas disturbed during construction, as described in the Restoration Management Plan.

- Implement noxious weed management as described in the Restoration Management Plan where necessary to reduce the potential for spread or invasion by weeds and implement standard operating procedures for noxious weed management, including vehicle and equipment cleaning and additional measures near sensitive areas (special status species locations, wetland/riparian areas, waterbodies, cultural resources, and human residences).
- Minimize the risk of fire ignitions during construction by implementing fire prevention and control measures.
- Minimize the removal of shelterbelts and trees.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.5.4 Effects Summary

Implementation of Alternative A would have both short- and long-term, direct and indirect, adverse impacts. These adverse impacts would be minimized after temporarily disturbed areas are restored. Additionally, at least 500 acres would be protected through mitigation to offset temporary and permanent impacts on beetle habitat. Therefore, because avoidance, minimization, and mitigation measures would minimize impacts on this resource and because a relatively small proportion of the overall vegetation and individual vegetation communities in the local Project area and region would be permanently affected, implementation of Alternative A would not have potential for significant, adverse impacts on vegetation.

Implementation of Alternative B would have both short- and long-term, direct and indirect, adverse impacts. These adverse impacts would be minimized once temporarily disturbed areas are restored. Additionally, approximately 660 acres would be protected through mitigation to offset temporary and permanent impacts on beetle habitat. Because avoidance, minimization, and mitigation measures would minimize impacts on this resource and because a relatively small proportion of the overall vegetation and individual vegetation communities in the local Project area and region would be permanently affected, implementation of Alternative B would not have potential for significant, adverse impacts on vegetation.

The total disturbance to vegetation under Alternative B would be greater compared to Alternative A and more damage could occur to vegetation from construction equipment. Additionally, the invasion of noxious and invasive weeds could be greater under Alternative B.

## 3.6 Wildlife

**Nesting Swans and their Brood**

Source: USFWS

*Trumpeter swan (Cygnus buccinator)*

The R-Project would be situated in the unique Nebraska Sandhills ecoregion, which provides vast and largely undisturbed, unfragmented habitat for diverse wildlife species. As discussed in more detail below, construction, operation, and maintenance, including emergency repairs, associated with the R-Project would have the potential to affect wildlife in a number of ways, including injury or death from collisions with of transmission lines; temporary disturbance of feeding or reproductive behaviors; and loss, degradation, and/or fragmentation of habitat. This section is divided into two parts: the first (Section 3.6.1) describes the affected environment for wildlife in the Nebraska Sandhills and specific occurrences of species within the study area, and the second (Section 3.6.2) describes and quantifies direct and indirect effects on species in the Project area, as defined in Section 3.1. Section 3.6.2 also qualitatively measures impact intensity based on the criteria provided in Table 3.1-2. Discussion of wildlife species and habitats and potential effects of the alternatives in this section is limited to those species that do not hold a special status at either the Federal or state level. Special status species are discussed in Section 3.7, *Special Status Species.*

### 3.6.1 Affected Environment

This section describes wildlife species and their habitats known to occur or likely to occur in the study area. The affected environment for the R-Project consists of approximately 7,039 square miles of lands in north-central Nebraska including portions of Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, Blaine, Rock, Loup, Holt, Garfield, Antelope, and Wheeler counties (Figure 1-1).

#### 3.6.1.1 Nebraska Sandhills Ecoregion and Habitats

The study area covers portions of the Western High Plains, Central Great Plains, and Nebraska Sandhills Level III ecoregions, as designated by USEPA (Chapman et al. 2001) (Figure 3.6-1). The vast majority of the study area is located with the Nebraska Sandhills ecoregion. This uniquely distinct ecoregion spans approximately 20,000 square miles in central Nebraska and is one of the largest, intact native grasslands in North America. Additionally, the largest stabilized dune system in the Western Hemisphere and the largest area of vegetated dunes in the world are located in the Nebraska Sandhills (Schneider et al. 2011). Level IV ecoregions that fall in the study area include the Platte River Valley, Wet Meadow and Marsh Plain, Lakes Area, and Central Nebraska Loess Plains, among others (Figure 3.6-1) (Chapman et al. 2001).

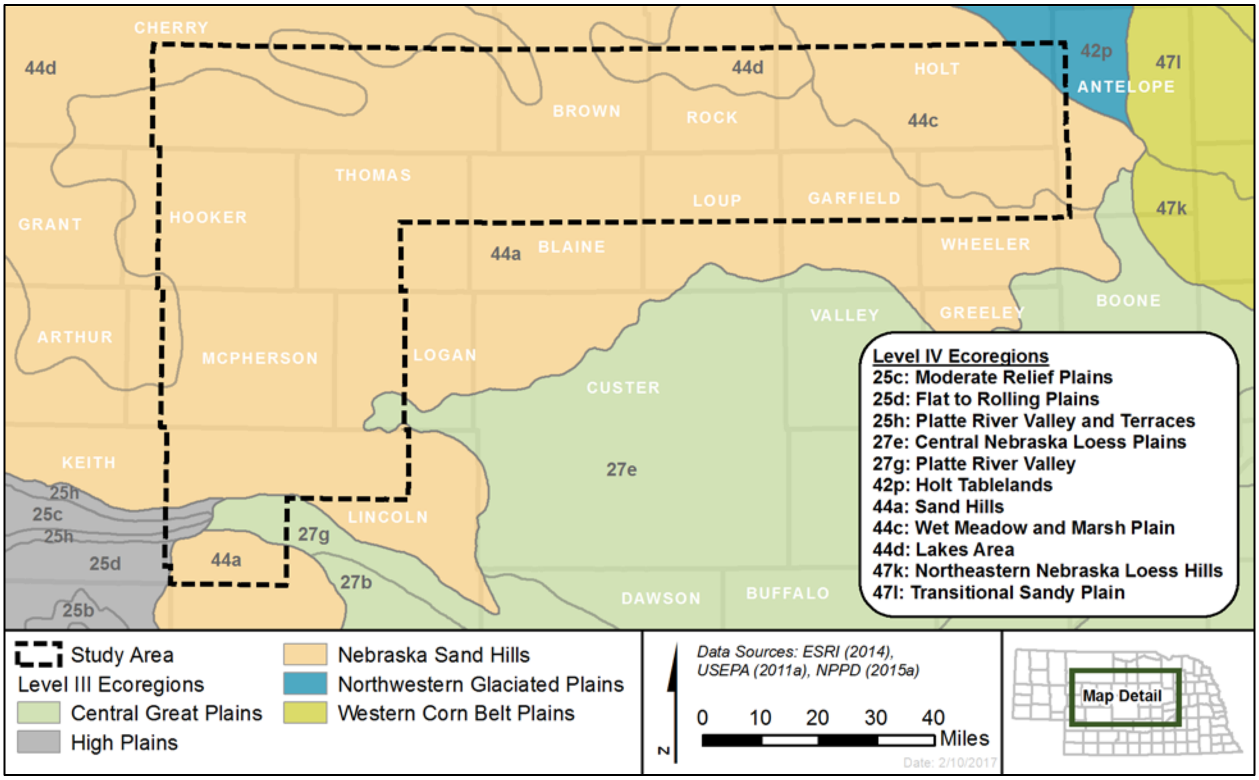



**Figure 3.6-1. Nebraska Ecoregions in R-Project Study Area**

Although regarded as one of the most homogenous North American ecoregions, the Nebraska Sandhills contains a variety of habitats that are home to hundreds of wildlife species. Habitats found in the Nebraska Sandhills includes high sandy dunes, dune prairies, subirrigated wet meadows, marshes, streams, shallow lakes, and rivers. Wooded areas are largely limited to planted shelter belts and forested riparian areas along rivers, although many of these rivers do not support densely forested riparian areas (Schneider et al. 2011).

> ***Sandhills Ecoregion***
>
> …is vulnerable to a variety of natural environmental disturbances.

The Sandhills ecoregion is vulnerable to a variety of environmental disturbances. Overgrazing, altered frequency of wildfires, or physical damage to dune vegetation caused by vehicles and equipment can cause blowouts (Stubbendieck et al. 1989), facilitating the introduction of noxious weeds and alteration of vegetation communities. Other environmental stressors that threaten the Sandhills ecoregion include conversion of grasslands to cropland, ditching and draining of subirrigated wet meadows and marshes, depletion of aquifers for irrigation or livestock watering, and loss or fragmentation of habitat resulting from other forms of development. Although the region is largely undisturbed and most natural communities remain intact, accelerating rates of development for agricultural purposes and expanding utility-scale wind energy development and transportation infrastructure pose an ongoing threat (Schneider et al. 2011).

Source: Louis Berger Team

*Sandhills ecoregion*

#### 3.6.1.2 Biologically Unique Landscapes

The Nebraska Natural Legacy Project has identified a series of BULs throughout the state that should be targeted for priority management and conservation efforts (Figure 3.6-2). These BULs were selected based on occurrences of at-risk species and unique natural communities. If effectively managed, targeted conservation of BULs could conserve the majority of the state's biological diversity (Schneider et al. 2011). BULs designated by the Nebraska Natural Legacy Project that fall within the study area include:

- Cherry County Wetlands—The Cherry County Wetlands BUL is located in the northern portion of the Nebraska Sandhills; the southern portion of the BUL falls within the study area, although it would not be crossed by the R-Project transmission line (Figure 3.6-2). The Cherry County Wetlands BUL, which consists of high linear dunes with interdunal valleys, provides a variety of habitat types for wildlife species. Upland habitats consist primarily of dune grasslands, while the valleys include grasslands with subirrigated wet meadows, marshes, fens (type of wetland; further described in Section 3.4, *Wetlands*), lakes and streams, which collectively make up large wetland complexes. This BUL is drained by the North Loup River and its tributaries. The Cherry County Wetlands BUL provides important habitat for nesting and migratory water birds, and its aquatic habitats are known to support large populations of reptiles, amphibians, fish, and other aquatic species. Primary stressors to fish and wildlife species and habitats in the Cherry County Wetlands BUL include draining of wetlands, stream channelization, invasive species, unsustainable grazing practices, and poorly sited utility-scale wind turbines and cellular/television towers (Schneider et al. 2011).

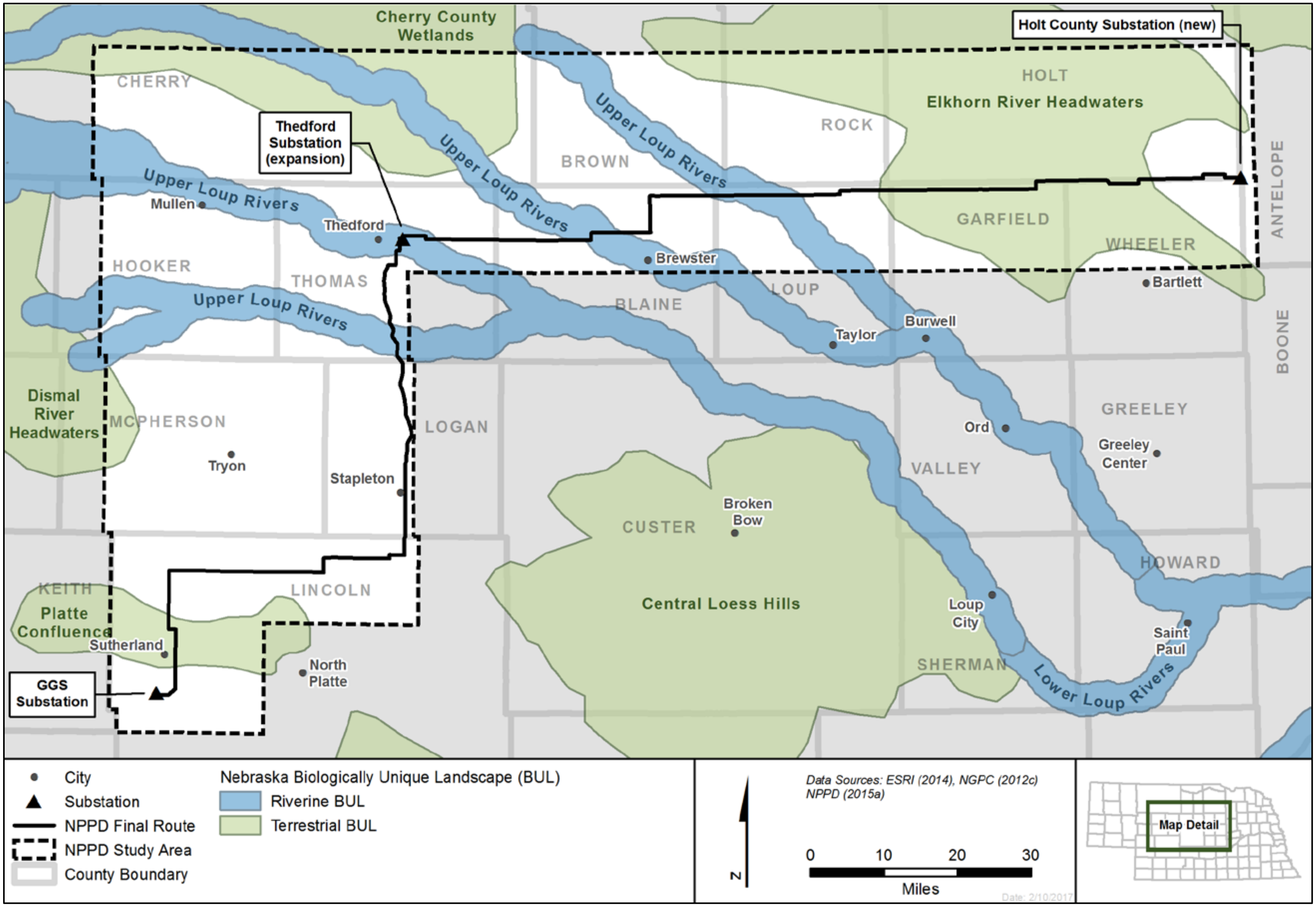



**Figure 3.6-2. Nebraska Natural Legacy Project Biologically Unique Landscapes**

- Dismal River and Headwaters—The Dismal River and its associated headwaters are located in the central region of the Nebraska Sandhills. The southeastern portion of Dismal River Headwaters BUL falls within the study area along its western boundary in McPherson and Hooker counties, while the Dismal River transects the lower portion of the study area in McPherson, Hooker, and Thomas counties. However, this BUL would not be crossed by NPPD's final route (Figure 3.6-2). This BUL consists of high choppy prairie-covered dunes with interdunal valleys. In addition to the Dismal River and its tributaries, this BUL includes an abundance of aquatic habitats including subirrigated wet meadows, marshes, fens, lakes and streams that support an abundance of aquatic species including fish, amphibians, reptiles, and invertebrates. Stressors to fish and wildlife species and habitats in the region of the Dismal River and its headwaters are similar to those of the Cherry County Wetlands BUL and include draining of wetlands, stream channelization, invasive species, unsustainable grazing practices, and poorly sited utility-scale wind turbines (Schneider et al. 2011).
- Elkhorn River and Headwaters—The Elkhorn River and Headwaters BUL is located in the northeastern portion of the Nebraska Sandhills. More than 50 percent of the designated area in the BUL falls within the eastern portion of the study area and includes portions of Rock, Holt, Loup, Garfield, and Wheeler counties. This BUL consists of low rolling sand dunes and extensive large, relatively level subirrigated wet meadows, marshes, and lakes and is drained by the north and south forks of the Elkhorn River. The area provides habitat for large numbers of nesting and migratory birds and supports large populations of waterfowl. Aquatic habitats in the BUL provide habitat for a variety of fish, reptiles, amphibians, and other aquatic species. Specific stressors in the Elkhorn River Headwaters BUL include draining of wetlands, stream channelization, ATV use in waterways, invasive species, unsustainable grazing practices, and poorly sited utility-scale wind turbines (Schneider et al. 2011). NPPD's final route would cross approximately 30 miles of the Elkhorn River and Headwaters BUL in Garfield, Holt, and Wheeler counties (Figure 3.6-2).
- Platte River Confluence—The Platte River Confluence BUL is located in the southernmost portion of the study area in Lincoln County. This BUL includes portions of the North Platte River and the South Platte River and is bordered by the Sandhills to the north. The headwaters of Birdwood Creek begin in the Sandhills and drain into the North Platte River. Birdwood Creek is one of three unique groundwater-fed streams in this BUL that drain the Sandhills. Habitats in this BUL, including groundwater-fed streams and river sloughs, wet meadows, sandbars, riparian corridors and woodlands, support an abundance and diversity of migratory birds, fish, mammals, and other aquatic and terrestrial species. Stressors to wildlife species and habitats in this BUL include conversion of wet meadows to cropland, sedimentation and drainage of backwater sloughs, invasive species, alterations to hydrology, and unsustainable livestock grazing practices (Schneider et al. 2011). NPPD's final route would bisect the Platte River Confluence BUL in Lincoln County (Figure 3.6-2).

Upper Loup Rivers and Tributaries—This BUL includes the upper reaches of the North Loup, Middle Loup, Dismal, and Calamus rivers, all of which transect the study area. These rivers are characterized by a relatively constant discharge as they are heavily influenced by groundwater from the Ogallala Aquifer. These rivers support a large number of fish, amphibians, and other aquatic species. River channels are bordered on each side by 2 miles of riparian corridors that provide habitat for birds, mammals, and reptiles. Habitats in the BUL include subirrigated wet meadows, marshes, lakes, dune prairies, and woodlands often extending along the rivers. The Calamus Reservoir, which was created by an impoundment along the main stem of the Calamus River, is the only impoundment in the region. Stressors to species and habitats in the Upper Loup Rivers and Tributaries BUL include draining of wetlands, stream channelization, dams and water diversions, invasive species, unsustainable grazing practices, poorly sited utility-scale wind turbines, and residential and commercial development along the Calamus River (Schneider et al. 2011). NPPD's final route would cross the Upper Loup Rivers and Tributaries BUL at four locations in Thomas, Blaine, and Loup counties (Figure 3.6-2).

#### 3.6.1.3 Other Conservation Areas

In addition to the BULs described above, the study area includes several conservation areas that provide habitat for wildlife (Figure 3.8-1 in Section 3.8, *Land Use*). Not all of the conservation areas in the study area would be crossed by NPPD's final route. Notable conservation areas are described below. Federal and state conservation lands and public and private conservation easements and other important wildlife areas are described in Section 3.8, *Land Use*.

> ***Conservation Areas***
>
> The Project study area contains several conservation areas that support wildlife habitat and conservation easements that serve as wildlife conservation areas.

The John W. and Louise Seier NWR consists of 2,400 acres of grassland, wetlands, and woodland habitat. This NWR, managed by the Service, is located in the Sandhills in Rock County and is currently closed to the public (USFWS 2014b).

State conservation lands in the study area, managed by NGPC, include 12 WMAs and 3 SRAs, which provide high-quality wildlife habitat. WMAs in the study area include: American Game Marsh WMA, East Hershey WMA, East Sutherland State WMA, Goose Lake WMA, Hershey WMA, Muskrat Run WMA, North River WMA, South Twin Lake WMA, Twin Lakes WMA, Calamus WMA, West Hershey WMA, and Willow Lake WMA. SRAs in the study area include Long Lake SRA, Sutherland Reservoir SRA, and Calamus River SRA.

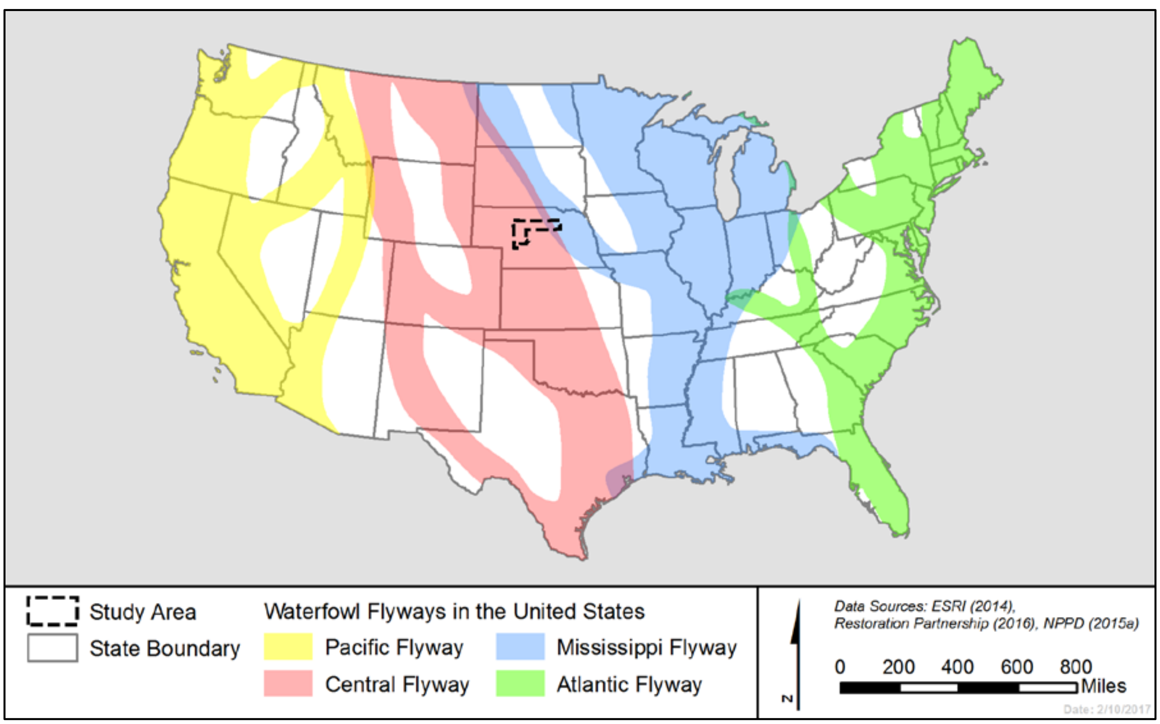
Several conservation easements, held by non-governmental organizations (NGOs), serve as wildlife conservation areas and are located in the study area. NGOs that hold conservation easements in the study area include Ducks Unlimited, The Nature Conservancy, Sandhills Task Force, and Nebraska Land Trust. NGO-held conservation easements with the study area include Schafer conservation easement, Hansen conservation easement, Double Dog Ranch, North Platte Ranch, North Platte River easement, Herrod easement, Sandhills easement, Horse Creek fen easement, Weber/Keller Sandhills Task Force conservation easement, and McWha and Waite conservation easements. Four NRDs are located in the study area: Twin Platte, Upper Loup, Lower Loup, and Upper Elkhorn. NRDs are local government entities with responsibilities to protect natural resources, including facilitating wildlife conservation through land management.

Although not officially designated as conservation lands, the study area also includes many privately owned lands that provide excellent habitat for wildlife. Land management on these private lands is designed to sustain ranching activities, providing positive benefits to wildlife. Privately owned wildlife habitats in the study area include subirrigated wet meadows, lake complexes, warm water slough complexes, and expansive native grasslands.

#### 3.6.1.4 Species

**Birds**

More than 300 species of resident and migratory birds have been documented in the Nebraska Sandhills ecoregion (Figure 3.6-1). The American Bird Conservancy has described the Nebraska Sandhills as the "best grassland bird place in the United States" (Schneider et al. 2011). The study area falls within the Central Flyway migration corridor (Figure 3.6-3), which provides nesting, breeding, overwintering, and stopover habitat for a large diversity of migratory species, including grassland specialists, waterfowl, shorebirds, and passerine songbirds in the Nebraska Sandhills. A representative list of avian species known to occur in the Nebraska Sandhills is provided in Appendix D.




Note: The R-Project study area is located within the Central Flyway.

**Figure 3.6-3. Migratory Bird Flyways in the United States**

The Nebraska Sandhills ecoregion, which includes most of the study area, provides breeding and wintering grounds for hundreds of thousands of waterfowl annually. The area is considered to be the most important breeding area for mallards (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), and northern pintails (*Anas acuta*) south of the prairie pothole region, located in central North and South Dakota. Large breeding populations of gadwall (*Anas strepera*) and northern shoveler (*Anas clypeata*) have also been documented in the region (Vrtiska and Powell 2011). Other waterbirds that are common breeders in the Sandhills include Wilson's phalarope (*Phalaropus tricolor*), American avocet (*Recurvirostra americana*), western grebe (*Aechmophorus occidentalis*), and black tern (*Chlidonias niger*). Although woodlands are mostly confined to stream corridors, woodland species such as black-billed magpie (*Pica hudsonia*), Bell's vireo (*Vireo bellii*), black-and-white-warbler (*Mniotilta varia*), and rose-breasted grosbeak (*Pheucticus ludovicianus*) are known to nest in the Sandhills (Schneider et al. 2011).

Source: Jim Fleecs

*Migratory waterfowl overwintering at Birdwood Creek*

The Sandhills ecoregion is also a stronghold for sharp-tailed grouse (*Tympanuchus phasianellus*) and is considered to be an important breeding site for the world's largest sandpiper, the longbilled curlew (*Numenius americanus*). The Sandhills contains substantial breeding populations of upland sandpiper (*Bartramia longicauda*), vesper sparrow (*Pooecetes gramineus*), lark bunting (*Calamospiza melanocorys*), grasshopper sparrow (*Ammodramus savannarum*), and western meadowlark (*Sturnella neglecta*). The Sandhills hosts the highest concentrations of northern harriers (*Circus cyaneus*) in the state of Nebraska (Schneider et al. 2011).

Source: USFWS

*Greater prairie chicken (Tympanuchus cupido)*

Non-special-status bird species of particular interest in the Sandhills include trumpeter swan (*Cygnus buccinator*) and greater prairie-chicken (*Tympanuchus cupido*). The trumpeter swan is the largest native North American waterfowl species and is characterized by its distinct, trumpet-like call (Mitchell and Eichholz 2010). The trumpeter swan occurs in Sandhills and is known to overwinter on lakes, rivers, and wetlands throughout the study area (NPPD 2015a). Buckboard Ranch Conservation Easement, located along Birdwood Creek, attracts large numbers of migrating waterfowl and shorebirds, including trumpeter swans (NPPD 2015a). Buckboard Ranch is located in the study area but would not be crossed by NPPD's final route. During a trumpeter swan survey, conducted in winter 2008, the Service and NGPC documented 639 individuals throughout Nebraska and reported particularly high swan abundances along the North Loup, North Platte, and Calamus rivers and at Birdwood Creek. Of the 639 documented individuals, 222 were documented in the study area. This survey was limited to the interior population of the High Plains Flock, which has a population goal set by the Service of 500 individuals (Vrtiska and Comeau 2009).

The greater prairie-chicken is a large grouse species that uses tallgrass and mixed-grass prairies throughout the central United States, including most of Nebraska. This species has been extirpated throughout much of its historical range, but it is likely to occur in upland areas throughout the study area. The greater prairie-chicken is known for its unique mating behavior in which males gather each spring in breeding areas known as "leks" to perform ritualistic mating displays to attract females. Nesting occurs from April to June and nests are commonly located in undisturbed meadows, pastures, and hayfields (NRCS 2005).

The North American Breeding Bird Survey is conducted annually as a cooperative effort between the USGS Patuxent Wildlife Research Center and Environment Canada's Canadian Wildlife Service, and in partnership with Mexico's Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, to monitor the status and trends of North American bird populations (USGS 2015). The survey occurs in June of each year, when the majority of documented species are present in the study area (NPPD 2015a).

Five North American Breeding Bird Survey Routes occur in the study area—Ringgold, Swan Lake, Wheeler County, Brownlee, and Mullen. A total of 121 species of birds have been documented along these routes. Some of the most commonly recorded birds include western meadowlark, red-winged blackbird (*Agelaius phoeniceus*), mallard, Canada goose (*Branta canadensis*), upland sandpiper, killdeer (*Charadrius vociferus*), mourning dove (*Zenaida macroura*), grasshopper sparrow, dickcissel (*Spiza americana*), horned lark (*Eremophila alpestris*), Swainson's hawk (*Buteo swainsoni*), and redtail hawk (*Buteo jamaicensis*) (Pardieck et al. 2016). A complete list of all species documented along North American Breeding Bird

Survey Routes in the study area is included in NPPD's MBCP, which is included as a supporting document to the DEIS and draft HCP.

The Service, in collaboration with NGPC, has identified several specific locations in the study area that are of particular importance for migratory birds. These areas, which are used by an abundance and diversity of migratory birds, include:

- North and South Platte River Valley—This area is located between the North Platte River and South Platte River between the towns of Sutherland and North Platte and includes the North and South Platte rivers and their associated subirrigated wet meadows and groundwater-fed sloughs and agricultural area. The valley attracts a large number and diversity of migratory birds annually that use the area as overwintering and stopover habitat during the spring and fall migrations. Sandhill cranes spend several weeks in the valley and rely on the wet meadows and agricultural fields for forage and broad sandbars along the North Platte River for roosting sites. A large number of waterfowl use the warmwater sloughs along the South and North Platte rivers for overwintering areas. NPPD's final route would bisect the North and South Platte River Valley from north-to-south between Sutherland and Hershey.
- Birdwood Creek—Birdwood Creek enters the North Platte River in the North Platte River Valley north of the town of Sutherland. Birdwood Creek, one of the few groundwater-fed natural streams that drain the Sandhills, attracts large numbers of migrating shorebirds and waterfowl, including trumpeter swans that overwinter in the open, groundwater-fed marshes along Birdwood Creek. NPPD's final route crosses Birdwood Creek.
- Buckboard Ranch Conservation Easement—The Buckboard Ranch Conservation Easement is located along Birdwood Creek in southern McPherson County. The conservation easement is held in coordination with The Nature Conservancy to preserve Birdwood Creek and the surrounding ranch lands for their natural resource value. The Buckboard Ranch Conservation Easement attracts large numbers of migrating waterfowl and shorebirds. NPPD's final route is located approximately 5 miles to the south and approximately 29 miles to the east of the Buckboard Ranch Conservation Easement but does not cross the property.
- Willow Lake State WMA—NGPC manages the Willow Lake State WMA. This natural lake located in the Sandhills provides nesting and migration stopover habitats for large numbers of migrating waterfowl and shorebirds. NPPD's final route is located approximately 20 miles south of Willow Lake State WMA in Brown County.
- Goose Lake State WMA—Like Willow Lake State WMA, the Goose Lake State WMA features a natural lake located in the Sandhills and is managed by NGPC. Similarly, this area attracts large numbers of migratory waterfowl and shorebirds that use the areas nesting and migratory stopover habitats. NPPD's final route passes within 1 mile to the south of Goose Lake WMA in southern Holt County but does not cross the property.

- Greater Gracie Creek Important Bird Area (IBA)—This conservation easement consists of native Sandhills vegetation with subirrigated wet meadows and marshes along Gracie Creek. The Audubon Society has designated this area as an IBA. The Greater Gracie Creek IBA is the only Audubon-designated IBA located in the study area. Species of common occurrence on the Greater Gracie Creek IBA include greater prairie-chicken, upland sandpiper, bobolink (*Dolichonyx oryzivorus*), and burrowing owl (*Athene cunicularia*). The Greater Gracie Creek IBA, is located approximately 8 miles south of NPPD's final route in Rock County, but is not crossed by the transmission line.
- Buffalo Flats region (Wheeler County)—Although the Buffalo Flats region of Wheeler County has no official designation, the area contains a large sub-irrigated wet meadow habitat that attracts migrating waterfowl and shorebirds. NPPD's final route is located approximately 12 miles north of the Buffalo Flats region near the Holt-Wheeler County transmission line.
- Chain Lake (Holt County) and Carson Lake (Garfield County)—Like the Buffalo Flats region, Chain Lake and Carson Lake do not hold an official designation; however, information received during the public scoping process indicated that these areas provide important habitat for migratory birds, especially waterfowl. NPPD's final route would cross the Chain Lake/Cross Carson Lake area.

In addition to the specific locations identified above, the study area contains vast expanses of privately owned lands that also provide important nesting, stopover, and wintering habitat for migratory birds. Privately owned habitats in the study area include subirrigated wet meadow and lake complexes, riverine wet meadow and warm water slough complexes, and expansive native grasslands. Additional information about migratory birds in the study area is provided in the MBCP.

### Mammals

Source: USFWS

*Coyote in north central Nebraska*

The Nebraska Sandhills ecoregion is home to more than 50 species of mammals; however, most are widespread with no distinct affiliation to the Sandhills ecoregion. Mammal species known to occur in the Sandhills include carnivores, ungulates, rabbits, marsupials, bats, and rodents. Mammals occurring in the Sandhills occupy a diversity of habitat throughout the region including wetlands, riparian forests, grasslands, prairies, and shrublands (Freeman 1998a). Common mammals in the study area are ubiquitous throughout the Sandhills and may include white-tailed jackrabbit (*Lepus townsendii*), black-tailed prairie dog (*Cynomys ludovicianus*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), American badger (*Taxidea taxus*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), prairie vole (*Microtus ochrogaster*), least shrew (*Cryptotis parva*), and kangaroo rat (*Dipodomys ordi*) (Schneider et al.

2011). A complete list of mammal species known to occur in the Nebraska Sandhills is provided in Appendix D.

### Herpetofauna

Twenty-seven species of reptiles and amphibians are known to occur in the Nebraska Sandhills ecoregion, including snakes, turtles, lizards, frogs, toads, and salamanders (Freeman 1998b; Schneider et al. 2011). However, most reptile and amphibian species that may occur in the study area have no distinct affiliation to the Nebraska Sandhills ecoregion. Reptiles and amphibians use a diverse assemblage of habitats throughout the Sandhills, including upland prairies, wetlands and marshes, rivers, lakes, and streams (Freeman 1998b). Common species include: include ornate box turtle (*Terrapenne ornata ornata*), bullsnake (*Pituophus catenifer sayi*), eastern yellowbelly racer (*Coluber constrictor flaviventris*), western garter snake (*Thamnophis radix haydenii*), plains spadefoot toad (*Spea bombifrons*), and leopard frog (*Rana blairi*) (NPPD 2015a). A complete list of herpetofauna species known to occur in the Nebraska Sandhills is provided in Appendix D.

### Fish

Fish occur in rivers, streams, lakes, ponds, and marshes throughout the study area. Approximately 75 species of fish have been documented throughout the Nebraska Sandhills ecoregion (Schneider et al. 2011). Major waterbodies in the study area include the North Platte River, South Platte River, South Loup River, Middle Loup River, North Loup River, Dismal River, Calamus River, and Birdwood Creek. Most streams and tributaries throughout the Sandhills are spring-fed and many support fish populations (Fischer and Paukert 2008). A series of summer fish surveys conducted at 67 separate sites in the Sandhills from 1996 to 2005 documented 47 individual species. This survey was not limited to the R-Project study area. Fish abundance and distribution throughout the Sandhills are influenced by a variety of biotic and abiotic factors including stream/lake size and depth, substrate type, amount of cover, water conductivity, and other water quality parameters (Fischer and Paukert 2008). A list of fish species documented during these surveys is provided in Appendix D. Common riverine species include channel catfish (*Ictalurus punctatus*), shortnose gar (*Lepisosteus platostomus*), flathead chub (*Platygobio gracilis*), and river carpsucker (*Carpiodes carpio*). Smaller fish species found in waterbodies throughout the study area include fathead minnow (*Pimephales promelas*), longnose dace (*Rhinichthys cataractae*), and plains topminnow (*Fundulus sciadicus*). Non-native fish species in the study

Source: NGPC

*Middle Loup River, Cherry County*

area consist primarily of gamefish such as largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*) (Fischer and Paukert 2008; NPPD 2015a).

#### Insects

Insects serve an important ecological role throughout the study area as pollinators, decomposers, grazers, and prey for other wildlife. They are also the most diverse, abundant, and least-studied animal group in the region. Seventy species of scarab beetles have been documented in Thomas County alone, and numerous species of butterflies are known to inhabit the Sandhills (Schneider et al. 2011). Other insects found in the study area are ubiquitous throughout the Sandhills and include bees, wasps, ants, moths, flies, cicadas, leafhoppers, and mantids. Insects occurring in the Nebraska Sandhills tend to be tolerant of dry, windy conditions, and have greater tolerance to solar radiation than most forest-adapted species (Ratcliffe 1998).

### 3.6.2 Direct and Indirect Effects

This section describes direct and indirect impacts on wildlife in the Project area, as described in Section 3.1. Impacts on wildlife include injury or death resulting from collisions with the Project transmission line features, temporary disruption of feeding, nesting, or breeding behaviors, and habitat loss or degradation. Direct impacts would be caused construction, operation, and maintenance of the Project and happen in the same location and at the same time. Indirect impacts would happen later in time and/or are further removed from the Project, but are still reasonably foreseeable.

Each alternative was analyzed based on the likelihood of effects on each group of wildlife species previously described in the Affected Environment section. Potential effects are described in terms of duration and intensity. Short-term effects are those that may affect wildlife or wildlife habitat for one to two breeding seasons. Effects on wildlife under Alternative A that would persist beyond two breeding seasons are considered long-term effects. In general, short-term effects would be those associated with construction activities and long-term effects would be those associated with operation and maintenance activities. The intensity of effects under each alternative is categorized as low, moderate, or high according to the threshold criteria described in Section 3.1.

#### 3.6.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction and operation of the R-Project transmission line would not occur, and an HCP would be neither be required nor implemented. Implementation of the No-action Alternative would not affect wildlife or wildlife habitats; thus, wildlife resources in the study area would remain unaltered.

#### 3.6.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Under Alternative A, the Service would issue a permit to NPPD for the take of the endangered beetle in accordance with Section 10(a)(1)(B) of the ESA. NPPD would construct, operate, and maintain the 225-mile-long, 345 kV R-Project transmission line along NPPD's final route, as described in Chapter 2. Selection of Alternative A would necessitate implementation of an HCP for the beetle.

Issuance of a permit and subsequent implementation of Alternative A would result in direct and indirect effects on wildlife in the Project area, as defined in Section 3.1, in the short term and long term. Effects on wildlife from construction, operation, and maintenance of the Project may include temporary disturbances to wildlife species (disruptions of feeding, breeding, or sheltering behavior) resulting from noise and the presence of equipment and crews, direct mortality of individuals, and/or destruction or degradation of habitat. Specific effects on species or groups of species as a result of the construction, operation, and maintenance activities associated with implementation of Alternative A are described below.

**Direct Effects**

Direct effects under Alternative A consist of those that may lead to immediate mortality, injury, or disturbance to wildlife species or habitat from Project construction, operation, and maintenance activities.

Under Alternative A, mortality or injury to individuals may occur as a result of being crushed by construction and maintenance equipment and vehicles. Crushing by construction equipment and vehicles would only potentially occur during the construction and maintenance phases of the Project, constituting a short-term effect, and would primarily affect less mobile terrestrial species, such as small mammals, reptiles, and insects. Wildlife species that occupy burrows may experience mortality if occupied burrows are collapsed or if egress is prevented. These impacts would be limited to the Project ROW, access roads, other sites where equipment would be operated. The risk of wildlife mortality from crushing by construction equipment and vehicles would result in short-term, adverse impacts of moderate intensity.

Additional direct impacts on wildlife under Alternative A would include disturbances from construction- and maintenance-related activities, such as the presence of construction personnel, presence and use of construction equipment (including helicopters), and noise from construction activities. These activities may disturb wildlife species in and adjacent to construction areas. Noise disturbances may occur beyond the R-Project ROW, particularly when helicopters are used but impacts would generally be confined to the Project area. These disturbances would likely affect all groups of species to some degree but may especially affect birds and mammals (Bayne et al. 2008; Francis and Barber 2013). Disturbances to wildlife associated with transmission line construction may result in disruptions in feeding, breeding, or sheltering behavior; increased energy expenditure spent fleeing approaching helicopters; and/or displacement of individuals (Bennett 1991; Bayne et al. 2008; Francis and Barber 2013). These disturbances could result in abandonment of individual wildlife nests, dens, or burrows.

Disturbances to wildlife resulting from construction activities would constitute a short-term, low-intensity impact because impacts would only persist during active construction periods, maintenance activities, and emergency repairs. Disturbed wildlife species would likely occupy the abundant habitat available directly adjacent to the Project area, and many would likely return to the area after construction, when personnel and equipment are no longer present. The magnitude of these impacts on individual species or groups of species would depend largely the timing of construction activities relative to seasonal or diurnal occurrences.

Disruption of wildlife behaviors from construction and maintenance actions would be minimized by avoiding sensitive times such as avian nesting and migratory seasons. For example, ROW clearing would be conducted outside the nesting period for migratory birds, generally from March 31 to July 16. Impacts on birds would be further minimized by conducting an onsite investigation to determine whether any occupied nests are present prior to R-Project construction activities scheduled between April and July. If active nests are found, construction activities would be delayed or the area around the nest(s) left undisturbed until all active nests are no longer active.

Operation of the R-Project would present a long-term collision risk to birds, given its location in the Central Flyway migration corridor, which includes high-use bird areas for overwintering, spring and fall migrants, and nesting migratory birds. Collisions with power lines represent a major source of bird mortality in the U.S. (Manville 2005, Loss et al. 2014). A 2014 review compiled data from 14 previous studies and determined that collisions with transmission lines account for 8 to 57 million bird mortalities each year in the U.S. with a median value of approximately 20 million (Loss et al. 2014). However, this is a broad-scale estimate, and regional rates of bird mortality due to power line collisions may vary greatly.

Birds do not always readily recognize and avoid power lines, particularly when fleeing from a perceived predator or when flying during poor visibility conditions. Collision risk varies among avian species and depends on physiology and flight behavior, as well as weather and location of the transmission lines in relation to high-use bird areas (Faanes 1987; Savereno et al. 1996; Bevanger 1998). Waterbirds, such as waterfowl and cranes, are particularly vulnerable to collision with power lines (Faanes 1987, Manville 2005). Because of their size, body proportions, and flight styles, these species require longer reaction times to avoid collisions compared to smaller, more agile birds (Bevanger 1998).

Suitable habitat, such as wetlands, that attract more birds to the area near a power line would have higher mortality rates. Avian collisions with power lines (distribution and transmission) are most likely to occur when they cross migratory paths, bisect feeding and nesting or roosting sites, or occur in or adjacent to major avian use areas. Power lines that cross rivers are known to cause significantly higher avian mortality rates than power lines in agricultural habitats (Erickson et al. 2005).

An approach to reduce avian mortalities when a power line is located within or in proximity to a wetland or other form of high quality habitat is to “mark” the line with bird flight diverters. Bird flight diverters increase power line visibility and can serve to alert birds of a collision risk. When installed on power lines, bird flight diverters can reduce avian mortalities by 50 to 60 percent. Applying the criteria outlined in Table 3.1-2 would result in a long-term, moderate-intensity impact because birds are likely to collide with the transmission line wires resulting in injury or mortality, even with placement of bird flight diverters.

Spiral bird flight diverters are effective in reducing avian mortality from collision with power lines under daytime light conditions; however, other types of bird flight diverters may be more effective at night or during low-visibility conditions (Murphy et al. 2016). This is especially true for large migratory species (such as whooping cranes) that require greater reaction time to avoid collisions compared to smaller, more agile species (Murphy et al. 2016). Thus, NPPD would install avian flight diverters with reflective and glow-in-the-dark surfaces to reduce avian collision in low-visibility conditions. Portions of the R-Project that would be marked with the reflective and glow-in-dark avian flight diverters include river crossings and areas identified as areas of bird use during low light conditions. Reflective and glow-in-the-dark bird flight diverters would be installed on approximately 10 to 15 percent of the transmission line. The remainder of the R-Project proposed for line marking would have spiral bird flight diverters. Additional measures to avoid or minimize and mitigate impacts on species protected under the Migratory Bird Treaty Act are outlined in NPPD’s MBCP.

Section 3.6.1.4 identifies locations with a higher potential for avian collisions. These locations include the North and South Platte River Valley, Birdwood Creek, and the Chain Lake/Carson Lake area. Other areas identified in Section 3.6.1.4 would be avoided by NPPD’s final route.

Construction, operation, and maintenance of the R-Project transmission line under Alternative A would also adversely affect wildlife by causing temporary and permanent habitat loss (Table 3.6-1). Impacts on wildlife habitat would be short term and long term and of low to moderate intensity. All species groups would be affected to some degree, but impacts would be greater on bird populations because of the high abundance and diversity of avian species that are known to occur in the Sandhills. Avian species occupying R-Project disturbed areas would likely move to suitable adjacent habitat. Under Alternative A, wildlife habitat would be permanently removed at transmission line structure locations and substation sites, and along permanent access roads. Once constructed, the transmission line would have long-term, direct adverse impacts on birds because of the continuing risk of collision, even with placement of bird flight diverters.

Table 3.6-1 shows the estimated area of permanent loss of habitat and temporary disturbances to habitat associated with R-Project construction, operation, maintenance, and emergency repair activities under Alternative A. While these estimates were established based on the best available information, the exact locations and amount of habitat disturbances for certain activities, such as temporary access route placement, are currently unknown and would depend on site-specific conditions and landowner negotiations. The total amount of habitat disturbance would also depend on the number and type of towers to be installed, steel lattice versus steel tubular monopole structures (see Chapter 2 for detailed discussion of construction procedures). It should be noted that effects on wildlife habitats due to distribution power line moves and well relocations may occur outside the Project ROW. Distribution power line moves would include 22 miles of overhead line and 6 miles of underground line relocation. Underground relocation would require excavation of a 6-inch trench. The timing and location of emergency repairs are not known and cannot be predicted. The estimated acres of temporary and permanent disturbance in Table 3.6-1 represent potential disturbance from all Project activities. The actual total area of disturbance would likely be reduced because much of the temporary disturbance, such as fly and construction yards and staging areas, would be located in previously disturbed areas that do not provide high-quality wildlife habitat. Additionally, the Holt County Substation would be located on cropland, which provides minimal benefit to wildlife.

**Table 3.6-1. Estimated R-Project Potential Disturbance Acreages under Alternative A**

| Project Activity | Temporary Disturbance (acres[a]) | Permanent Disturbance (acres[a]) |
|---|---|---|
| **Construction** | | |
| Access | 258 | 26[b] |
| ROW tree clearing | | 49[c] |
| Fly yards/assembly yards | 193 | |
| Construction yards/staging areas | 203 | |
| Pulling and tensioning sites | 275 | |
| Structure work areas | 486 | |
| Structure foundations | | 1 |
| Thedford Substation | | 13 |
| Holt County Substation | | 12 |
| Distribution line relocations | 43 | |
| Well relocations | < 1 | |
| *Construction subtotal* | *1,458* | *101* |
| **Operation and Maintenance** | | |
| Emergency repairs[d] | 293 | |
| *Operation and maintenance subtotal* | *293* | |
| **Total** | **1,708** | **101** |

Source: NPPD (2015a)

[a] Rounded to nearest acre

[b] Permanent disturbance from access was calculated based on a percentage of temporary access for calculating the take of the beetle at a conservative level. Permanent access roads are only associated with substations, and NPPD does not anticipate them in association with access to the transmission line ROW.

[c] Trees would not be allowed to re-grow in ROW. ROW would be converted to grassland.

[d] Disturbance from emergency repairs is estimated at 20% of the total temporary disturbance from construction. Disturbed areas would be restored if conditions require restoration efforts.

Alternative A would result in the permanent loss of approximately 52 acres of grassland habitat and cultivated cropland and the temporary disturbance of an additional estimated 1,708 acres, consisting mostly of grassland habitat and including an estimated 293 acres of disturbances due to emergency repairs, over the 50-year life of the Project. Additionally, 49 acres of trees would be cleared for the ROW, which would represent a permanent conversion of forest to grassland habitat. This total area of potential disturbance is based on the most recent NPPD estimates. However, this estimate is intended to be conservative and implementation of the final design of the transmission line under Alternative A would likely result in a smaller area of temporary disturbance. The majority of disturbances to grassland habitat would be temporary and would be restored following the completion of construction activities. Thus, the majority of grassland habitat disturbed under Alternative A would remain available to wildlife. To ensure successful restoration of habitats disturbed by temporary work areas and access improvements, NPPD would establish an escrow agreement to govern restoration of disturbed beetle habitat. Additionally, the stipulations of the Restoration Management Plan would be implemented, including successful reclamation criteria and steps that would be taken in the event reclamation does not meet those stipulations.

The transmission line would not present a permanent barrier to wildlife species that may use the surrounding areas, so effects from habitat fragmentation would be minimal. However, implementation of Alternative A may result in temporary habitat fragmentation from the construction of temporary access improvements. The use of lattice towers, rather than tubular steel monopoles, where existing access is lacking, would minimize the amount of ground disturbances during construction because they would be installed using helicopters rather than ground vehicles. However, ground disturbance would still occur; for example equipment needed to install the helical piers for the monopole structures.

Direct impacts on aquatic species and habitats would be minimal because all waterways would be spanned by conductors. Access would include existing waterway crossings; where existing access is not available, the Project ROW would be approached from each side of the waterway. Temporary crossings of smaller streams may be required in areas and would utilize temporary bridges or culverts that would not affect stream channel hydrology. Placement of culverts would cause temporary increases in stream turbidity, resulting in temporary adverse impacts.

Under Alternative A, NPPD would secure at least 500 acres of occupied beetle habitat to mitigate impacts on the beetle, as outlined in the R-Project HCP. The preservation of this land would also protect habitat for other wildlife resources, resulting in a long-term, beneficial impact on wildlife. The location of mitigation lands is currently unknown.

#### Indirect Effects

Most impacts on wildlife under Alternative A would be direct; however, indirect impacts on wildlife may occur as a result of direct impacts associated with construction, operation, and maintenance activities. Disturbances from noise, human presence, or presence of construction or maintenance equipment could disrupt feeding, nesting or breeding behavior, potentially leading to reduced reproductive success for affected individuals. Abandonment of nests, dens, or burrows could lead to reduced health or survival of young. Most disturbed individuals, particularly highly mobile species such as birds and mammals, would likely move to adjacent suitable habitat. Movement to adjacent habitats would avoid direct impacts such as injury or death, but would also divert time and energy away other essential behaviors associated with reproduction. Bird flushing in response to disturbances can vary greatly among species, and according to the type and frequency of disturbances (Borgmann 2011). However, noise disturbances during construction and maintenance activities would likely affect birds that may be present in adjacent habitats outside the Project ROW. Helicopters would represent one of the largest sources of noise disturbances to wildlife. NPPD would minimize impacts by avoiding peak breeding or nesting seasons, as prescribed in the MBCP. Indirect impacts on wildlife species under Alternative A would be mostly short term and of low intensity, although indirect impacts associated with ongoing maintenance activities, including emergency repairs, would recur during the life of the Project.

#### 3.6.2.3 Alternative B: Tubular Steel Monopole Structures Only

Alternative B would be identical to Alternative A, except NPPD would construct the R-Project transmission line using steel monopoles throughout the entire 225-mile length of the line, rather than using a combination of steel monopoles and lattice towers.

Issuance of a permit and subsequent construction, operation, and maintenance of the R-Project under Alternative B would cause direct and indirect effects on wildlife in the Project area. Effects on wildlife under Alternative B would be similar to those described for Alternative A; differences would be attributable to increases in the area of ground disturbance for access improvements, structure work areas, and the duration of ground equipment operation associated with monopole construction and elimination of fly yards for helicopter erection of structures.

##### Direct Effects

Direct effects on wildlife under Alternative B would be generally the same as Alternative A and would include potential mortality from crushing by construction and maintenance equipment, collisions with transmission line infrastructure, temporary disturbances from noise and the presence of equipment and crews, and temporary and permanent loss of habitat.

The risk that construction and maintenance equipment would crush wildlife would be slightly greater under Alternative B than under Alternative A because heavy ground equipment would be used over a greater area and for longer durations. This use would increase the risk of direct mortality of or injury to wildlife, resulting in short-term, moderate-intensity, adverse impacts.

Temporary disturbances to wildlife from noise and the presence of construction equipment and crews would be similar to those described for Alternative A because the ROW and locations of tower foundations would not change. These temporary disturbances would persist for a longer duration under Alternative B, compared to Alternative A, because heavy equipment used for access clearing and installation of monopole foundations would be used for approximately twice as long. However, helicopters would not be used under Alternative B for erecting structures, resulting in less noise disturbances, particularly to birds. Therefore, temporary visual and noise disturbances to wildlife under Alternative B would result in short-term, low-intensity, adverse impacts.

Alternative B would result in greater disturbances to wildlife habitat because monopole foundations require a greater area of ground disturbance than lattice tower structures. Furthermore, additional access improvements would be required to accommodate heavy equipment for monopole installation. Necessary improvements to existing temporary access routes may include blading and placement of fill material on geofabric. Because monopole towers cannot be installed using helicopters, all materials and equipment would need to be transported using ground equipment, even across sensitive habitats. Equipment needed to install monopole towers would include heavy machinery, such as cement trucks and cranes, as opposed to ATVs, light vehicles, and low-ground-pressure equipment that can be used for lattice tower installation. Use of this heavy machinery would result in greater damage to terrestrial habitats. Increased habitat disturbance due to monopole tower foundations and additional access requirements under Alternative B would occur along east-to-west segments of the line in Lincoln, Thomas, Blaine, Loup, and Garfield counties.

Alternative B would result in the permanent loss of approximately 77 acres of grassland habitat and cultivated cropland and the temporary disturbance of an additional estimated 1,872 acres, consisting mostly of grassland habitat, including an estimated 374 acres of disturbances from emergency repairs, over the 50-year life of the Project. Additionally, 49 acres of trees would be cleared for the ROW, which would represent a permanent conversion of forest to grassland habitat. Habitat loss and degradation under Alternative B would result in short- and long-term, moderate-intensity, effects on wildlife. The estimated potential disturbances to wildlife habitat under Alternative B, are shown below in Table 3.6-2.

Risk of avian collision with the transmission line would not be affected by structure type. Therefore, potential for bird mortality from collisions with the transmission line during operation would be the same as Alternative A, resulting in long-term, moderate-intensity, adverse impacts. Effects from maintenance activities would be the same as Alternative A.

Under Alternative B, NPPD would secure at least 660 acres of occupied beetle habitat to mitigate the effects on the beetle, resulting in a long-term, beneficial effects on wildlife.

Although the specific land parcels are unknown at this time, NPPD would secure at least 660 acres of occupied beetle habitat to mitigate the effects on the beetle from construction and operation of the R-Project. This compensatory mitigation would also result in long-term, beneficial effects for other wildlife resources.

**Table 3.6-2. Estimated Potential Disturbance Acreages under Alternative B**

| Project Activity | Temporary Disturbance (acres[a]) | Permanent Disturbance (acres[a]) |
|---|---|---|
| **Construction** | | |
| Access | 506 | 51[b] |
| ROW tree clearing | | 49[c] |
| Fly yards/assembly yards | 0 | |
| Construction yards/staging areas | 203 | |
| Pulling and tensioning sites | 294 | |
| Structure work areas | 825 | |
| Structure foundations | | 1 |
| Thedford Substation | | 13 |
| Holt County Substation | | 12 |
| Distribution line relocations | 43 | |
| Well relocations | < 1 | |
| *Construction subtotal* | *1,872* | *126* |
| **Operation and Maintenance** | | |
| Emergency repairs[d] | 374 | |
| *Operation and maintenance subtotal* | *374* | |
| **Total** | **2,246** | **126** |

Source: NPPD (2016a)

[a] Rounded to nearest acre.

[b] Permanent disturbance from access was calculated based on a percentage of temporary access for calculating the take of the beetle at a conservative level. Permanent access roads are only associated with substations, and NPPD does not anticipate them in association with access to the transmission line ROW.

[c] Trees would not be allowed to re-grow in ROW. ROW would be converted to grassland.

[d] Disturbance from emergency repairs is estimated at 20% of the total temporary disturbance from construction. Disturbed areas would be restored if conditions require restoration efforts.

### Indirect Effects

Indirect effects on wildlife from noise and visual disturbances because of the presence of construction and maintenance equipment and crews would be similar to Alternative A, but these effects would persist for a longer duration under Alternative B. Helicopters would not be used under Alternative B for structure erection, resulting in less noise disturbance to wildlife, especially birds, outside the ROW. Only disturbances that result in reduced long-term health or reproductive success of individuals, or disturbances to species outside the ROW, would constitute indirect effects. Alternative B would result in short-and long-term, low- to moderate-intensity, adverse impacts on wildlife and wildlife habitat.

### 3.6.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on wildlife.

- Locate construction staging areas and tensioning and pulling sites adjacent to existing roads and disturbed areas, where practicable based on availability and landowner approval.
- Use helicopters for erecting lattice structures (Alternative A only), stringing sock line, and mobilizing certain equipment to minimize ground disturbance.
- Use helical pier foundations for lattice structures in the Sandhills, which require less equipment, a smaller temporary work area, and result in less ground disturbance than traditional steel monopole foundations (Alternative A only).
- Use temporary improvements for access.
- Use existing roads and two-tracks for access during construction, based on availability and landowner approval; use low-ground-pressure tracked or rubber-tired equipment for overland access to reduce effects on vegetation where possible (Alternative A only).
- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas, where practicable based on availability and landowner approval and outside environmentally sensitive areas.
- Restrict all construction vehicle movement outside the ROW to designated access routes and established roads other than for emergency situations.
- Use existing river and stream crossings for construction access where available; use temporary bridges or culverts that do not alter stream flow or the channel to minimize effects where existing crossings cannot be used.
- When possible, use overland travel routes to access opposite banks and avoid stream crossings.
- Require construction personnel to remove all trash to avoid attracting scavenging wildlife to the construction areas.
- Immediately backfill or cover overnight any pits, trenches, and/or holes required for construction to prevent trapping and killing amphibians, reptiles, and small mammals.
- Implement measures of the MBCP (available as a supporting document with the DEIS for public review) to avoid and minimize potential effects on migratory birds, including bald eagles throughout the life of the R-Project.
- Install bird flight diverters (according to Avian Power Line Interaction Committee (APLIC) (APLIC 2012) and NPPD standards) on the overhead shield wire used on the transmission line at crossings of major watercourses, wetland spans, and in proximity to sensitive biological features to minimize the potential for bird collisions:

  - Mark areas with known high avian densities, such as river crossings and known roost sites, with bird flight diverters having reflective and glow-in-the-dark surfaces to reduce the risk of collisions during low-light conditions.
  - Install bird flight diverters on an equal amount (123 miles) of NPPD-owned power lines within the 95 percent sighting corridor to comply with the Region 6 Guidance.
- Design all transmission lines according to APLIC standards to eliminate any potential for electrocution of large avian species. Design of the transmission line, which exceeds APLIC standards, includes the following:
  - 23 feet minus the 18-inch conductor bundle for the vertical separation between energized conductors on steel monopole towers.
  - 23 feet minus the 18-inch conductor bundle for the straight line horizontal spacing on steel monopole towers.
  - 30 feet minus the 18-inch conductor bundle for the horizontal spacing on lattice towers.
- Conduct clearing in the ROW outside the nesting period for migratory birds, from July 16 to March 31. R-Project construction activities scheduled between April 1 and July 15 would include an onsite investigation to determine whether any occupied nests are present. If active nests are found, construction activities would be delayed or the area around the nest(s) left undisturbed until the nest(s) is no longer active.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.6.4 Effects Summary

Under either action alternative, the R-Project would result in short- and long-term, low- to moderate-intensity effects on wildlife species and habitats from construction, operation, and maintenance of the R-Project, including emergency repairs. Direct and indirect effects on wildlife could include injury or mortality of individuals, noise and visual disturbances resulting in disruption of feeding or breeding behaviors, and loss or degradation of habitat. The majority of habitat loss and disturbance would occur in grassland habitats, and Alternative B would result in greater disturbance because of the types of equipment and access needed to construct the line using steel monopoles only.

Affected species may include birds, mammals, herpetofauna, fish, and insects. Under both action alternatives, migratory birds would likely be the most heavily affected wildlife group because the location of the transmission line within the Central Flyway migration corridor would pose a long-term collision risk. Avoidance, minimization, and mitigation measures described above, and presented in the draft HCP, would reduce the magnitude of some adverse effects on wildlife. Thus, adverse impacts to wildlife are not expected to be significant, assuming that all proposed avoidance, minimization, and mitigation measures are successfully implemented.

## 3.7 Special Status Species

### 3.7.1 Introduction

Issuance of a permit and subsequent implementation of the R-Project, including the HCP, would affect special status species in the study area. The R-Project transmission line would be located in habitats known to support as many as 17 special status species. As discussed below, construction, operation, and maintenance, including emergency repairs, of the R-Project would have the potential to affect special status species in a number of ways including injury or death caused by collisions with power lines, disturbance of feeding or reproductive behaviors, and loss or degradation of habitat.

Seventeen special status species are known to occur or are likely to occur in the study area (Table 3.7-1). Federally listed species include those listed as endangered, threatened, proposed, or candidate species under the ESA or granted Federal protection under the Bald and Golden Eagle Protection Act (BGEPA). In addition, this section evaluates one species, the Blanding's turtle, that is not currently Federally or state listed, but that has been petitioned for listing under the ESA and is currently under status review by the Service. Nine federally listed species, two eagles, and one petitioned special status species are known to occur or are likely to occur in the study area. These species consist of four birds, one mammal, one reptile, one fish, one insect, and two plants (Table 3.7-1). The status, distribution, habitat characteristics and use, and occurrence in the study area are described for each Federally listed species, eagle, or petitioned species in the sections below. The Federally listed species described in this section and the Blanding's turtle are evaluated in NPPD's draft HCP (NPPD 2016a), which will accompany its application to the Service for a permit to authorize take of one Federally listed species—the American burying beetle—pursuant to Section 10(a)(1)(B) of the ESA.

In Nebraska, any species listed as endangered or threatened at the Federal level is given the same status at the state level. The State of Nebraska has the discretion to list a Federally threatened species as endangered at the state level or list new species as threatened or endangered at the state level, but this would not automatically result in a similar listing at the Federal level. State-listed species include those listed as endangered or threatened under the Nebraska Nongame and Endangered Species Conservation Act (NESCA). Six species listed as endangered or threatened at the state level, but not designated as special status species at the Federal level, are known to occur or are likely to occur in the study area, including two mammals, three fish, and one plant species (Table 3.7-1). The status, distribution, habitat characteristics and use, and occurrence in the Project study area are described for each state-listed species below.

This section also discusses the potential effects of the Project on special status plant species that are Federally listed or state-listed as endangered, threatened, proposed, or candidate species. Nebraska's special-status plant species that are designated as threatened or endangered are protected at the Federal level by the ESA (16 U.S.C. §§ 1533, 1538) and/or at the state level by NESCA (Nebraska Revised Statutes §§ 37-801 to 37-811). Section 9(a)(2)(B) of the ESA prohibits the removal and possession or malicious destruction of listed plants in areas under Federal jurisdiction and the destruction or damage of listed plants in other areas in knowing violation of state law (16 U.S.C. §1538(a)(2)(B)). Under Sections 7(a)(2) and 10(a)(1)(B) of the ESA, the Service must ensure that issuance of a permit would not likely jeopardize the continued existence of a federally listed endangered or threatened species, including plants, or result in the destruction or modification of any designated critical habitat (16 U.S.C. § 1536(a)(2)).

**Table 3.7-1. Special Status Species Potentially Occurring in Study Area**

| Species | Federal Status | Nebraska State Status |
|---|---|---|
| **Birds** | | |
| Bald eagle (*Haliaeetus leucocephalus*) | BGEPA | None |
| Golden eagle (*Aquila chrysaetos*) | BGEPA | None |
| Interior least tern (*Sterna antillarum*) | Endangered | Endangered |
| Piping plover (*Charadrius melodus*) | Threatened | Threatened |
| Rufa red knot (*Calidris canutus rufa*) | Threatened | Threatened |
| Whooping crane (*Grus americana*) | Endangered | Endangered |
| **Mammals** | | |
| Northern long-eared bat (*Myotis septentrionalis*) | Threatened | Threatened |
| North American river otter (*Lutra canadensis*) | None | Threatened |
| Swift fox (*Vulpes velox*) | None | Endangered |
| **Reptiles** | | |
| Blanding's turtle (*Emydoidea blandingii*) | None[a] | None[a] |
| **Fish** | | |
| Blacknose shiner (*Notropis heterolepis*) | None | Endangered |
| Finescale dace (*Phoxinus neogaeus*) | None | Threatened |
| Northern redbelly dace (*Phoxinus eos*) | None | Threatened |
| Topeka shiner (*Notropis topeka*) | Endangered | Endangered |

| Species | Federal Status | Nebraska State Status |
|---|---|---|
| **Insects** | | |
| American burying beetle (*Nicrophorus americanus*) | Endangered | Endangered |
| **Plants** | | |
| Blowout penstemon (*Penstemon haydenii*) | Endangered | Endangered |
| Small white lady's slipper orchid (*Cypripedium candidum*) | None | Threatened |
| Western prairie fringed orchid (*Platanthera praeclara*) | Threatened | Threatened |

[a] Although the Blanding's turtle currently holds no official special status designation at the Federal or state level, the Service has been petitioned to include this species under the protection of the ESA, and its status is currently under review. If Blanding's turtle receives special-status designation under the ESA, it would also likely receive the same designation at the state level.

The subsections in this resource section are organized by special status species under one heading to consolidate all material related to that species. Thus, the affected environment; environmental consequences (direct and indirect impacts) for each action alternative; and specific avoidance, minimization and mitigation measures are discussed under each species. Direct effects are those that cause an immediate effect on an individual or special status species population. Indirect effects are those that occur at a later time but are still a result of the action alternative. Each alternative was analyzed based on the likelihood of effects on special status species described in the Affected Environment subsection. Potential effects are described in terms of duration and intensity. The intensity of effects of each alternative is categorized as low, moderate, or high according to the threshold criteria described in Section 3.1. Potential effects on habitat for each special status species are described in terms of total estimated area of disturbance for each alternative. An effects summary, as with each of the other resource topics, concludes this section.

#### 3.7.1.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would be neither required nor implemented. Implementation of the No-action Alternative would not affect special status species, including the take of the American burying beetle. Consequently, the No-action Alternative is not discussed further in this DEIS section dealing with special status species.

#### 3.7.1.2 Alternative A

Under Alternative A, the Service would issue a permit to NPPD for the take of the Federally endangered beetle in accordance with Section 10(a)(1)(B) of the ESA, and NPPD would construct, operate, and maintain the 225-mile-long, 345 kV transmission line along NPPD's final route, as described in Chapter 2. Implementation of Alternative A would result in short- and long-term, moderate-intensity, including incidental take, of the beetle and would necessitate implementation of an HCP, which includes biological goals and objectives designed to avoid, minimize, and mitigate the effects of the potential taking of the beetle in the permit area. NPPD proposes that the beetle is the only covered species for which take would be permitted under the permit; however, it must avoid take of other Federally listed species as required under the ESA.

Federally listed species that are known to occur or may potentially occur in the Project area, but not covered under the permit, are considered evaluated species in the draft HCP. The draft HCP includes species-specific avoidance, minimization, and mitigation measures that would be implemented under Alternative A to effectively avoid or minimize adverse effects on the evaluated species. Although the draft HCP does not cover state-listed species, unless they are also Federally listed, NPPD would comply with all state laws for the protection of state-listed species. NPPD has developed, in collaboration with NGPC, measures to avoid, minimize, or mitigate potential effects on state-listed species, and these measures also would be implemented under Alternative A. In addition to the implementation of these measures, NPPD would complete a final Access Plan, which delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed. The final Access Plan would be submitted to the Service for review prior to construction and would ensure that effects on special-status species from access-related activities are avoided and minimized to the degree possible.

#### 3.7.1.3 Alternative B: Tubular Monopole Structures Only

Direct and indirect effects on special status species under Alternative B would be similar to those described for Alternative A with differences being attributable to increases in the area of ground disturbance associated with access improvements and tower foundations, and increased duration of ground equipment operation associated with monopole construction. Effects associated with operation and maintenance activities and avoidance, minimization, and mitigation measures for each species would be the same as Alternative A, except where noted as applicable to only one of the alternatives in the discussion below for each individual special status species.

### 3.7.2 Bald Eagle (Protected under the BGEPA)

#### 3.7.2.1 Affected Environment

The bald eagle was historically listed as both endangered then, later threatened at the Federal level, but it was delisted in 2007 because of its recovery (USFWS 2015b). The bald eagle is not currently protected under the ESA, but the species continues to receive Federal protection under the BGEPA. Originally implemented in 1940 and amended in 1962, the BGEPA prohibits the take or possession of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16 U.S.C. § 668(a); 50 CFR Part 22).

Source: NGPC

*Bald eagle (Haliaeetus leucocephalus) at Sutherland Reservoir*

The bald eagle is the second-largest North American bird of prey and is distinguished by its white head and tail, which contrast with its dark brown to black body. Distribution of the bald eagle is extensive throughout North America, and breeding populations occur in most U.S. states and Canadian provinces. Bald eagles exhibit complex migration patterns that are influenced by age, location of breeding site, severity of climate at breeding site, and availability of prey. Bald eagle habitat is closely associated with proximity to large bodies of water. Wintering bald eagles often form large congregations with individuals sometimes numbering into the thousands (Buehler 2000). Threats to bald eagles include poaching, use of harmful pesticides, and collisions with vehicles and power lines (Buehler 2000).

***Occurrence in the Study Area***—The Nebraska Natural Heritage Program (NNHP) has documented 18 occurrences of bald eagle nests in the study area from 1991 through 2016, all of which have been associated with a major waterbody (Table 3.7-2). Additionally, the 2015 Nebraska Bald Eagle Nesting Report, prepared by NGPC, identified a total of 146 bald eagle nests (118 active) statewide. Thirty-two bald eagle nests were documented for the first time in 2015, and 29 of those were active. Eleven active nests were documented in Nebraska Sandhills, of which 8 occurred in the study area (Jorgensen and Dinan 2016).

NPPD completed aerial surveys for bald eagle nests near major waterbodies along alternative routing options evaluated by NPPD during the 2014 nesting season and along NPPD's final route during the 2016 nesting season. Surveys included areas along the South Platte River, North Platte River, Birdwood Creek, Dismal River, Middle Loup River, North Loup River, and Calamus River. Individual bald eagles were identified along the North Platte River, Middle Loup River, North Loup River, and Calamus River. Four occupied bald eagle nests were identified in route corridors. The two occupied bald eagle nests occurred adjacent to the Calamus River—one occupied nest on the North Loup River and one occupied nest on Birdwood Creek. One additional occupied bald eagle nest was recorded along the Cedar River slightly south of the study area during an NPPD general site assessment in 2013 (NPPD 2016a).

During the winter, bald eagles roost in groups in areas that provide thermal cover and wind break, including dense forested areas often found near rivers and streams. Three of these areas, known as winter concentration areas, have been documented in the study area (Table 3.7-2). Bald eagles routinely occur at Sutherland Reservoir during the winter because of the NPPD power plant's warm-water discharge that prevents a portion of the reservoir from freezing. Additionally, the discharge area on the North Platte River downstream of Lake McConaughy and Lake Ogallala, located approximately 20 miles west of the study area, provides ideal winter habitat for bald eagles, and eagles using these habitats may be present in the study area during daily flights (NPPD 2016a).

**Table 3.7-2. Nebraska Natural Heritage Program-documented Bald Eagle Occurrences in Study Area**

| Nest Location (nearest waterbody) | Year Last Observed |
|---|---|
| Sutherland Reservoir | 1992[a] |
| Sutherland Reservoir | 1992[a] |
| Sutherland Reservoir | 2013 |
| North Platte River | 1991[a] |
| Swan Lake | 2008 |
| Calamus River | 2013 |
| Calamus River | 2013 |
| Calamus River | 2014 |
| Calamus River | 2014 |
| Calamus River | 2016 |
| Calamus River | 2016 |
| North Loup River | 2016 |
| Bloody Creek | 2014 |
| Hagan Lake | 2004 |
| Lake George | 2014 |
| Elkhorn River | 2008 |
| Elkhorn River | 2014 |
| Goose Lake | 2012 |
| Unnamed wetland | 1996 |
| Birdwood Creek | 2016 |

Source: NPPD (2016a)

[a] Winter concentration area

#### 3.7.2.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Under Alternative A, direct effects on bald eagles during construction of the R-Project may include displacement and loss of habitat. The presence of construction crews and equipment and associated noise may temporarily displace migrating bald eagles, which are common in Nebraska, particularly where major river corridors provide migratory stopover habitat and winter habitat, such as the North Platte, Middle Loup, North Loup, and Calamus River crossings. Bald eagles were frequently observed at such locations during the 2014 surveys. Although displacement from construction activities may temporarily disrupt eagle foraging behavior, the displacement would be limited to the R-Project ROW and ample undisturbed, adjacent habitat would remain available for foraging by bald eagles. Bald eagles would not be impeded from moving up and down the river corridor during migration. Avoidance and mitigation measures described in this section would minimize potential adverse effects on bald eagles by implementing appropriate seasonal spatial buffers relative to winter roosts and nests, conducting pre-construction surveys to ensure that construction and maintenance activities avoid nests, and installing bird flight diverters. Compliance with the *National Bald Eagle Management Guidelines* (USFWS 2007) would also effectively minimize impacts, resulting in low-intensity, adverse effects on this species.

Under Alternative A, direct effects on bald eagles from R-Project construction activities would also include the permanent loss of habitat. NPPD designed the R-Project to minimize effects on riparian habitat that may provide bald eagle nesting, roosting, and foraging habitat. However, forested riparian areas must be crossed along NPPD's final route, requiring clearing of approximately 18 acres of forested riparian habitat in the ROW to satisfy utility safety requirements.

Direct effects on bald eagles from Project operation could include collisions with transmission lines, potentially resulting in injury or death of individuals from impact trauma. NPPD would mark 123 miles of the transmission line with spiral bird flight diverters to minimize the potential for collision. Line marking would be completed according to APLIC (2012) and NPPD standards. The Service's Office of Migratory Bird Management has reviewed NPPD's MBCP, which includes the bald eagle, and concludes that a bald eagle take permit is not required.

Electrocution of bald eagles would not be possible because of the spacing between energized conductors and between energized conductors and grounded portions of the structure. The steel monopoles would have a vertical separation between energized conductors of 29 feet, minus the 18-inch conductor bundle. The separation between energized conductors and grounded portions of the structure would be 11 feet. The straight line horizontal spacing on steel monopoles would be the same. The horizontal spacing on lattice towers would be 30 feet, minus the 18-inch conductor bundle. The separation between energized conductors and grounded portions of the structure on lattice towers would be 9 feet, 2 inches. These spacing distances are substantially greater than the 60 inches recommended by APLIC (2006). No bird that may occur along the R-

Project has a wing-span that could connect multiple energized conductors or energized conductors and grounded portions of the structure, eliminating the risk of avian electrocution.

The presence of maintenance vehicles, equipment, and personnel during routine Project maintenance activities implemented under Alternative A could temporarily displace bald eagles. Emergency repairs may temporarily disturb an estimated total of 293 acres of habitat during the life of the R-Project. The timing and location of emergency repair activities cannot be predicted. Currently, no known bald eagle nests or winter roosts occur within 0.5 mile of the R-Project, as determined by data obtained from NNHP and Project-specific surveys completed in 2014 and 2016 (NPPD 2016a). If an occupied bald eagle nest is established within 0.5 mile of the R-Project in the future, emergency repair activities would comply with the *National Bald Eagle Management Guidelines* (USFWS 2007) to avoid or minimize potential effects on nesting bald eagles. Disturbance from maintenance activities, including both routine maintenance beginning at year 30 and continuing every 10 years thereafter and infrequent emergency repairs, would result in temporary, short-term impacts over the 50-year life of the Project. In general, effects from maintenance activities would be similar to effects during the construction phase.

#### Alternative A—Indirect Effects

Indirect effects on bald eagles under Alternative A may include reduced fecundity and/or population sizes in years subsequent to Project implementation if breeding or nesting behavior is disrupted by construction, operation, and maintenance activities. Other indirect impacts could include changes in prey abundance from the loss or disturbance of habitat. Indirect effects on bald eagles would be negligible because NPPD would seek to avoid occupied nests by 0.5 mile during construction and in accordance with the *National Bald Eagle Management Guidelines* (USFWS 2007) during emergency repairs, as described in the draft HCP. Habitat loss is not expected to significantly alter prey resources because of the large amount of undisturbed habitat adjacent to the proposed Project site. Indirect effects on the bald eagle would be negligible.

#### Alternative B—Direct Effects

Direct effects on bald eagles under Alternative B would be generally the same as described for Alternative A and would consist of short- and long-term, adverse impacts because of the displacement of individuals during construction activities, loss of habitat, and risk of collision with power lines. Fewer individuals would be temporarily displaced because of noise or visual disturbances during construction activities under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. Although overall ground disturbance would be greater under Alternative B, compared to Alternative A, loss of potential bald eagle roosting or nesting habitat would be the same because the amount and location of tree removal for ROW clearing would be the same under both action alternatives, resulting in the removal of approximately 18 acres of forested riparian habitat. Risk of collision with power lines under Alternative B would be the same as under Alternative A because the route would not change. Direct, short- and long-term, adverse effects would be of low intensity after implementing avoidance, minimization, and mitigation measures described for Alternative A.

Implementation of Alternative B would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative B—Indirect Effects

Indirect effects on bald eagles under Alternative B would be the same as described for Alternative A, but potential changes in prey abundance could be slightly greater because a greater amount of ground disturbance would occur under Alternative B. Indirect, adverse effects would be both short- and long-term and of low intensity.

### 3.7.2.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the bald eagle:

- Conduct a bald eagle survey during the spring prior to construction to ensure no new bald eagle nests have been constructed within 0.5 mile of the R-Project; if a new occupied bald eagle nest is identified during the pre-construction survey, construction would not be allowed within 0.5 mile of the occupied nest during the bald eagle nesting season (February 1 through August 31).
- Conduct winter roost surveys according to Nebraska Bald Eagle Survey Protocol if active construction is to occur in areas of suitable roost habitat; if active roosts are located within 0.25 mile of construction, delay construction activities until eagles leave roosts for the day; consult with the Service and NGPC regarding the need for a second follow-up pre-construction survey.
- Design the R-Project to adhere to NPPD and APLIC (2006) standards to eliminate the risk of bald eagle electrocution.
- Install bird flight diverters, according to APLIC (2012) and NPPD standards, on the overhead shield wire at river spans and near wetlands to reduce the risk of bald eagle collisions.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Require construction personnel to remove all trash, which may attract scavenging bald eagles to construction areas.
- Implement measures in the MBCP to avoid and minimize potential effects on migratory birds, including bald eagles throughout the life of the R-Project.
- Implement a Helicopter Construction Plan, prohibiting the use of helicopters within 0.5 mile of active bald eagle nests during the nesting season.

- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.

### 3.7.3 Golden Eagle (Protected under the BGEPA)

#### 3.7.3.1 Affected Environment

Like the bald eagle, the golden eagle is not listed under the ESA, but it receives Federal protection under the BGEPA. The golden eagle is a large raptor species common throughout the western United States and Canada. The majority of the North American population occurs from the central Great Plains west to the Pacific Coast. Nebraska is located along the eastern edge of this population. The golden eagle uses a variety of habitats throughout its range but typically inhabits riparian areas and river corridors in the Great Plains region, particularly during the winter months, and nests along cliffs or in large tree tops (Kochert et al. 2002; Delong 2004).

Source: USFWS

*Golden eagle (Aquila chrysaetos)*

Threats to golden eagles include loss of habitat and direct mortality from anthropogenic sources such as collision with cars, fences, and power lines; accidental and purposeful shooting; and poisoning (Franson et al. 1995).

***Occurrence in the Study Area***—In Nebraska, the golden eagle is most common in the northwestern portion of the state, and wintering eagles may occur farther east in the state as individuals search for prey. Although no formal surveys have been conducted, historical data indicate that three occurrences of golden eagles have been documented in the study area (in 1972, 1979, and 1982). All of these occurrences were reported along Birdwood Creek, north of the North Platte River (NPPD 2016a). However, because of the size and low population of the study area, it is likely that most occurrences would not be documented. The golden eagle is likely to be at least occasionally present in the study area.

#### 3.7.3.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Potential direct effects on golden eagles under Alternative A would be similar to those described for bald eagles. However, effects on golden eagles would be less likely to occur because this species typically occurs only in the western portion of the study area near Birdwood Creek. All documented occurrences of golden eagles in the study area, the most recent of which was in 1982, were reported along Birdwood Creek, north of the North Platte River, making that the most likely location for potential effects. However, because of the size and low population of the study area, it is likely that most occurrences would not be documented. Direct effects on golden eagles during construction of the R-Project may include disturbance to individuals and loss of habitat, the same as described for bald eagles. Noise disturbance and the presence of construction crews, vehicles, and equipment would result in short-term impacts.

During transmission line ROW clearing, 23 acres of trees would be removed between GGS Substation and Thedford Substation where nesting golden eagles have the potential to occur. These acres include planted shelterbelts, which were not included in the riparian forested habitat described for bald eagles above. This permanent loss of habitat would constitute a long-term impact. However, ample undisturbed habitat exists adjacent to the ROW and would remain available for nesting or foraging golden eagles.

As described in Section 3.6, *Wildlife*, transmission lines create a potential collision hazard for birds, especially larger species. During Project operation, golden eagle collisions with the Project transmission line are possible and could result in injury or death. However, the likelihood of impacts due to collision would be minimized by adherence with NPPD and APLIC line marking standards and implementation of additional avoidance measures described for bald eagles and further discussed in the draft HCP.

Under Alternative A, the presence of maintenance vehicles, equipment, and personnel required for Project maintenance activities, both routine maintenance beginning at year 30 and continuing every 10 years thereafter and infrequent emergency repairs, could temporarily displace golden eagles, resulting in short-term, temporary impacts.

Direct effects on the golden eagle under Alternative A would be of low intensity in the short- and long-term because this species may occur only in the western portion of the study area, most disturbances would be temporary, and NPPD would implement measures to avoid and minimize effects on this species, as described below. Implementation of Alternative A would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative A—Indirect Effects

Potential indirect effects on the golden eagle under Alternative A would be the same as described for the bald eagle, but are less likely to occur. Potential indirect effects may include reduced fecundity and/or population sizes in years subsequent to Project implementation if breeding or nesting behavior is disrupted because of R-Project construction, operation, and maintenance activities and if prey abundance changes because of the loss or disturbance of habitat. Indirect effects on the golden eagle would be negligible because this species is not common in the study area and because NPPD would implement mitigation measures to avoid or minimize effects on the golden eagle.

#### Alternative B—Direct Effects

Potential direct effects on golden eagles under Alternative B would generally be the same as described for Alternative A. These effects would include displacement of individuals during construction activities, loss of habitat, and risk of collision with power lines. Fewer individuals would be temporarily displaced because of noise or visual disturbances during construction activities under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. Loss of potential golden eagle nesting habitat would be the same under both action alternatives because the amount and location of tree removal for ROW clearing would be the same under the action alternatives, resulting in the removal of approximately 23 acres of trees between GGS Substation and Thedford Substation. These acres include planted shelterbelts, which were not included in the riparian forested habitat described for bald eagles above. Risk of collision with power lines under Alternative B would be the same as under Alternative A because the route would not change. Direct, adverse effects on golden eagles under Alternative B would be both short term and long term and of low intensity. Adverse effects would be reduced by implementing the avoidance, minimization, and mitigation measures described for Alternative A. Alternative B would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative B—Indirect Effects

Potential indirect effects on the golden eagle under Alternative B would be the same as described for Alternative A, but potential changes in prey abundance could be slightly greater because a greater amount of ground disturbance would occur under Alternative B. Indirect, adverse effects would be both short and long term and negligible.

### 3.7.3.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the golden eagle:

- Design the Project to adhere to NPPD and APLIC (2006) standards to eliminate the risk of golden eagle electrocution.
- Install bird flight diverters, according to APLIC (2012) and NPPD standards, on the overhead shield wire at river and wetland spans.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Require construction personnel to remove all trash, which may attract scavenging golden eagles to the construction areas.
- Implement measures in the MBCP to avoid and minimize potential effects on migratory birds, including bald eagles throughout the life of the R-Project.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service’s review to ensure permit requirements are met and successful restoration is implemented.

### 3.7.4 Interior Least Tern (Federally Listed Species)

#### 3.7.4.1 Affected Environment

Source: NPGC

*Interior least tern (Sterna antillarum)*

The interior least tern is listed as endangered at the Federal level and state level in Nebraska. The interior least tern is a small migratory shorebird with white and gray plumage, distinguished by its black cap and contrasting white forehead. The interior least tern is the smallest of the North American terns. Breeding populations occur along rivers and lakes across the Great Plains where they nest in large colonies. Preferred habitats include sparsely vegetated sand and gravel bars in a wide, unobstructed river channel, salt flats, and lake shorelines (Thompson et al. 1997). The distribution of the interior least tern also spans coastlines throughout the United States and Central America along with portions of South America.

Within Nebraska, the interior least tern uses sandbar habitats of the Platte River, Missouri River, the lower reaches of the Loup and Niobrara rivers, and large sandy beaches of Lake McConaughy on the North Platte River. Breeding populations are typically present from late April to mid-late July. The Service has monitored interior least tern breeding populations along the Loup and Platte rivers since 1988.

Threats to the interior least tern include habitat loss or alteration from hydrologic changes of riverine systems, such as the creation of reservoirs, untimely release of water from dams, and channelization that causes loss of mid-channel sandbars and islands (Thompson et al. 1997).

***Occurrence in the Study Area***—The interior least tern has not been documented in the study area; however, the species has been documented at Lake McConaughy on the North Platte River and portions of the South Platte River upstream of the study area. The species also has been documented nesting near the confluence of the North and South Platte Rivers, approximately 15 miles downstream of the proposed study area. Therefore, it is likely that interior least terns cross the study area during migration. A 2014 interior least tern nesting habitat assessment completed for the R-Project crossing locations on the North Platte River and South Platte River reported no suitable nesting habitat at either location (NPPD 2016a), although these locations are in the breeding range. No known nesting locations occur within 6 miles of the study area.

#### 3.7.4.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Under Alternative A, potential direct effects on the interior least tern during construction of the R-Project may include temporary noise disturbance from the presence of construction crews, vehicles, and equipment. These short-term impacts would most likely occur at the North Platte and South Platte River crossings during the spring and fall when this species travels along major river corridors to and from nesting or wintering grounds along the Gulf of Mexico. Noise disturbance during construction could temporarily disrupt foraging behavior or migration patterns because the interior least tern would likely change course to avoid construction activities.

Construction activities associated with the R-Project would not be located in potential interior least tern nesting habitat, as identified during 2014 surveys; therefore, impacts on nesting interior least terns are not anticipated.

The R-Project transmission line would create a collision hazard, possibly resulting in injury or death to individuals. This long-term impact would persist for the life of the R-Project. Although one interior least tern mortality resulting from a transmission line collision has been reported in Nebraska (Dinan et al. 2012), such incidents are unlikely because the interior least tern is a small, agile flyer and will be able to easily avoid the transmission line in most cases. Avoidance and minimization measures that may further reduce the risk of transmission line collisions include strategic placement of river crossings in areas without interior least tern habitat and at existing infrastructure (i.e., bridges) and installation of line markers.

Maintenance activities, including both routine maintenance beginning at year 30 and continuing every 10 years thereafter and infrequent emergency repairs, would result in temporary, short-term impacts over the 50-year life of the Project. Because of the lack of nesting habitat along the corridor, these disturbances would be minimal.

Overall, direct effects on the interior least tern under Alternative A would be of low intensity because of the lack of suitable habitat in the study area and the ability of this species to avoid collision with the transmission line. Additionally, most disturbances would be temporary. Mitigation measures described below would aid in minimizing the potential effects on this species. Implementation of Alternative A would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative A—Indirect Effects

Indirect effects on the interior least tern under Alternative A are not expected.

#### Alternative B—Direct Effects

Potential direct effects on the interior least tern under Alternative B would generally be the same as described for Alternative A and would consist of temporary displacement of individuals resulting from noise or visual disturbances during construction activities, if present during migrations, and risk of collision with power lines. Noise disturbance would be slightly less intense under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. Risk of collision with power lines under Alternative B would be the same as under Alternative A because the route would not change. Direct, adverse effects on the interior least tern under Alternative B would be short term and of low intensity because construction activities would be temporary, suitable habitat is lacking in the study area, this species would be able to avoid collision with the transmission line, and NPPD would implement the avoidance, minimization, and mitigation measures, described for Alternative A. Alternative B would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative B—Indirect Effects

No indirect effects on the interior least tern are anticipated under Alternative B.

#### 3.7.4.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the interior least tern:

- Span the North Platte and South Platte rivers at locations that do not provide suitable interior least tern nesting habitat and avoid locating Project activities in potential interior least tern nesting habitat.
- Install bird flight diverters, according to APLIC (2012) and NPPD standards, on the overhead shield wire at the North Platte River and South Platte River spans.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Employ the measures in the MBCP to avoid and minimize potential effects on migratory birds throughout the life of the R-Project.

### 3.7.5 Piping Plover (Federally Listed Species)

#### 3.7.5.1 Affected Environment

The piping plover is listed as a threatened species at both the Federal and state levels in Nebraska. This small migratory shorebird occurs throughout North America and uses coastal habitats as well as lakeshores and river banks with low relief and minimal vegetation (Elliot-Smith and Haig 2004). The piping plover in Nebraska belongs to the Northern Great Plains population. In Nebraska, breeding populations are typically present from mid-April to late June annually and nesting occurs along the Missouri, Platte, Loup, and Niobrara rivers. Threats to this species include coastal development, invasive predators, and hydrologic alterations (Elliot-Smith and Haig 2004).

Source: USFWS

*Piping plover (Charadrius melodus)*

***Occurrence in the Study Area***—Piping plovers commonly breed in the same locations as interior least terns; however, the piping plover will use vegetated sandbars for nesting, while the interior least tern prefers sandbars devoid of all vegetation. If present in the study area, piping plovers would most likely occur in the same locations as the interior least tern. Input received during the public scoping process indicated that this species has been documented in the study area at Carson Lake in the eastern Sandhills during the 1992 migration. A piping plover nesting habitat assessment completed for the R-Project crossing locations on the North Platte River and South Platte River found no nesting habitat at the crossing locations. However, the species has been documented at Lake McConaughy on the North Platte River and portions of the South Platte River upstream of the study area. The species also has been documented nesting near the confluence of the North and South Platte rivers, approximately 15 miles downstream of the proposed study area. Thus, it is likely that the piping plover is occasionally present in the study area during migration flights to and from nesting locations (NPPD 2016a).

#### 3.7.5.2 Direct and Indirect Effects

##### Alternative A—Direct Effects

Potential effects on the piping plover under Alternative A would be similar to those described for interior least terns, given the overlap in range habitat preferences between the two species. Potential direct effects on the piping plover during construction of the R-Project may include temporary noise disturbance from the presence of construction crews, vehicles, and equipment. These short-term impacts would most likely occur at the North Platte and South Platte River crossings and large wetland complexes during the spring and fall migration. Project activities would not be located in potential piping plover nesting habitat. Therefore, construction of the R-Project would not result in permanent or temporary disturbance of nesting piping plovers or their habitat.

Operation of the R-Project transmission line would result in a long-term collision hazard. Potential collision impacts would be minimal due to the ability of the piping plover to avoid collisions with power lines and the implementation of avoidance and minimization measures which including strategic placement of river crossings in areas without piping plover habitat and at existing infrastructure (i.e., bridges) and installation of line markers.

Maintenance activities, including both routine maintenance beginning at year 30 and continuing every 10 years thereafter and infrequent emergency repairs, would result in temporary, short-term impacts over the 50-year life of the Project. These disturbances would be minimal due to the lack of nesting habitat in the study area.

Direct effects on nesting piping plovers under Alternative A would be of low intensity due to the lack of suitable habitat in the study area and the ability of this species to avoid direct impacts. However, temporary impact is expected at locations known to be used by the species during migration. Mitigation measures described below and further discussed in the draft HCP and MBCP would aid in minimizing the potential for effects on this species. Implementation of Alternative A would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative A—Indirect Effects

Indirect effects on piping plovers under Alternative A are not expected.

#### Alternative B—Direct Effects

Potential direct effects on the piping plover under Alternative B would generally be the same as described for Alternative A, and would be similar to those described for interior least tern because of the overlap in range and habitat preferences between the two species. Noise disturbances would be slightly less intense under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. Adverse effects would only potentially occur if individuals are present in the Project area during seasonal migrations. Direct, adverse effects on the piping plover under Alternative B would be short term and of low intensity because construction activities would be temporary, suitable habitat is lacking in the study area, this species would be able to avoid collision with the transmission line, and NPPD would implement the avoidance, minimization, and mitigation measures, described for Alternative A. Alternative B would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative B—Indirect Effects

No indirect effects on the piping plover are anticipated under Alternative B.

### 3.7.5.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the piping plover:

- Span the North Platte and South Platte rivers at locations that do not provide suitable piping plover nesting habitat and avoid locating Project activities in potential piping plover nesting and migration habitat.
- Install bird flight diverters, according to APLIC (2012) and NPPD standards, on the overhead shield wire at the North Platte and South Platte river spans, Carson Lake, and other locations known to provide migration habitat for the piping plover
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Implement the measures in the MBCP to avoid and minimize potential effects on migratory birds throughout the life of the R-Project.

### 3.7.6 Rufa Red Knot (Federally Listed Species)

#### 3.7.6.1 Affected Environment

The rufa red knot is listed as a threatened species at both the Federal and state levels in Nebraska. The rufa red knot was officially listed as Federally threatened in December 2014, following a rapid population decline from about 82,000 individuals in the 1980s to fewer than 30,000 by 2010 (79 FR 73706).

Source: USFWS

*Rufa red knot (Calidris canutus rufa)*

The rufa red knot is a subspecies of the red knot (*Calidris canudus*), which is the largest North American sandpiper species. The red knot is noted for its extraordinarily long-distance migrations, sometimes traveling up to 9,000 miles between breeding and wintering grounds. The rufa subspecies breeds in the Canadian Arctic and winters in Chile and Argentina, except a small subset that winters along the Texas coast. Nesting habitat for the rufa red knot consists of barren tundra, while wintering habitat consists of sandy beaches, tidal flats, and mangroves. Threats to the rufa red knot include loss of nesting and wintering habitat from climate change (Baker et al. 2013), which affects weather conditions, seasons, and availability of food resources, most notably the availability of horseshoe crab eggs.

***Occurrence in the Study Area***—Individuals of the Texas wintering subset have occasionally been documented in the states along the Central Flyway, including Nebraska (Baker et al. 2013; Jorgensen 2014). However, this species only potentially occurs in the study area during spring and fall migrations, and the likelihood of a rufa red knot occurring in the study area is very low. Only 15 occurrences of the rufa red knot have been noted in the state of Nebraska in more than 100 years (Jorgensen 2014; Central Flyway Council 2013). Sites where the rufa red knot has previously been documented in Nebraska include Rainwater Basin in south-central Nebraska and Lake McConaughy on the North Platte River (CNPPID 2013; NPPD 2016a).

#### 3.7.6.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Construction, operation, and maintenance of the R-Project under Alternative A would not likely affect the rufa red knot because this species is not likely to be present in the study area with regular frequency. However, if present, short-term construction effects on the rufa red knot may include temporary disturbances from noise, presence of construction crews, and presence of vehicles and equipment. The R-Project would result in the permanent and temporary disturbance of wetland habitat that may be used by migrating individuals. A total of 63 acres of wetland habitat would potentially be disturbed under Alternative A. However, NPPD would seek to avoid, minimize, or mitigate impacts on wetlands by implementing the measures described in

Section 3.4 and summarized below. Wetlands temporarily disturbed by construction activities would be restored following the completion of construction. The Restoration Management Plan would include stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet the stipulations. Alternative A would not affect nesting rufa red knots or their habitat because the Project area is not located within the breeding range of the species.

Operation of the R-Project transmission line would result in a long-term collision hazard. However, the potential for collisions would be minimal due to the unlikely presence of this species in the study area and the implementation of avoidance and minimization measures, which include avoidance of effects on wetlands and installation of line markers. These measures are further discussed in the draft HCP and MBCP.

Maintenance activities associated with the R-Project under Alternative A could temporarily disturb rufa red knots if present in the vicinity of those activities. If maintenance activities occur while migrating rufa red knot are present in the Project area, they may be disturbed by the presence of maintenance vehicles, equipment, and personnel. Maintenance activities occurring throughout the life of the R-Project, including both routine maintenance beginning at year 30 and continuing every 10 years thereafter and emergency repairs, would result in short-term, temporary impacts throughout the life of the Project.

Direct effects on the rufa red knot under Alternative A would be of low intensity because of the rare occurrence of this species in the Project area and the ability of this species to avoid direct impacts. Additionally, disturbances would be temporary. Mitigation measures described below would aid in minimizing the potential for effects on this species. Implementation of Alternative A would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative A—Indirect Effects

Indirect effects from under Alternative A are unlikely given the lack of suitable nesting habitat near the study area, avoidance and minimization of impacts on wetlands planned for the Project, and the unlikely occurrence of this species in the Project area.

#### Alternative B—Direct Effects

Implementation of Alternative B would not likely adversely affect the rufa red knot because this species is not likely to be present in the Project area with regular frequency. Therefore, coverage under a permit is not necessary.

#### Alternative B—Indirect Effects

No indirect effects on the rufa red knot are anticipated under Alternative B.

#### 3.7.6.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under to avoid, minimize, or mitigate effects on the rufa red knot:

- Delineate and map field-verified wetlands for the final design of the Project to avoid locating permanent structures in wetlands where possible.
- Span wetlands when siting structures.
- Use low-ground-pressure equipment and temporary matting or other measures to cross wetlands, where necessary, to avoid and/or minimize impacts and remove these materials upon completion of construction (Alternative A only).
- Install bird flight diverters, according to APLIC (2012) and NPPD standards, on the overhead shield wires at river and wetland spans.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Implement the measures in the MBCP to avoid and minimize potential effects on migratory birds throughout the life of the R-Project.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.

### 3.7.7 Whooping Crane (Federally Listed Species)

#### 3.7.7.1 Affected Environment

The whooping crane is listed as an endangered species at the Federal and state levels in Nebraska. This wading bird is the tallest bird species in North America with adult males approaching 5 feet in height when standing. The whooping crane, which has snowy white plumage with black markings on its head and the tips of its wings, is noted for its distinctive call. It was near extinction by the mid-twentieth century, and despite intensive management efforts, the whooping crane remains one of the rarest birds in North America, the only continent on which it occurs (Urbanek and Lewis 2015).

Source: USFWS

*Whooping crane (Grus americana)*

Whooping cranes currently exist in four distinct populations—the Aransas-Wood Buffalo population, the Louisiana population, the Eastern Migratory population, and the Florida population. Whooping cranes that may occur in the study area are part of the Aransas-Wood Buffalo migratory population. The Aransas-Wood Buffalo population is the only remaining self-sustaining population and the last remaining naturally migrating population. The Aransas-Wood Buffalo population nests in or near Wood Buffalo National Park in the Northwest Territories and adjacent areas of northeastern Alberta, Canada, and winters in Aransas NWR on the Texas coast (Urbanek and Lewis 2015). Wintering habitat for the Aransas-Wood Buffalo population consists of estuarine marshes, shallow bays, and tidal flats while nesting habitat consists of shallow wetlands separated by ridges that support narrow stands of spruce and willow (Urbanek and Lewis 2015).

Whooping cranes of the Aransas-Wood Buffalo population leave the nesting grounds in Canada in September and October and arrive at the Texas wintering grounds in October and November. They return to the nesting grounds in the spring, leaving the Texas coast in March and April and arriving in Alberta and Northwest Territories in April and May (CWS and USFWS 2007).

Major threats to the whooping crane include collisions with power lines and poaching (Stehn and Strobel 2011; Urbanek and Lewis 2015). Other threats to this species include habitat loss and degradation from draining wetlands and converting prairie habitat to croplands (Urbanek and Lewis 2015) and modification to river hydrology. Collision with power lines is the greatest known source of mortality for fledged whooping cranes in the Aransas-Wood Buffalo population, representing 38 percent of all known mortalities to this population since 1956 (Stehn and Wassenich 2008). Mortality resulting from collision with power lines is most likely to occur during spring and fall migrations (Stehn and Wassenich 2008).

***Occurrence in the Study Area***—During spring and fall migrations, whooping cranes travel along the Central Flyway (Figure 3.6-3), frequently traversing the study area, and sometimes using palustrine wetland and riverine habitats in the study area as stopover roost sites (Armbruster 1990; NPPD 2016a). Critical habitat for this species has been designated in Nebraska along a portion of the Platte River, south of the study area.

Whooping cranes have been observed in the study area 27 times since 1968, most recently, in 2014 (USFWS 2015c). Because the study area is sparsely populated, most occurrences of whooping cranes are likely not documented; therefore, the frequency of occurrence in the study area is likely higher than estimates based on observations. However, it should be noted that whooping cranes are largely, though not entirely, opportunistic in their use of stopover sites along the Central Flyway and will use sites with available habitat when weather or diurnal conditions require a break in migration. Because much of the Central Flyway is sparsely populated by humans, only a small percentage of stopovers are observed, those observed may not be identified, those identified may not be reported, and those reported may not be confirmed. Based on the crane population and average flight distances, as little as 4 percent of crane stopovers is reported. Therefore, absence of documented whooping crane use of a given area in the Central Flyway does not necessarily mean that whooping cranes do not use that area.

In Nebraska, 95 percent of all whooping crane sightings occur in a 200-mile-long corridor through the center of the state. The entire 7,039-square-mile study area for the R-Project falls within this corridor (Figure 3.7-1). In its desktop analysis, NPPD found that approximately 8,969 acres of suitable whooping crane stopover habitat within 1 mile of the centerline of NPPD's final route. However, this analysis, conducted for the purposes of selecting line marking locations, does not represent an overall assessment of suitable whooping crane stopover habitat in the study area. Thus, it is likely that the entire study area contains much more suitable whooping crane stopover habitat, which is readily abundant in much of Nebraska (Stahlecker 1997). However, because the study area is located directly in the center of the whooping crane sighting corridor and the Central Flyway (Figure 3.6-3), it is more likely that whooping cranes will occur in this area than anywhere else in the state of Nebraska, and the species is most likely to be present in the study area during spring and fall migrations. In total, the proposed transmission line would span nearly the entire whooping crane sighting corridor (Figure 3.7-1). A complete list of all recorded observations of whooping cranes in the study area is provided in the draft HCP.

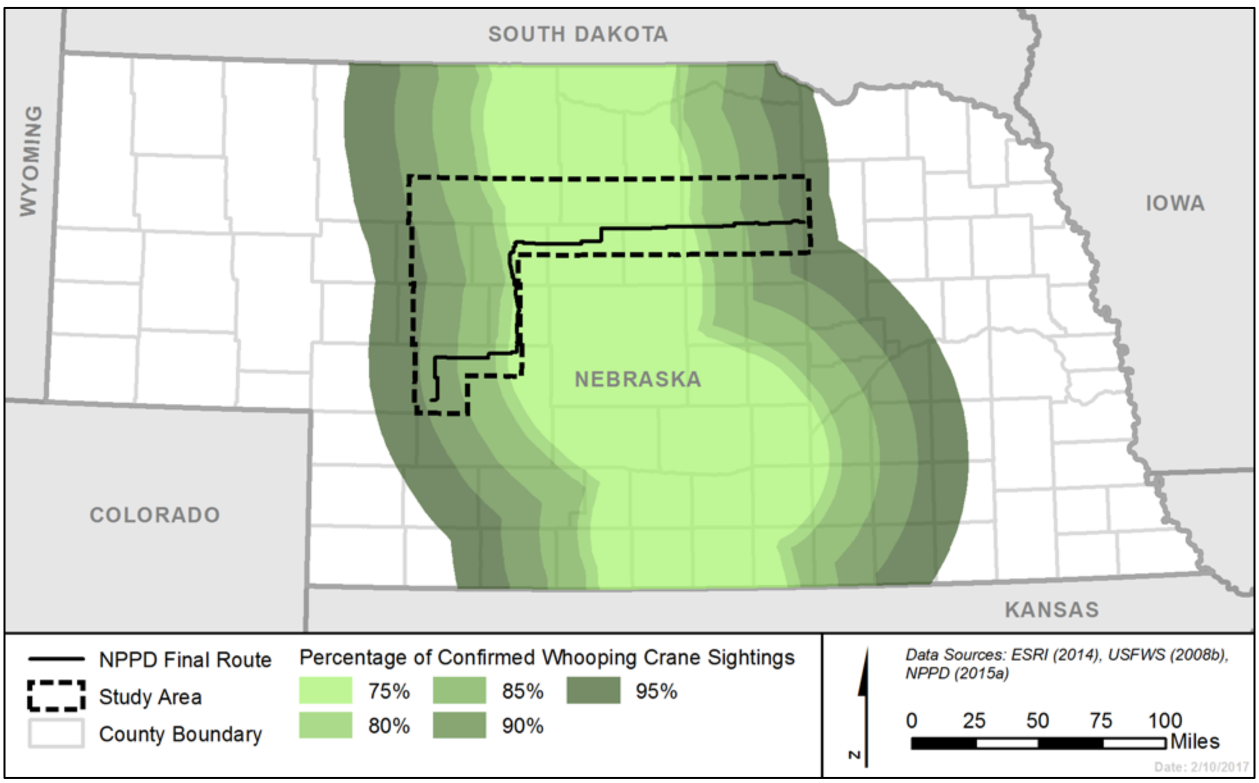



**Figure 3.7-1. Whooping Crane Migration Corridor**

### 3.7.7.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Under Alternative A, direct effects on whooping cranes during construction of the R-Project may include disturbances to migrating individuals and loss or disturbance of habitat. Disturbances to migrating whooping cranes from construction would be short term and may include noise, presence of construction crews, and presence of vehicles and equipment. Construction activities could disturb whooping cranes if they are present in the Project area during construction activity. Whooping cranes are known to avoid areas affected by human-related disturbances, such as urban and commercial areas, at distances up to half a mile (Armbruster 1990). Armbruster and Farmer (1981) found migrating sandhill cranes, a species similar to whooping cranes in habitat selection, avoided paved roads by 400 meters, gravel roads by 200 meters, and homes by 200 meters. Thus, construction-related disturbances may cause migrating whooping cranes arriving in the area to avoid potentially suitable stopover habitat in the vicinity of construction activities during active construction periods. However, migrating whooping cranes potentially disturbed by construction activities would likely use adjacent suitable, undisturbed habitats that are abundant throughout the Nebraska Sandhills. Daily preconstruction surveys during migration season would minimize the likelihood of disturbances to whooping cranes and work would cease if a whooping crane were to land within 0.5 mile of construction activities.

A desktop assessment of whooping crane habitat, conducted by NPPD, determined that construction of the R-Project under Alternative A would result in disturbance of approximately 12.7 acres of potentially suitable whooping crane habitat (12.7 acres temporary and 0.013 acres permanent). Permanent loss of habitat would only occur at structure foundations for steel monopoles and lattice towers. Temporary disturbance would occur as a result of access routes and improvements, fly yards/assembly areas, structure work areas, pulling and tensioning sites, and distribution line relocations. NPPD would select large temporary work areas such as fly yards and construction yards in cooperation with the Service and NGPC; however, final design must also account for engineering, technical, legal, and economic considerations. No permanent structures or temporary disturbance areas would be located in rivers and streams that provide habitat for whooping cranes, and existing river and stream crossings would be used for construction equipment. The temporary and permanent disturbance of suitable whooping crane stopover habitat under Alternative A would have moderate-intensity, adverse effects on migrating whooping cranes. These effects would not rise to the level of take because of the use of bird flight diverters and the abundance of nearby suitable habitat.

The R-Project transmission line would present a long-term collision hazard for whooping cranes. Collisions with transmission and distribution lines are considered to be a major threat to whooping cranes (Stehn and Strobel 2011; Urbanek and Lewis 2015), and 10 collision-related mortalities of individuals within the Aransas-Wood Buffalo population have been previously documented, one of which was a transmission line collision (Stehn and Wassenich 2008; USFWS 2009c). However, risk assessment calculations completed for the R-Project, as described in the draft HCP, suggest that the likelihood of whooping crane collisions with the R-Project transmission line would be extremely low, resulting in a risk value of less than one collision over the 50-year life of the Project. The Service conducted a separate whooping crane collision risk assessment that also concluded the risk of whooping crane mortality from collision with the R-Project transmission line would be low (Appendix E). Avoidance, minimization, and mitigation measures listed below and further described in the draft HCP and MBCP would further reduce the risk of collisions. NPPD would also implement measures described in the Service's memorandum titled *USFWS Region 6 Guidance for Minimizing Effects from Power Line Projects within the Whooping Crane Migration Corridor* (hereafter referred to as Region 6 Guidance), which can be found in Appendix E of the draft HCP. The Region 6 Guidance recommends placing bird flight diverters on all new power lines within 1 mile of potentially suitable whooping crane habitat and marking an equal amount of existing power lines in the migration corridor. NPPD currently plans to mark the R-Project line using spiral flight diverters. These diverters improve line visibility and have been shown to reduce collisions (Murphy et al. 2016). The use and effectiveness of bird flight diverters is further discussed in Section 3.6, *Wildlife*.

With the implementation of the Region 6 Guidance, the risk of taking a whooping crane(s) from the operation of the R-Project transmission line over the life of the permit is expected to be negligible; therefore, the whooping crane is not a covered species in the draft HCP or permit. However, if new or additional information emerges suggesting that risk of whooping crane take is higher than currently expected, NPPD would seek to amend the draft HCP and permit for the R-Project to include the whooping crane as a covered species. New information that would result in the addition of whooping crane as a covered species would consist of any confirmed whooping crane collisions with 115 kV or higher power lines that have been marked with bird flight diverters that have been documented to be at least as effective as those installed by NPPD on the R-Project transmission line. The collision must also occur within 1 mile of suitable whooping crane habitat. Amending the draft HCP and permit to include the whooping crane in such an event would require the Service to revisit the other analysis documents for permit issuance and an opportunity to review the changes to the draft HCP and NEPA documents. Overall, operation of the R-Project transmission line would result in long-term, moderate-intensity, adverse effects on the whooping crane.

To minimize the risk of avian collision with the R-Project, NPPD would install spiral bird flight diverters along approximately 123 miles of NPPD's final route that pose the greatest threat to birds. In accordance with the Region 6 Guidance, NPPD would also install bird flight diverters on an additional 123 miles of existing NPPD-owned power lines. Location of the spiral bird flight diverters would be based on the proximity to wetlands and rivers that serve as potentially suitable whooping crane and migratory bird habitat. The transmission line would be marked and maintained according to APLIC (2012) and NPPD standards. NPPD standards call for the placement of spiral bird flight diverters at 50-foot intervals alternating on opposite shield wires. This application is within the recommended spacing per APLIC (2012) and would increase protection against collision, reducing the magnitude of this impact.

Maintenance activities under Alternative A may cause temporary disturbances to whooping cranes due to the presence of maintenance vehicles, equipment (including helicopters), and personnel and associated noise. The timing and location of emergency repair activities cannot be predicted, but suitable whooping crane habitat would be avoided to the extent practicable, as these areas are not conducive to vehicle access. ROW maintenance, including vegetation (tree) management activities, would be scheduled outside of the migration season to the maximum extent practicable to further avoid disturbance to whooping cranes. In general, effects on the whooping crane from maintenance activities would be similar to, but less frequent and intense than, those during the construction phase. Disturbances to whooping cranes from maintenance activities, including both routine maintenance beginning at year 30 and continuing every 10 years thereafter and infrequent emergency repairs, would result in temporary, short-term impacts.

Potential direct effects on the whooping crane from construction, operation, and maintenance of the R-Project under Alternative A would most likely occur near wetlands or at river crossings during spring and fall migration periods from March 23 to May 10 and September 16 to November 16, respectively, when whooping cranes are most likely to be present in the study area. Waterbodies containing suitable whooping crane habitat that would be spanned by the R-Project transmission line under Alternative A include: North Platte River, South Platte River, North Loup River, Middle Loup River, South Loup River, Dismal River, Calamus River, and Birdwood Creek. Avoidance, minimization, and mitigation measures described below would effectively avoid or minimize potential adverse effects on the whooping crane.

#### Alternative A—Indirect Effects

Disruptions of feeding and breeding behavior and excess energy expenditure associated with avoidance of disturbed habitats from construction, operation, and maintenance activities could result in indirect effects. These could include reduced fecundity and/or population sizes in years subsequent to Project implementation. However, these effects are not anticipated to occur because whooping cranes disturbed from habitats are likely to make use of the abundant nearby stopover habitat as an alternative.

#### Alternative B—Direct Effects

Direct effects on the whooping crane under Alternative B would generally be the same as described for Alternative A. Direct, adverse effects on migratory individuals would consist of noise and visual disturbances, temporary and permanent loss of habitat, and risk of collision with power lines.

Temporary displacement of individuals resulting from noise or visual disturbances during construction would be slightly less under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. In either case, NPPD would implement protocol surveys and not commence or continue construction activities if a crane is sighted within 0.5 mile. Construction of the Project under Alternative B would result in slightly greater disturbance of suitable whooping crane stopover habitat than Alternative A, according to NPPD’s desktop analysis. Alternative B would result in the temporary disturbance of 20.7 acres of suitable whooping crane stopover habitat and the permanent loss of 0.01 acre. Additional habitat disturbance under Alternative B would be attributable to additional access improvements required to accommodate heavy equipment at all structure locations, and more temporary structure work areas associated with installation of steel monopoles. Risk of collision with power lines under Alternative B would be the same as under Alternative A because the route would not change. Direct, short- and long-term, adverse effects on whooping cranes under Alternative B would be of moderate intensity because of the abundance of adjacent habitat in the Nebraska Sandhills and the implementation of avoidance, minimization, and mitigation measures described for Alternative A.

#### Alternative B—Indirect Effects

Indirect effects on the whooping crane would be the same as under Alternative A.

### 3.7.7.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the whooping crane:

- Implement minimization and mitigation measures outlined in the Service's, Region 6, *Guidance for Minimizing Effects of Power Line Projects within the Whooping Crane Migration Corridor*.
- Before beginning construction, conduct surveys in suitable whooping crane habitat within 0.5 mile of construction activities during the spring (March 23–May 10) and fall (September 16–November 16) migration periods and according to the Whooping Crane Protocol (NGPC 2015d). If whooping cranes are observed within 0.5 mile of any planned construction-related activity, do not begin work until whooping cranes have left the area on their own accord. Contact the Service and NGPC immediately if a whooping crane is observed during survey periods. If, during the day, a whooping crane lands within 0.5 mile of the Project, cease all work and do not resume until the whooping crane(s) has left the area or relocates at least 0.5 mile away from the construction area on its own accord. Require environmental monitors to maintain documentation of daily whooping crane surveys and occurrence of whooping cranes within 0.5 mile of construction activities. Require contractors to complete survey checklists for submittal to NPPD to document daily surveys.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Span rivers and streams at locations with existing bridge crossings when such infrastructure is available.
- Use low-ground-pressure equipment and temporary matting or other measures to cross wetlands and sub-irrigated meadows where necessary to avoid or minimize impacts and remove upon completion of construction (Alternative A only).

- Install bird flight diverters on the overhead shield wire along portions of the line within 1 mile of potentially suitable whooping crane habitat, including river channels and wetlands to be identified in a desktop habitat assessment. Mark lines according to APLIC (2012) and NPPD standards:
  - Mark areas with known high avian densities, such as river crossings and known roost sites, with bird flight diverters having reflective and glow-in-the-dark surfaces to reduce the risk of collisions during low-light conditions.
  - Install bird flight diverters on an equal amount (123 miles) of NPPD-owned power lines within the 95 percent sighting corridor to comply with the Region 6 Guidance.
- Implement the measures in the MBCP to avoid and minimize potential effects on migratory birds throughout the life of the R-Project.
- Implement a Helicopter Construction Plan, prohibiting the use of helicopters within 0.5 mile of any whooping crane(s) observed during the daily preconstruction surveys.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.

### 3.7.8 Northern Long-eared Bat (Federally Listed Species)

#### 3.7.8.1 Affected Environment

Source: USFWS

*Northern long-eared bat (Myotis septentrionalis)*

The northern long-eared bat is listed as a threatened species at both the Federal and state levels in Nebraska. This small bat species occurs across much of the eastern and north central United States, encompassing 37 states and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. During the summer months, the northern long-eared bat roosts underneath bark or in cavities of a variety of tree species, both live and dead, and may roost individually or in colonies. Summer roosting sites may also include caves, mines, or human-made structures, such as barns, other buildings, utility poles, window shutters, and bat houses (80 FR 17974). During the winter, the northern long-eared bat inhabits large caves or mines (Caceres and Pybus 1997; USFWS 2015d) and crevices and deep fissures in rock outcrops (Harms 2016, pers. comm.). This species is relatively common in Cass County (80 FR 17974), southeast of the study area, where individuals use limestone quarries as hibernacula.

Currently, the predominant threat to this species is white-nose syndrome, a fungal disease that has caused massive population declines in some portions of this species' range (USFWS 2015d). Other threats include habitat fragmentation, destruction, and modification from logging, oil/gas/mineral development, and wind energy development. Disturbances of hibernacula caused by recreational caving activities have also been documented as a potential threat to the northern long-eared bat (80 FR 17974).

***Occurrence in the Study Area***—In Nebraska, the northern long-eared bat is mainly found in forested habitat in the eastern portion of the state and is not common in the Sandhills because it lacks suitable habitat (80 FR 17974), except along riparian corridors. Currently, there are no records of northern long-eared bat in the study area, and the study area does not contain large tracts of unfragmented forest habitat. However, the study area does include forested riparian areas that may be used as roosting sites for individuals or colonies, or dispersal areas. No hibernacula are present in the study area. Northern long-eared bats are known to summer in the northwestern parts of Nebraska outside the study area, specifically in the Pine Ridge BUL in Sheridan County (Geluso et al. 2015), and a reproducing population has been documented north of Valentine in Cherry County north of the study area (80 FR 17974). It is likely that the northern-long eared bat is at least occasionally present in the study area.

#### 3.7.8.2 Direct and Indirect Effects

##### Alternative A—Direct Effects

The Service published a final 4(d) rule that accompanied the final listing for the northern long-eared bat on January 14, 2016 (81 FR 1900). The take prohibitions of the final 4(d) rule apply to areas in an identified white-nose syndrome zone, which represents all counties that contain or are located within 150 miles of documented cases of white-nose syndrome or documented presence of the fungus that causes white-nose syndrome. For all areas of the country outside the white-nose syndrome zone, there are no prohibitions on incidental take as per the final 4(d) rule. In the white-nose syndrome zone, the final 4(d) rule prohibits incidental take of northern long-eared bats occurring: 1) in known hibernacula, 2) as a result of removing a known occupied maternity roost tree or removing trees within 150 feet of a known occupied maternity roost tree during the pup season from June 1 through July 31, or 3) as a result of removing trees from within 0.25 mile of a hibernaculum at any time of year.

The fungus that causes white-nose syndrome was identified in Cass County in southeastern Nebraska in November 2015 and in Sarpy County in spring 2016. Approximately 75 miles of the R-Project in Holt, Wheeler, Garfield, and Loup counties fall within the white-nose syndrome zone, as defined by the final 4(d) rule. It is possible that maternity colonies are present in these counties. However, it is doubtful that hibernacula are present because of the lack of rock outcroppings and mines that are used by the species during the winter.

Within the white-nose syndrome zone, ROW clearing would result in the removal of 19 acres of trees that could provide habitat for maternity colonies, including planted shelter belts and riparian areas. The loss of these trees could result in long-term, adverse effects on the northern-long eared bat, especially if a maternity colony was removed.

Operation and maintenance activities may result in short- and long-term, adverse effects on the northern long-eared bat. Emergency repairs could result in impacts on maternity colonies, but it is unknown where the impacts may occur or determine the magnitude of impact. Vegetation management of trees in the ROW and removal of danger trees that encroach on the ROW could remove potential northern long-eared bat roost habitat. NPPD would not remove trees in the segment of the Project located in the white-nose syndrome zone during the pup season (June 1–July 31) to ensure compliance with the final 4(d) rule. NPPD would also be cognizant of the any future expansions in the white-nose syndrome zone. Routine maintenance would begin at year 30 and continue every 10 years thereafter.

Overall, direct effects on northern long-eared bats under Alternative A would be of low intensity because of the rare occurrence of this species, the small amount of suitable riparian habitat in the Project area, and commitment by NPPD to avoid tree removal from June 1 through July 31. Implementation of Alternative A would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

#### Alternative A—Indirect Effects

Construction, operation, and maintenance of the R-Project under Alternative B would not result in indirect effects on the northern long-eared bat because of the small amount of riparian habitat in the Project area.

#### Alternative B—Direct Effects

Potential direct effects on the northern long-eared bat under Alternative B would be nearly identical to those described for Alternative A. Potential direct, adverse effects associated with construction activities would include disturbances from noise or the presence of equipment and crews, and permanent loss of habitat due to ROW clearing (removal of trees). Noise disturbances would be slightly less intense under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. Habitat loss resulting from tree removal for ROW clearing would be the same as described for Alternative B because the ROW would be the same. Alternative B would not likely result in take of this species. Therefore, coverage under a permit is not necessary.

Direct, adverse effects on the northern long-eared bat under Alternative B would be of low intensity in both the short term and long term because of its rare occurrence and lack of suitable habitat in the Project area. By complying with the 4(d) rule, NPPD would likely avoid most effects on the northern long-eared bat.

#### Alternative B—Indirect Effects

No indirect effects on the northern long-eared bat are anticipated under Alternative B.

#### 3.7.8.3 Avoidance, Minimization, Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the northern long-eared bat:

- Avoid tree clearing in the transmission line ROW in Holt, Wheeler, Garfield, and Loup counties during the pup season (June 1 through July 31) as defined under the final 4(d) rule.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).

### 3.7.9 Blanding's Turtle (Petitioned for Listing under ESA)

#### 3.7.9.1 Affected Environment

Source: Ohio Department of Natural Resources

*Blanding's turtle (Emydoidea blandingii)*

Blanding's turtle is not currently listed under the ESA; however, on July 11, 2012, the Service received a petition from the Center for Biological Diversity requesting protection for 53 species of reptiles and amphibians, including Blanding's turtle, under the ESA. On July 1, 2015, the Service issued a 90-day finding on 31 petitions for various species, including Blanding's turtle, which concluded that the petition presented substantial information indicating that the species may be warranted for protection under the ESA (80 FR 37568). The status of Blanding's turtle is currently under review by the Service. If Blanding's turtle were to receive special-status designation under the ESA, it would also be listed at the state level in Nebraska.

This medium-sized turtle species is characterized by its domed upper shell (carapace) and its bright yellow chin and throat. The dark carapace typically has numerous, scattered yellow flecks. Blanding's turtle has a wide range surrounding the Great Lakes and extends west into the prairies of Minnesota and central Nebraska (Congdon et al. 2008). Habitat for Blanding's turtle includes a mixture of aquatic and upland areas, but optimal habitat includes lake shallows, ponds, soft-bottom streams, marshes and other wetlands, both permanent and ephemeral (Congdon and Keinath 2006; Congdon et al. 2011; Panella 2012a). This species prefers aquatic habitats with dense aquatic vegetation. Specific habitat preferences for this species may vary by season. Blanding's turtle typically burrows into wetlands to overwinter around November and begins to emerge in late March or early April (Lang 2004; MDNR 2008). The active season for Blanding's turtle in Nebraska is considered to be April through October.

In Nebraska, distribution of Blanding's turtle includes all reaches of major named rivers and streams throughout the state—except the Republican River drainage—and all of north, central, and eastern Nebraska from the South Dakota border, east to the Missouri River, and south to the Platte River exclusive of the Panhandle region (Panella 2012a). Surveys completed by the NDOR identified a single Blanding's turtle population estimated at more than 130,000 individuals in the Valentine NWR, located north of the study area in Cherry County, Nebraska (Lang 2004).

Threats to this species include the loss and conversion of wetland and surrounding upland habitat, nest predation by raccoons and foxes, and road mortality. The loss of wetland habitat is the primary driver of population loss range-wide (Panella 2012a).

***Occurrence in the Study Area***—Blanding's turtle occurs in the study area and may be found in any of the study area's approximately 120,000 acres of wetland habitat identified from the Service's NWI or any of the many lakes, ponds, rivers, and streams. No formal surveys have been conducted for this species in association with the R-Project. However, previous accounts of this species in the study area have reported its presence on the South Loup River near Stapleton, the Middle Loup River near Mullen, and a small pond on the Holt/Wheeler County line.

#### 3.7.9.2 Direct and Indirect Effects

##### Alternative A—Direct Effects

Blanding's turtle is not currently listed under the ESA; however, on July 11, 2012, the Service received a petition from the Center for Biological Diversity requesting protection for 53 species of reptiles and amphibians, including Blanding's turtle, under the ESA. On July 1, 2015, the Service issued a 90-day finding on 31 petitions for various species, including Blanding's turtle, which concluded that the petition presented substantial information indicating that the species may be warranted for protection under the ESA (80 FR 37568). The status of Blanding's turtle is currently under review by the Service. If Blanding's turtle were to receive special-status designation under the ESA, it would also be listed at the state level in Nebraska.

Direct effects on the Blanding's turtle from Project construction under Alternative A could include injury or mortality of individuals, permanent and temporary habitat disturbance, and disturbance of individual turtles and/or nests due to the presence of construction crews, vehicles, and equipment and associated noise.

Permanent and temporary habitat disturbance would occur in both upland and wetland habitats suitable for Blanding's turtle. Construction activities are expected to temporarily disturb approximately 158 acres of upland grassland and prairie habitat suitable for Blanding's turtle. Approximately 13 acres of upland habitat would be lost because of the construction of the Thedford substation and placement of structure foundations. Blanding's turtles may be found in upland habitat during their active season (April 1–October 31) when moving to and from nesting habitat and moving between wetland habitats. Thus, disturbances to this species in upland habitats would most likely occur during the active season, which coincides with Project construction time frames.

Construction of the R-Project under Alternative A would potentially result in the permanent loss of 1.5 acres of wetland habitat and temporary disturbance of an additional 63 acres of wetland habitat for access to structures during construction, as described in Section 3.4. Low-ground-pressure equipment and matting would be used if wetland crossings are required and removed upon completion of construction. Blanding’s turtle uses various types of wetland habitat throughout the year. This species relies heavily on wetlands for feeding and as refugia during travel throughout its active season and requires wetlands with permanent water that is deep enough or warm enough to not freeze solid for overwintering habitat. Therefore, all wetlands in the study area are considered potentially suitable habitat for Blanding’s turtle; however, not all wetlands provide suitable overwintering habitat.

Injury of or mortality to individual turtles and nests may occur as a result of crushing by construction equipment in work areas and along access routes to and from construction sites. NPPD would survey for Blanding’s turtles and their nests in these areas prior to daily construction activities. Blanding’s turtles prefer to nest in recently disturbed areas. If a Blanding’s turtle nest is established in a construction work area, that nest would be flagged and avoided by a 1-meter radius until the nest fails or the hatchlings emerge and disperse. Individual Blanding’s turtles would be identified and removed from disturbance areas immediately prior to commencement of construction activities. If a Blanding’s turtle travels into an active construction site, construction monitors would remove the turtle from the area to suitable adjacent habitat within 100 yards. NPPD would consult with the Service and NGPC biologists if suitable adjacent habitat is not available within 100 yards. These measures would effectively avoid crushing of Blanding’s turtles by construction equipment.

Blanding’s turtles may become trapped in excavations dug as part of construction activities. Excavations would be checked for Blanding’s turtles prior to backfilling, and turtles would be removed and relocated to suitable adjacent habitat within 100 yards if necessary. In instances such as structure foundations where the holes would be extremely deep, NPPD would install turtle-proof fencing (e.g., silt fence) around the holes or would cover holes to prevent turtles from falling in and becoming trapped or buried.

Handling of Blanding’s turtles by construction monitors if relocation is necessary, would result in inadvertent disturbance to individuals. Some turtle and tortoise species may suffer adverse impacts as a result of dehydration from urinating during temporary handling coupled with a lack of water when released. However, NPPD would avoid significant effects by releasing individuals near water sources if relocation is necessary. Temporary disturbances to Blanding’s turtle would also occur during construction as a result of noise and the presence of construction crews, vehicles, and equipment. However, these effects would be of low intensity.

Operation of the R-Project would not likely affect Blanding's turtle. However, maintenance activities and emergency repairs may temporarily affect this species over the long term. Direct effects from maintenance activities would be similar to those described for construction activities. Potential effects would include risk of turtle injury or mortality due to crushing by maintenance equipment and potential disturbances to individuals due to noise and the presence of maintenance crews, vehicles and equipment. Routine maintenance activities would begin 30 years after Project construction and would occur every 10 years over the 50-year life of the transmission line. Routine maintenance activities would occur from October–April, effectively avoiding the active season of Blanding's turtle. NPPD would also avoid routine maintenance effects on Blanding's turtle by avoiding permanent standing water where wintering turtles may occur.

Overall, avoidance, minimization, and mitigation measures described below would effectively avoid significant effects and take of the Blanding's turtle. Thus, Alternative A would result in low-intensity, direct, adverse effects in the short and long term.

#### Alternative A—Indirect Effects

Indirect effects on Blanding's turtle under Alternative A could include reduced fecundity and/or population sizes in years subsequent to Project implementation as a result of increased energy expenditure or missed breeding opportunities due to disturbances associated with R-Project construction and maintenance. However, indirect effects would be negligible because the potential for disturbances would be avoided or minimized by implementing the avoidance, minimization, and mitigation measures described below.

#### Alternative B—Direct Effects

The types of potential direct effects on Blanding's turtle under Alternative B would generally be the same as Alternative A and would consist of injury to or mortality of individuals, permanent and temporary habitat disturbance, and disturbance of individual turtles and/or nests resulting from the presence of construction crews, vehicles, and equipment and associated noise.

Potential for injury or mortality of individuals by being crushed by equipment would be greater under Alternative B because heavy equipment would be needed to access additional areas because helicopters would not be used for structure placement. Temporary and permanent loss of upland grassland and prairie habitat would be approximately the same as described for Alternative A. However, emergency repairs under Alternative B would result in greater disturbance (estimated 374 acres compared to estimated 293 acres under Alternative A). The intensity of noise disturbances would be slightly less under Alternative B because helicopters would not be used. However, ground equipment would be used for a longer duration.

Alternative B would result in adverse, short- and long-term, low-intensity effects on Blanding's turtle. These impacts would be partially offset by the implementation of avoidance, minimization, and mitigation measures described for Alternative A.

#### Alternative B—Indirect Effects

Indirect effects on Blanding's turtle would be the same as Alternative A.

### 3.7.9.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under to avoid, minimize, or mitigate effects on the Blanding's turtle:

- Employ construction monitors to remove Blanding's turtles from disturbance areas or access paths immediately prior to construction activities and relocate them to adjacent suitable habitat within 100 yards.
- Provide training to all personnel entering R-Project work areas, including contractors, on Blanding's turtle identification and avoidance and minimization measures.
- Require construction monitors to clear ahead of equipment by carefully inspecting the soil surface to ensure adequate inspection for and relocation of Blanding's turtles, if necessary.
- Install turtle-proof fencing (e.g., silt fence) around fly yards/assembly areas and construction yards/staging areas to prevent Blanding's turtles from entering work areas.
- Inspect all pipes, culverts, or similar structures with a diameter greater than 3 inches and left above ground onsite for one or more nights for Blanding's turtles before the material is moved, buried, or capped, during the active period of the Blanding's turtle.
- Cover or install turtle-proof fencing (e.g., silt fencing) around all open trenches and excavations left open overnight to prevent Blanding's turtles from falling into open trenches.
- Span wetlands when siting structures whenever possible.
- Use low-ground-pressure equipment and temporary matting to cross wetlands and sub-irrigated meadows where necessary to avoid or minimize impacts and remove these materials upon completion of construction (Alternative A only).
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).

### 3.7.10 Topeka Shiner (Federally Listed Endangered Species)

#### 3.7.10.1 Affected Environment

Source: USFWS

*Topeka shiner (Notropis topeka)*

The Topeka shiner is listed as an endangered species at both the Federal and state levels in Nebraska (USFWS 2009a). This small minnow species is known to occur in only six U.S. states—Minnesota, South Dakota, Iowa, Nebraska, Kansas, and Missouri. Habitat for the Topeka shiner consists of small spring-fed prairie streams with good water quality and cool temperatures. Suitable streams maintain flow year-round, although some may be reduced to intermittent flows during the summer. When surface flows drop, the Topeka shiner retreats to deeper pools that are sustained through groundwater discharge in the form of springs and seeps. This species breeds in stream pools, sometimes using nests of native sunfish (Kerns and Bonneau 2002).

Threats to the Topeka shiner include long-term habitat degradation resulting from gravel removal, vegetation clearing, stream channelization, and groundwater withdrawals and reduced stream flows associated with changes in climate patterns (USFWS 2009a). In Nebraska, conversion of native grasslands for agricultural purposes presents the greatest threat to the Topeka shiner in Nebraska due to associated stream impacts including sedimentation, runoff, and increased exposure to chemicals (Panella 2012b).

***Occurrence in the Study Area***—In Nebraska, the Topeka shiner has only been documented in Cherry and Madison counties. Two extant populations are known to persist in the study area in Cherry County. These populations occur in Brush Creek and Big Creek, tributaries of the North Loup River located north of Thedford (USFWS 2009a).

#### 3.7.10.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

None of the rivers or streams spanned by the R-Project are known to support Topeka shiner populations. The only known extant populations of the Topeka shiner in the study area occur in Brush Creek and Big Creek, which are tributaries of the North Loup River located north of Thedford in Cherry County (USFWS 2009a). These populations are located 20 to 25 miles northwest of the Thedford Substation expansion site and NPPD's final route under Alternative A, and no construction activities would occur in Brush Creek or Big Creek. Thus, individuals of the species would not be subjected to direct impacts from construction activities and coverage under a permit is not necessary.

**Alternative A—Indirect Effects**

No indirect effects would occur to the Topeka shiner under Alternative A.

**Alternative B—Direct Effects**

Direct effects on the Topeka shiner under Alternative B would be the same as Alternative A because the route would be the same under both action alternatives and no construction activities would occur in the area Brush Creek or Big Creek where this species is known to occur. Consequently, no direct adverse effects are expected in the short and long term. Therefore, coverage under a permit is not necessary.

**Alternative B—Indirect Effects**

No indirect effects on the Topeka shiner under Alternative B are expected.

#### 3.7.10.3 Avoidance, Minimization and Mitigation Measures

NPPD does not propose any specific mitigation measures for this species because the Topeka shiner is not known to occur in areas that would be affected by the Project.

### 3.7.11 American Burying Beetle (Federally Listed Endangered Species)

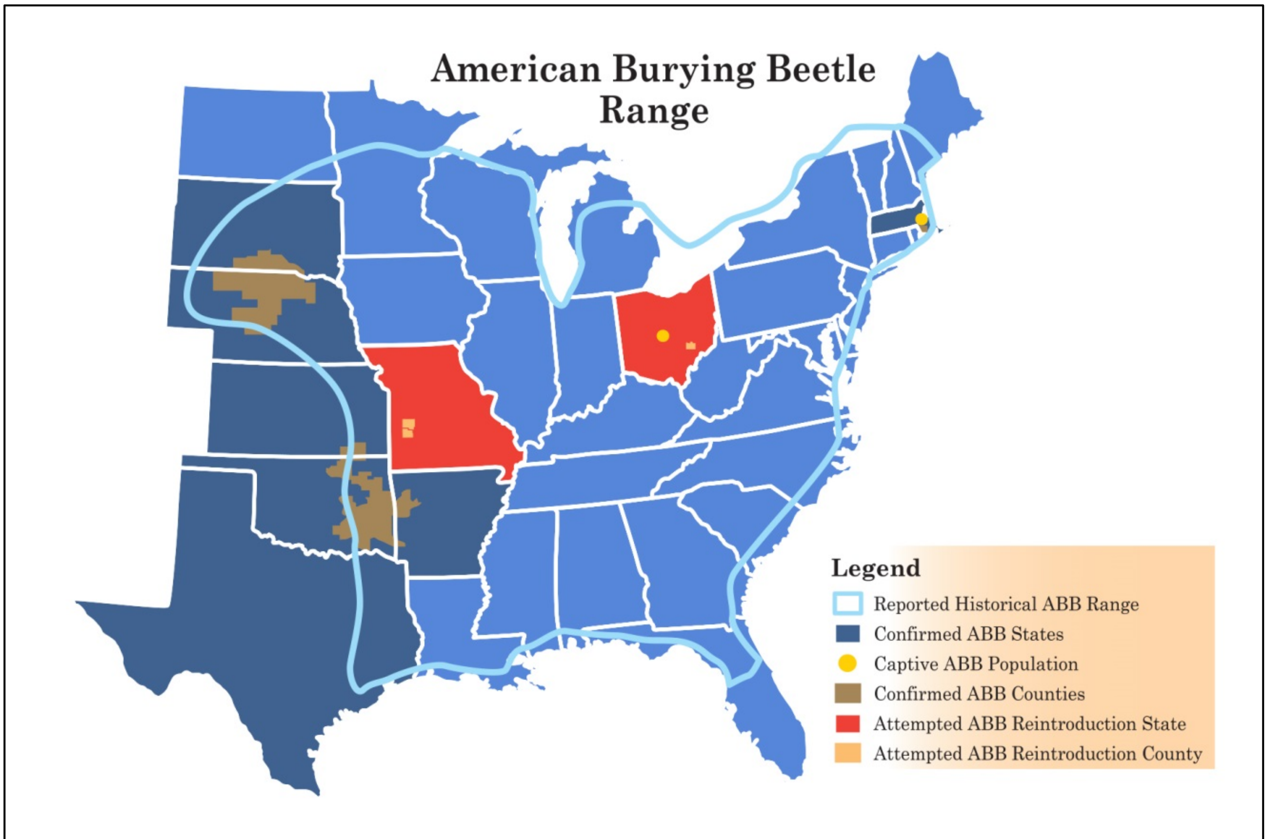
#### 3.7.11.1 Affected Environment

Source: USFWS

*American burying beetle (Nicrophorus americanus)*

The American burying beetle is listed as endangered at the Federal level and also at the state level in Nebraska. The beetle is the only species covered under the draft HCP and the only species for which NPPD is seeking a permit. The beetle is approximately 1 to 2 inches long and the largest member of the genus *Nicrophorus*. The beetle is characterized by a black body with two distinct orange markings on each elytra (covering over the wings) and a large orange marking on the pronotum (plate-like structure covering the thorax), which distinguishes this species from all other members of the genus. Sex of individuals can be determined through markings on the clypeus, located just above the mouth. Male beetles have a large, orange, rectangular marking on the clypeus, while female beetles have a small orange triangular marking (Ratcliffe 1996).

The beetle was historically abundant throughout most of the eastern United States and Canada, ranging north to Québec, east to Nova Scotia, south to the Gulf of Mexico, and west to Nebraska (USFWS 2008a; NatureServe 2015a). Beetle populations have collapsed dramatically during the twentieth century primarily from habitat loss and alteration, and the species is considered to be extirpated throughout most of its historical range (Figure 3.7-2). It is estimated that the beetle currently occurs in less than 10 percent of its historical range and occupies less than 1 percent of its historical habitat (USFWS 1991; USFWS 2008a; NatureServe 2015a). At the time of its ESA listing in 1989, the beetle was believed to occur at only two locations—Block Island, Rhode Island, and Latimer County, Oklahoma (USFWS 1991). However, additional surveys have been conducted since that time, and the beetle is now believed to occur in Massachusetts (isolated populations), South Dakota, Kansas, Oklahoma, Arkansas, Texas, and Nebraska where it is believed to occur in at least 20 counties (USFWS 2008a; NatureServe 2015a). Extensive surveys in many other eastern U.S. states have failed to discover remnant beetle populations (USFWS 2008a).




Source: DJ Case (see Appendix A)

**Figure 3.7-2. Historical Range of the American Burying Beetle**

The beetle occurs across a wide range of large, expansive, and unfragmented habitat types, including grasslands, shrublands, forests, and wetlands (USFWS 2008a; NatureServe 2015a). Soil characteristics are an important aspect of beetle habitat, and moisture has been shown to positively influence beetle presence (Jorgensen et al. 2014). This species is not tolerant to disturbance and is largely restricted to areas mostly undisturbed by human activity (Jurzenski et al. 2014; USFWS 1991; Lomolino et al. 1995; Panella 2013). In Nebraska, the beetle can be found throughout the Sandhills ecoregion and Loess Canyons in mesic areas such as wet meadows, semi-arid Sandhills, loam grasslands, and tree-lined shelterbelts.

Although vegetation and soil composition are important components of beetle habitat, prey availability, absence of human disturbance (Holloway and Schnell 1997), precipitation, and temperature (Jurzenski et al. 2014) may be the most important determinants of beetle presence. The beetle is a scavenging species that uses carrion (i.e., decomposing animals) for food and brood rearing. Deceased animals of all sizes provide a source of food for the beetle, but carrion used for brood rearing, which the beetle buries, must be of the proper size, typically consisting of small mammals and birds between 50 and 300 grams (Ratcliffe 1996; Panella 2013) (e.g., pigeon-sized). Because carrion is typically a limited resource, the beetle must find carcasses quickly. The discovery of a carcass often occurs within 2 days but may occur as quickly as 35 minutes after death (Ratcliffe 1996). Reliance on available carrion likely accounts for the beetle's avoidance of highly fragmented landscapes. Landscapes that are fragmented by anthropogenic disturbances (e.g., roads, transmission line and pipeline corridors, towns, and homes) allow easier access for vertebrate and avian scavengers (e.g., coyotes, opossums, raccoons, crows, and vultures) to consume carcasses before the beetle can bury them (Panella 2013).

The beetle buries into the ground to hibernate during the winter; the next generation typically remerges in late May or early June (in Nebraska) (Ratcliffe 1996; USFWS 2013a) when temperatures consistently reach 55 to 60°F. During its active period in the summer, the beetle is fully nocturnal with its peak activity occurring after sundown (Jurzenski 2012); therefore, it is most likely to be encountered in Nebraska during the summer in the early evening or at night.

The major threat to the beetle is habitat fragmentation, to which the massive overall decline of this species has been attributed (USFWS 1991; NatureServe 2015a). In Nebraska, loss of native grassland from conversion to irrigated row crop agriculture is the main cause of beetle habitat loss and fragmentation. Other potential threats to this species include use of artificial lighting and competition with avian and mammalian scavengers for carrion. Because the beetle's life cycle depends on temperature and precipitation cues, global climate change may also affect this species (USFWS 2008a). Although effects of global climate change on the beetle are difficult to predict, increasing temperatures and dryer conditions could result in further reductions in the species' range. Similarly, milder winters could disrupt hibernation cycles if freezing temperatures occur later in the year or if temperatures consistently reach 55 to 60°F earlier in the year. Changes in the frequency of extreme weather events associated with global climate change could also affect the beetle, although these potential impacts have not been fully assessed (USFWS 2008a).

***Occurrence in the Study Area***—American burying beetles in Nebraska occur in two separate geographically isolated populations, both of which fall partially in the study area (Figure 1-2) (USFWS 2008a; Jurzenski 2012; Hoback 2015). The Loess Hills population is located in south central Nebraska, primarily south of the Platte River, in Lincoln, Dawson, Frontier, and Gosper counties. The larger beetle population in Nebraska occurs in the Sandhills ecoregion of north central Nebraska (USFWS 2008a; NGPC 2014b). This population occurs throughout all or a portion of Logan, McPherson, Hooker, Thomas, Cherry, Custer, Blaine, Loup, Rock, Brown, Keya Paha, Boyd, Holt, Knox, Antelope, Boone, Valley, Greeley, Wheeler, and Garfield counties (Jorgensen et al. 2014; NGPC 2014b).

Recent efforts to model areas of high likelihood of beetle occurrence indicate that the beetle is most likely to be encountered in the study area in Brown, Rock, Holt, Blaine, Loup, and Garfield counties (Jurzenski 2012; Jorgensen et al. 2014) (Figure 3.7-3). NPPD conducted beetle presence/absence surveys in the study area in 2014, 2015, and 2016. The 2014 surveys, conducted in June across portions of Thomas, Logan and McPherson counties, captured three beetles during a 5-day period across 76 traps. The three beetles were captured along the Dismal River. In August 2015, NPPD conducted beetle surveys near Brewster, in a portion of Blaine County with a potentially high beetle density. During these surveys, 130 beetles were captured across nine sites during a 5-day period. The greatest number of individuals was collected near the Loup River, and no beetles were encountered at the survey sites located in dry, sandy ridge tops associated with Valentine soil (Hoback 2015). In August 2016, NPPD completed a large-scale mark/recapture survey that included 79 traps spread throughout the permit area. This survey captured 514 individual beetles with 102 recaptures over a 5-night trap period. Land cover surveyed was representative of the R-Project ROW and ranged from wet meadows to dry Sandhills. The beetles were captured in 2016 throughout the east-west portion of the R-Project.

### 3.7.11.2 Direct and Indirect Effects

#### Alternative A—Direct Effects

The beetle is the only species for which NPPD is requesting take authorization under a permit in accordance with Section 10(a)(1)(B) of the ESA. Under Alternative A, take of the beetle would only be permitted in the designated permit area (Figure 1-3). Nebraska has two beetle populations: the Sandhills population and the Loess Canyons population (Figure 1-2). Take would be limited to the beetle occurring within the Sandhills population because no portions of the R-Project would occur in suitable beetle habitat where the Loess Canyon population occurs. As required under ESA Section 10(a)(2), the draft HCP presents conservation measures that NPPD would implement to minimize and mitigate impacts associated with permitted activities to the maximum extent practicable for the construction, operation, and maintenance of the R-Project. The draft HCP also describes the following impacts likely to result from the proposed taking of the species for which permit coverage is requested.

Direct effects on the beetle from construction activities under Alternative A could include mortality of individuals, temporary disruption of behavior, and destruction or degradation of beetle habitat. During construction, construction equipment or vehicles may crush beetles or their eggs and larvae. Excavation or grading activities could also crush beetles and may compact the soil and prevent egress of beetles from below ground. Disturbance of soils during construction may also uncover buried beetles, leading to desiccation, injury, or death.

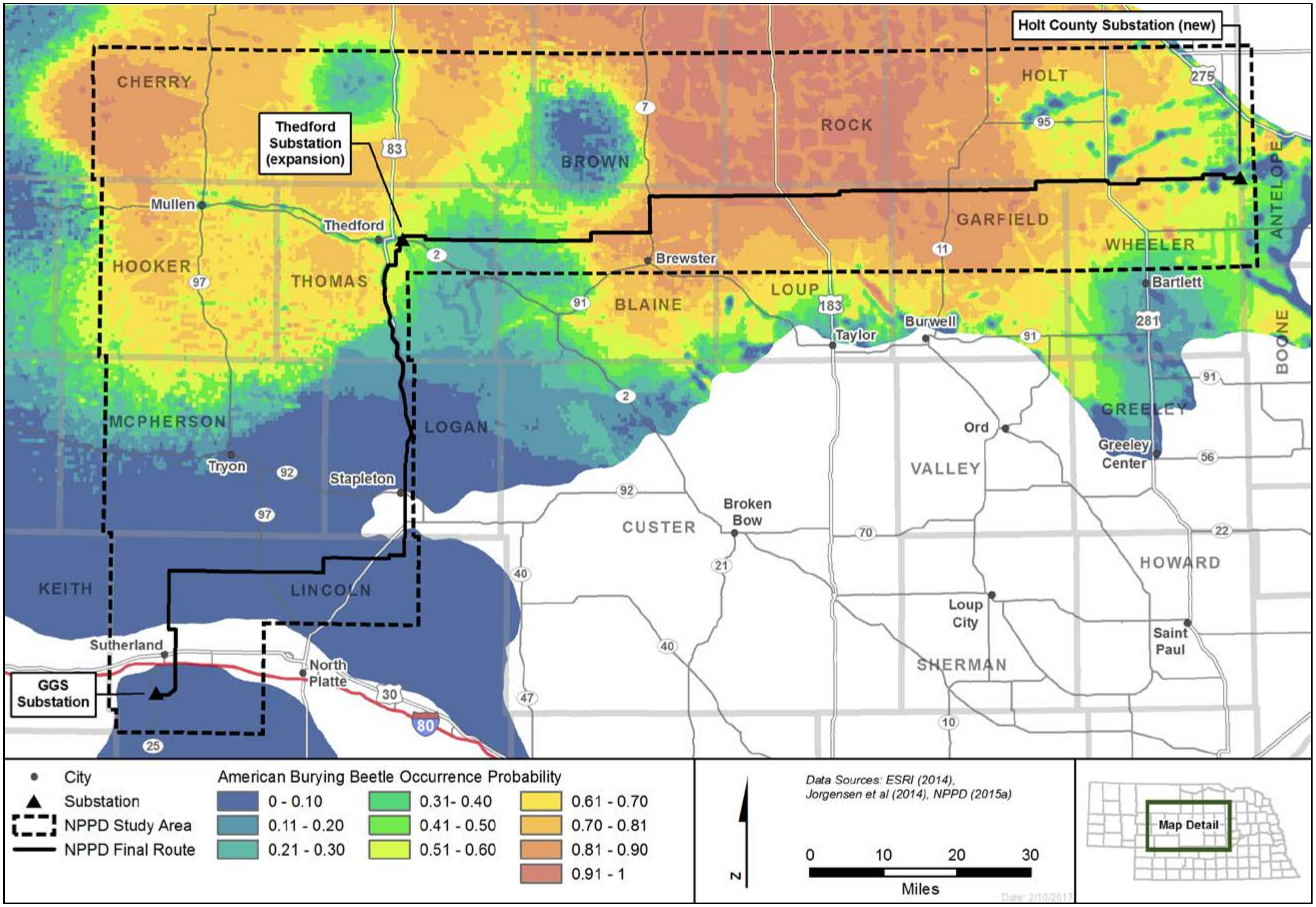



**Figure 3.7-3. Predicted Probability of American Burying Beetle Occurrence in Nebraska Sandhills Ecoregion**

Increases in human activity, vehicle traffic, and noise during R-Project construction may temporarily disturb beetles, potentially altering behavioral patterns or causing beetles to avoid otherwise suitable habitat. The use of artificial lighting during construction activities at night may also attract the beetle. The beetle, like many insects, is attracted to artificial lighting (USFWS 1991), and this attraction to artificial lighting at construction sites may disrupt normal beetle feeding and/or reproductive behavior, increase the risk of injury or mortality due to crushing by equipment or vehicles, or increase the risk of predation. To reduce such impacts, nighttime work would be minimized during the peak beetle active season from June through August, when potential impacts from artificial lighting would be greatest. Furthermore, any lighting used would be sodium-vapor lights with down-shielding to prevent attracting beetles to work sites. Injury and mortality of individual beetles and temporary disturbances during construction represent short-term, moderate-intensity effects on the beetle.

Direct effects on beetle habitat from construction activities under Alternative A could include destruction or degradation of habitat. Construction of the R-Project is expected to permanently destroy 33 acres of beetle habitat in the permit area and temporarily disturb an additional 1,042 acres of beetle habitat in the permit area. The permanent loss of 33 acres of beetle habitat would result from the installation of permanent access roads, structure foundations, relocation of distribution lines, and construction of the Thedford Substation. Temporary habitat disturbances would result from temporary access improvements, temporary work and staging areas, ROW clearing, relocation of distribution lines, and well relocations. Acres of permanent access roads were conservatively estimated at 10 percent of the access that may require improvement. However, actual permanent disturbance may be less because NPPD would restore as much of the access improvements to suitable beetle habitat as possible to minimize permanent loss of habitat.

During construction, it is expected that the beetle would continue to use adjacent undisturbed habitats. Upon completion of Project construction, temporarily disturbed habitat would be restored with native grasses, and these areas would again be available as beetle habitat. Permanent and temporary habitat disturbances associated with construction of the R-Project may also result in fragmentation of beetle habitat, which is considered to be a major cause of beetle decline throughout its range (USFWS 2008a, 1991). The majority of beetle habitat fragmentation would be attributable to temporary access, which would be restored upon completion of Project construction. The R-Project transmission line would not fragment beetle habitat or impede movement. Temporary and permanent habitat disturbances from construction activities would represent both short- and long-term, moderate-intensity impacts on the beetle.

Operation of the R-Project transmission line is not expected to affect the beetle. Routine maintenance and emergency repairs would be required throughout the life of the transmission line and may affect the beetle in ways similar to those described for construction. Maintenance activities would begin 30 years after construction and would occur at 10-year intervals for the 50-year life of the transmission line. NPPD would conduct all routine maintenance activities from October through April, when the beetle is typically dormant, reducing the likelihood of direct effects from maintenance activities. While the timing and locations of emergency repairs cannot be predicted, it is estimated that 208 acres of beetle habitat would be temporarily disturbed from emergency repairs throughout the life of the transmission line.

The number of beetles likely to be taken as a result of construction activities is assumed to be relative to the amount of beetle habitat expected to be disturbed under Alternative A and the population density of the beetle within those habitats. Therefore, take was calculated by multiplying beetle density (0.13 beetle/acre based on data collected in the Sandhills between 1996 and 2016) by the number of acres of beetle habitat that would be disturbed under each alternative, as described in the draft HCP. Based on these calculations, it is anticipated that Alternative A would result in the take of 167 beetles throughout the life of the R-Project (140 during construction and 27 during emergency repairs).

Following construction, temporary work and access areas would be revegetated to restore beetle habitat. Disturbed areas would be stabilized either through use of physical methods (e.g., matting and jute blankets) or vegetative cover. The primary restoration goal is to provide the best chance for disturbed areas to return to their pre-construction condition, or as close as possible. If initial restoration efforts are unsuccessful, NPPD would implement adaptive management measures to continue restoration until successful restoration was achieved. NPPD would also establish an escrow account to ensure successful restoration of beetle habitat and to serve as a financial guarantee that funds would be available to restore beetle habitat if NPPD failed to take the appropriate steps to do so. NPPD prepared and submitted to the Service an escrow agreement for review that would be finalized prior to implementation of any construction activities.

NPPD would implement compensatory mitigation to fully offset the impacts of the R-Project's incidental take the beetle. The amount of beetle habitat required to fully offset take was calculated at a rate of 3 acres of mitigation for every1 acre of disturbance (3:1) within the permit area, based on the assumption that all disturbed acres are beetle habitat and present equal high-quality value for the beetle.

The mitigation calculation also accounts for temporal aspects of beetle habitat loss for temporary impacts from project construction and emergency repairs within the permit area. This represents the anticipated amount of time between R-Project construction/emergency repairs and successful completion of restoration. Restoration of vegetation cover is expected to take 5 years, or 10 percent of the 50-year life of the R-Project. Therefore, the acres of beetle habitat required to offset temporary construction/emergency repair impacts were multiplied by 10 percent to mitigate for 5 years of beetle habitat loss. Based on these calculations (shown below in Table 3.7-3) NPPD would be required to purchase and protect in perpetuity at least 473 acres of occupied beetle habitat to serve as mitigation lands under Alternative A. However, NPPD has agreed to acquire and protect at least 500 acres of occupied beetle habitat.

**Table 3.7-3. R-Project Mitigation Calculations for Beetle Take**

| Type of Impact | Affected Acres | Mitigation Ration (Conserved: Affected) | Temporal Impact Timescale | Mitigation Acres Required |
|---|---|---|---|---|
| Temporary Construction Impact | 1,042 | 3:1 | 10% | 312 |
| Permanent impact | 33 | 3:1 | -- | 99 |
| Temporary Emergency Repairs Impact | 208 | 3:1 | 10% | 62 |
| **Total** | -- | -- | -- | **473** |

All mitigation lands would be of the same or higher quality habitat with beetle densities greater than or equal to those which would be disturbed or removed by the R-Project. Therefore, compensatory mitigation would conserve as many or more beetles than the anticipated take associated with the R-Project. Criteria for selecting suitable mitigation lands would include modeled probability of beetle occurrence (> 60 percent), trap data if available, and a general assessment of habitat quality. A determination regarding the suitability of proposed mitigation lands to satisfy mitigation requirements would be based on a consensus among the USFWS Nebraska Ecological Services Field Office, NGPC, and NPPD. Disturbed lands would not meet the requirements for suitable mitigation lands. However, restoration of disturbed lands may provide additional benefit to the beetle. Therefore, if representatives from the USFWS Nebraska Ecological Services Field Office, NGPC and NPPD all concur that a property has the potential to be restored to beetle habitat of an acceptable quality, it may be obtained. Such properties would require written verification by all parties and the preparation of a conceptual restoration plan.

NPPD would either secure and manage the property(ies) itself or work with a third party to identify, secure, and manage the property(ies), and NPPD would be responsible for mitigation success. NPPD's preference is to purchase a single tract of occupied habitat; however, the final acquisition would be based on parcel availability, habitat quality, and concurrence from the Service and NGPC. NPPD would make its best effort to secure mitigation lands prior to the onset of covered activities, as described in the draft HCP.

### Alternative A—Indirect Effects

Indirect effects on the beetle under Alternative A could include reduced fecundity and/or population sizes in years subsequent to Project implementation if breeding behavior is disrupted because of R-Project construction, maintenance, and emergency repair activities. Construction of the R-Project is expected to occur over approximately 21 to 24 months or at least two generations of the beetle. Thus, indirect effects on the beetle may extend beyond 2 years and disruptions to beetle breeding behavior during multiple generations may have a cumulative effect on future beetle abundance and population size in the study area. However, avoidance measures prescribed in the draft HCP would reduce the magnitude of indirect effects by avoiding times when beetles are most active, minimizing the area of ground disturbance, and providing restoration and mitigation for beetle habitat that would be disturbed or removed by the R-Project. NPPD calculated the number of acres of mitigation lands required to fully offset take of the beetle to compensate for temporal impacts as described above. Therefore, compensatory mitigation would offset both direct and indirect impacts. When avoidance, minimization, and mitigation measures are taken into account, Alternative A would result in long-term, low-intensity impacts on the beetles.

#### Alternative B—Direct Effects

The types of direct effects on the beetle under Alternative B would be similar to those under Alternative A because the route would be the same under both action alternatives. However, the use of steel monopoles along the entire length of the line would result in greater impacts under Alternative B. Direct, adverse effects on the beetle would consist of take resulting from crushing by vehicles and equipment, temporary disruption of behavior, and permanent and temporary destruction and degradation of beetle habitat.

Alternative B would result in additional take of the beetle compared to Alternative A because the use of steel monopoles along the entire line would result in a greater amount of disturbance to beetle habitat in the permit area. The use of steel monopole structures for the entire line would require heavy equipment to traverse the highest density portions of beetle habitat in the Project area, located in Blaine, Loup, and Garfield counties. Under Alternative B, heavy equipment would be used to access each structure foundation because steel monopoles cannot be placed using helicopters, resulting in greater permanent and temporary disturbances to beetle habitat because additional access modifications (such as blading) to accommodate heavy equipment would result in a greater of ground disturbance compared to those necessary to accommodate low-ground-pressure equipment. Larger structure work areas required for steel monopoles would also result in greater temporary disturbance of beetle habitat.

Construction of the R-Project under Alternative B would result in an additional permanent disturbance of an estimated 55 acres of beetle habitat in the permit area and temporary disturbance of 1,367 acres. Permanent loss of habitat would result from the installation of permanent access roads, structure foundations for monopoles, relocation of distribution lines, and construction of the Thedford Substation. Greater permanent disturbance to beetle habitat under Alternative B, compared to Alternative A, would be attributable to greater access requirements for heavy equipment. Temporary disturbance to beetle habitat under Alternative B would result from temporary access improvements, temporary work and staging areas, ROW clearing, relocation of distribution lines, well relocations, and emergency repairs. Greater temporary disturbance to beetle habitat under Alternative B, compared to Alternative A, would be attributable to greater temporary access improvements needed to accommodate heavy equipment and larger temporary work areas required for installation of steel monopoles. Emergency repairs are anticipated to account for an estimated 284 acres of temporary beetle habitat disturbance over the life of the Project.

It is anticipated that Alternative B would result in the take of 222 beetles throughout the life of the R-Project (185 during construction and 37 during emergency repairs) based on the beetle take calculation method described in the draft HCP. Therefore, Alternative B would result in short- and long-term, moderate-intensity effects on the beetle.

As under Alternative A, NPPD would implement compensatory mitigation to compensate for the R-Project's incidental take of the beetle. NPPD would acquire and protect in perpetuity at least 660 acres of occupied beetle habitat to serve as mitigation lands under Alternative B, as described in Section 2.4.12. NPPD would also establish an escrow account to ensure successful restoration of beetle habitat and to serve as a financial guarantee that funds would be available to restore beetle habitat if NPPD failed to take the appropriate steps to do so.

#### Alternative B—Indirect Effects

Indirect impacts under Alternative B would be the same as for Alternative A.

### 3.7.11.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on beetle:

- Avoid wetlands, including subirrigated wet meadows, during the design of temporary and permanent access routes; where subirrigated meadows have to be crossed by temporary access, use low-ground-pressure equipment and matting (Alternative A only).
- Use existing roads and two-tracks to cross streams and wetlands for construction and maintenance activities, based on availability and landowner approval.
- Use temporary improvements for access, including temporary bridges, culverts, and matting at stream and wetland crossings; remove fill material and geofabric and revegetate disturbed areas following construction.
- Use overland access with low-ground-pressure equipment to avoid soil disturbance and compaction in areas where existing roads are not available for construction and maintenance access.
- Site temporary work areas (e.g., fly yard/assembly and construction yard/staging areas) in areas unsuitable for the beetle, based on availability, identify these areas in coordination with and with concurrence from the Service and NGPC.
- Use helical pier foundations in the Sandhills because they require less equipment, require a smaller temporary work area, and result in less ground disturbance than traditional steel monopole foundations (Alternative A only).
- Use helicopters to install the lattice towers to reduce the need for ground access and for heavy equipment, which could cause high levels of soil disturbance (Alternative A only).
- Complete portions of construction in the winter (December 1–February 28) to avoid the beetle's active season—potential covered activities that may be completed during winter

may be associated with identified structures including work areas, structure erection, and stringing, pulling, and tensioning, as described in the draft HCP and preliminary areas identified for winter construction include mesic grasslands and wet meadows along the North Loup River, along State Highway 7, and from the Calamus River east to the Holt County Substation.

- Avoid nighttime construction and the use of artificial lighting during periods when the beetle is active to avoid attracting beetle to construction areas and increasing the likelihood of take.
- Use sodium vapor lighting and down-shield lighting at Thedford Substation to avoid attracting the beetle to artificial lighting sources.
- Conduct mowing and windrowing of vegetation in specified areas to reduce the likelihood of encountering the beetle within the permit area, subject to landowner approval; identify specific areas in coordination with and with concurrence from the Service and NGPC.
- Remove carrion in limited instances at structure locations and/or access roads in specified areas to reduce the likelihood of beetle presence within the permit area; identify specific areas in coordination with and with concurrence from the Service and NGPC.
- Restore beetle habitat including revegetation of temporarily disturbed areas.
- Require all personnel, including contractors, to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Acquire at least 500 acres of mitigation lands to conserve beetle habitat to offset R-Project's temporary and permanent impacts (at least 660 acres would be acquired under Alternative B).
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review and approval to ensure permit requirements are met and successful restoration is achieved.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met.

### 3.7.12 Blowout Penstemon (Federally Listed Endangered Species)

#### 3.7.12.1 Affected Environment

Source: USFWS

*Blowout penstemon (Penstemon haydenii)*

The blowout penstemon is a Federally and state-listed endangered plant. No critical habitat has been designated for the blowout penstemon. The blowout penstemon is a short-lived, perennial plant that frequently occurs in large, multi-stemmed clumps with both flower and vegetative stems that are commonly 1 to 2 feet tall. It flowers from mid-May to late June. The flowers are fragrant, tubular, 1 to 2 inches in length, and pale to dark lavender. Seeds are wind-dispersed and are often distributed downwind of blowout edges where sand accumulates (NatureServe 2016a; USFWS 2012, 1992). This plant is a pioneer species that grows in shifting sand in blowouts in the Sandhills region in Nebraska. Blowout penstemon is frequently found among blowout grass (*Redfieldia flexuosa*), which is often the first pioneer of a blowout (USFWS 2012, 1992). The blowout penstemon is a poor competitor and does not persist as blowouts heal and grasses begin to invade the blowout (USFWS 2012, 1992; NGPC 2013a).

**Blowouts**

Round or conical eroded areas, depressions formed in the sand when prevailing northwesterly winds scoop out the sides of dunes in areas where vegetative cover is removed or disturbed

The blowout penstemon is found in the Sandhills region of northcentral Nebraska and in the northeastern Great Divide Basin in southeastern Wyoming on the rim and lee slopes of blowouts or on the rim and steep faces of sandy slough slopes. Blowout penstemon is associated with Sandhill dune prairies in the central Platte River, Cherry County wetlands, Dismal River headwaters, Elkhorn River headwaters, panhandle prairies, Sandhill alkaline lakes, Upper Niobrara River, and Upper Loup rivers and tributaries in the Sandhills ecoregion (Schneider et al. 2011). Currently, 32 blowout penstemon populations (10 native sites and 22 introduced sites) occur in the Sandhills region of Nebraska (USFWS 2012). The total number of plants at the time of the 5-year review (USFWS 2012) surpassed the total needed for recovery increasing from 2,788 in 1990 to 23,876 in 2008 (USFWS 2012). However, research shows that most blowout penstemon population sites were not stable without supplemental introductions (USFWS 2012). Transplanting blowout penstemon into previously unoccupied blowouts in the last 20 years in Nebraska has enhanced subpopulations and has increased the overall number of plants and the number of subpopulations (USFWS 2012). Threats to this plant include elimination of prairie fires, loss of habitat from dune stabilization programs, lack of habitat management that creates or maintains blowouts on conservation lands, drought, intensive livestock grazing, over-collection, pesticides, pests, development, and off-road vehicle traffic (USFWS 2012, 1992; NGPC 2013a).

***Occurrence in the Study Area***—The known distribution of blowout penstemon includes counties in the study area (NGPC 2011a); NPPD's final route would cross potential habitat for blowout penstemon (NPPD 2015c). Based on data from the NNHP, 27 occurrences of blowout penstemon are located in the study area (NGPC 2013b). Of the 27 blowout penstemon occurrences, two are historical, one is possibly extirpated, and the remaining 24 occurrences are presumably extant. These occurrences are located in the counties of Blaine, Brown, Cherry, Hooker, Loup, Rock, and Thomas. Additional counties have potential for blowout penstemon including Lincoln, Logan, and McPherson (as cited in NPPD 2015c, 2016a).

Potentially suitable habitat (i.e., blowouts or sparsely vegetated depressions in actively moving sand dunes created by wind erosion [USFWS 1992]) for blowout penstemon was identified through a desktop habitat assessment. Based on a review of detailed 2013 aerial imagery, 75 blowouts in potential disturbance areas were mapped and are considered potentially suitable for blowout penstemon (NPPD 2015c, 2016c). An additional blowout was identified using NNHP data of occupied blowout penstemon habitat that resulted in the identification of 76 blowouts. Two of the 76 blowouts were not surveyed aerially because of landowner concerns. One of these sites was later surveyed during ground field surveys. Based on a ground field observation at a known blowout penstemon location, Dr. James Stubbendieck, a known blowout penstemon expert, noted that it would be easier to see plants from a helicopter because of the oblique angle of surveying from the air. Following coordination with the Service and NGPC, Dr. Stubbendieck and Beth Colket (POWER Engineers botanist) conducted presence/absence surveys by helicopter in June 2015. Field surveys of the mapped blowouts were conducted during the peak blooming period for blowout penstemon (NPPD 2015c). Of these 75 sites surveyed, 7 sites were determined to have good potentially suitable habitat for blowout penstemon, 57 blowouts had fair potential, and 9 had poor potential. Two of the mapped blowouts surveyed were determined upon inspection not to be a blowout. Many of the blowouts were too small or contained too much cover by vegetation. No occurrences of blowout penstemon were observed in the 75 blowouts surveyed (NPPD 2015c). Following the 2015 surveys, detailed 2013 aerial imagery was reviewed again because of Project design modifications and to map additional blowouts located outside of the area evaluated in 2015. This review resulted in the identification of 15 additional blowouts that required survey (NPPD 2016e). In 2016, 24 blowouts were surveyed—the 7 blowouts surveyed in 2015 identified as having good potentially suitable habitat for blowout penstemon; 1 site that surveyors were unable to access in 2015; the blowout that occurs in the buffer of the presumed extant blowout penstemon occurrence; and the 15 additional blowouts identified for survey. Habitat quality was assessed and documented (NPPD 2016e). No blowout penstemon plants were observed in the 24 blowouts surveyed (NPPD 2016e). Of the 24 blowouts surveyed, 11 had poor-quality habitat, 4 had fair-quality habitat, and 9 had good-quality habitat (NPPD 2016e). Prior to construction, an additional presence/absence survey will be conducted to confirm the previous survey in potentially suitable habitat with a likelihood of blowout penstemon and where surveys were not conducted in 2015 or 2016.

#### 3.7.12.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

For the effects analysis, the focus is on impacts resulting from construction, operation, and maintenance activities that would occur in the Project area (i.e., tree clearing within the 200-foot transmission line ROW; land area permanently disturbed, including structure bases, permanent access, and substations; and land area temporarily disturbed, including structure work areas, wire-pulling, tensioning, and splicing sites, construction yards/staging areas, fly yards and assembly areas, and temporary access).

For the purposes of this analysis, "potentially suitable habitat" includes areas in the geographic range of each special status plant species that have been identified as potentially having habitat characteristics based on a desktop analysis of GIS data for the area (NPPD 2015c, 2015d, 2016a, 2016b). "Suitable habitat" is defined as an area that has been field-verified to meet species-specific habitat characteristics. Potentially suitable habitat for blowout penstemon (i.e., blowouts or sparsely vegetated depressions in actively moving sand dunes created by wind erosion [USFWS 1992]) was identified during a desktop habitat assessment (NPPD 2015c, 2016e).

Direct effects from ground surface disturbances in the ROW would consist of temporary work areas for transmission structure installation and pulling and tensioning sites. Other direct effects outside the ROW include vegetation removal and blading to facilitate the construction of substations and temporary access, construction yards/staging areas, fly yards, and assembly areas.

No structures or temporary access would be located in blowouts. Pre-construction surveys would be conducted during the appropriate survey window (i.e., between June and July, the recognized flowering period, or during other times of the growing season as determined by a local species expert) prior to the onset of construction activities in blowouts previously assessed as having good habitat quality, in the nearby blowout in NNHP-buffered occupied habitat, and in any disturbance areas (as based on final design) that support blowouts not surveyed in 2015 or 2016 to confirm that occupied habitat has been avoided.

If any occupied habitat, in addition to what was identified in June 2015 and June 2016, is identified during the pre-construction survey prior to Project construction, the Project design would be adjusted to avoid impacts by spanning or micro-siting locations of structures and disturbance areas, fencing of the occurrence during construction, or other adjustments to avoid impacts. Additionally, NPPD would follow established coordination procedures with the Service and NGPC to prevent adverse impacts and to identify whether, and under what conditions, to proceed. Therefore, no direct mortality of individual plants or loss or degradation of occupied habitat is expected to occur during construction.

Unoccupied potentially suitable and suitable habitat of the three special status plant species is found in the Project area and could be directly affected by Project construction. Direct disturbance effects on habitat could include trampling or crushing of vegetation by construction vehicles and equipment in temporary access and temporary work areas. Suitable habitat for the three special status plants species includes non-woody, sparsely vegetated or herbaceous vegetation. Clearing of non-woody vegetation in the transmission line ROW would be minimal. The disturbance of potentially suitable and/or suitable special status plant species habitat during ROW clearing and activities outside the ROW in temporary work areas would be of low intensity and short term, and disturbed areas would be restored following the completion of construction activities.

The majority of potentially suitable and suitable habitat in the ROW would be spanned. However, direct effects include the temporary loss of potentially suitable and/or suitable habitat in temporary work and access areas, if spanning or avoidance of habitat is unachievable. The construction, operation, and maintenance of the three substations occur either within their existing footprints or outside suitable habitat for the three special status plant species. Therefore, individual special status plants would not be affected.

Direct effects from operation and maintenance of the proposed Project would result in the potential for loss or degradation of potentially suitable and/or suitable habitat related to the use of the ROW for emergency repairs and maintenance activities and vegetation management. Impacts associated with operation and maintenance activities would involve several of the same types of effect discussed for construction activities. Vegetation management would be required only in areas where trees and woody vegetation may encroach on the transmission line.

Additionally, the likelihood of these effects would be minimized through the use of appropriate avoidance and minimization measures in and near areas of occupied and unoccupied habitat. Therefore, direct, short- and long-term effects on special status plant species and their habitat from operation and maintenance would be of low intensity.

NPPD would only revegetate areas disturbed by construction of the Project. NPPD would avoid blowouts in its Project design. Few, if any, blowouts would require restoration efforts; therefore, no direct mortality of individual plants or loss or degradation of occupied habitat would occur during construction of restoration of temporary disturbance areas.

#### Alternative A—Indirect Effects

Indirect effects in association with construction, operation, and maintenance of the Project could include the following: 1) potentially increased erosion and sedimentation; 2) accumulation of fugitive dust on vegetation in suitable habitat; 3) establishment of noxious and invasive weed species; 4) habitat fragmentation; and 5) localized loss of pollinators from the use of herbicides; and 6) herbicide drift. Typically, indirect effects on plants occur in areas near or adjacent to the construction impact, but could affect special status species communities farther away such as through increased sedimentation into drainages affecting plant communities downstream or through loss of pollinators that may use plant communities away from the ROW.

Construction activities may increase erosion and sedimentation causing indirect, short-term effects on nearby vegetation in the Project area or outside and downstream of construction activities directly affecting the habitat of special status plant species. These indirect, short-term impacts would be minimized through erosion and sediment controls implemented throughout the construction of the Project. Indirect, short-term effects could occur on vegetation in special status plant species habitat from fugitive dust accumulation due to construction, operation, and maintenance vehicle and equipment use. Fugitive dust accumulation may adversely affect photosynthesis, respiration, transpiration, water use efficiency, leaf conductance, growth rate, gas exchange, and growth vigor (USFWS 2008c, as cited in Western 2013). Fugitive dust tends to be a greater issue in sparsely vegetated areas and sandy soils.

Localized ground surface disturbances can and have facilitated the invasion of noxious and invasive species by removing native vegetative cover, creating areas of bare ground (Burke and Grime 1996; Watkins et al. 2003), and increasing light and nutrient availability (Stohlgren et al. 2003, 1999). Construction access and other ground-disturbing activities create opportunity for noxious weeds to establish or for pre-existing noxious weed seeds to spread. Construction equipment and vehicles could carry and disperse weed seeds by using soil, gravel, and other fill materials brought in from outside sources. Noxious and invasive species compete with native plants, degrade and modify native communities, and reduce resources for native species (e.g., moisture, soil nutrients, and light). NPPD would minimize these impacts by implementing a noxious and invasive weed control program to reduce the potential for spread or invasion by weeds.

While NPPD has agreed to avoid all occupied habitat of the three species, indirect, long-term effects for unknown habitat locations could occur from habitat fragmentation as a result of the increased number of access roads, the ROW, and long-term, surface disturbance from transmission line structures and permanent facilities. The anthropogenic fragmentation of special status plant species habitats can result in more isolated, smaller populations, decreased species density, adverse effects on pollination, decreased reproductive success, increased edge effects, and increased competition from noxious and invasive weed species. If pollinator populations occur in or adjacent to the ROW and temporary access, a localized effect on pollinator and host species may occur. Reduced pollination of individual plants could reduce flower and seed production and impede gene flow between populations. Given the lack of pollinator data associated with species dominating the various potential habitats in the Project area, the intensity and extent of this potential impact is unknown. The use of herbicides to manage weeds during construction activities could inadvertently kill pollinators of the three special status plant species. Only state-licensed pesticide applicators following all local, state, and Federal regulations would apply herbicides for weed treatment. Herbicides would not be applied in field-verified occupied habitat for the three special status species, if discovered, without prior coordination with and concurrence from the Service and NGPC. The use of herbicide in portions of the ROW could result in drift near special status plant species populations and habitats and pollinator host plant species.

These indirect, short- and long-term effects from construction, operation, and maintenance would affect a relatively small proportion of the available and potentially suitable habitat throughout the region. Sufficient potentially suitable and suitable habitat for the three special status plant species would remain functional at both the local and range-wide scales to maintain the viability of the species. Additionally, the likelihood of these impacts would be minimized through the appropriate implementation of avoidance and minimization measures in and near areas of occupied and unoccupied habitat. Therefore, indirect, short- and long-term effects on the blowout penstemon as a result of construction would be low intensity.

#### Alternative B—Direct Effects

As described for Alternative A, NPPD would not locate structures or temporary access in blowouts and would conduct pre-construction surveys to confirm that occupied habitat has been avoided. If occupied habitat is identified during the pre-construction survey, the Project design would be adjusted to avoid impacts by spanning or micro-siting locations of structures and disturbance areas, fencing of the occurrence during construction, or other adjustments to avoid impacts. NPPD would only revegetate areas disturbed by construction of the Project. Few, if any, blowouts would require restoration efforts; therefore, no direct mortality of individual plants or loss or degradation of occupied habitat would occur during construction of restoration of temporary disturbance areas.

#### Alternative B—Indirect Effects

Indirect effects on the blowout penstemon would be the same as the effects described for Alternative A with greater potential for encountering the plant because of the greater amount of ground disturbance associated with Alternative B.

### 3.7.12.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the blowout penstemon:

- Locate construction yards/staging areas, fly yards, and assembly areas (and batch plants and borrow areas, if necessary) in previously disturbed areas, where available, and outside potentially suitable and suitable habitat for the blowout penstemon, where possible.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Avoid blowouts when locating temporary work areas and access routes.
- Implement a noxious and invasive weed control program to reduce the potential for spread or invasion by weeds.
- Avoid blowout penstemon in occupied and suitable habitat.

### 3.7.13 Western Prairie Fringed Orchid (Federally Listed and State-listed Species)

#### 3.7.13.1 Affected Environment

The western prairie fringed orchid is a Federal and state threatened species in Nebraska. No critical habitat has been designated for the western prairie fringed orchid. The western prairie fringed orchid is a smooth, erect, perennial herb that is 4 feet tall with two to five fairly thick, elongate, hairless leaves. The flowering stalk is a raceme bearing up to 24 showy, creamy white to white, or rarely greenish white flowers. The western prairie fringed orchid flowers from mid-June through mid-July (USFWS 1996b; NRCS 2009a; NGPC 2013c; NatureServe 2016b). The perennial orchid is found in wet to moist soils with full sunlight in swales in tallgrass prairie and on wet meadows usually in calcareous silt loam or sub-irrigated sandy loam prairies and may occur along ditches or roadsides (USFWS 1996b; NRCS 2009a; NGPC 2013c). Flooding may be an important agent of seed dispersal (Hof et al. 1999), although seeds develop into flowering plants only under appropriate hydrologic and other conditions.

Source: USFWS

*Western prairie fringed orchid (Platanthera praeclara)*

The western prairie fringed orchid is currently known to occur in six states in the United States (Iowa, Kansas, Minnesota, Missouri, Nebraska, and North Dakota) and in one province (Manitoba) in Canada, and appears to be extirpated from South Dakota and Oklahoma (USFWS 2009b, 1996b). Most remaining populations are found in North Dakota and Minnesota with about 3 percent of the populations found in the southern portion of its historical range (USFWS 1996b). In eastern Nebraska, Iowa, southeastern Kansas, and Missouri, the species is now extirpated from a significant number of counties where it occurred historically (USFWS 2009b). The orchid is known to occur at 64 sites in 15 counties in eastern Nebraska, the central Platte Valley, and the Sandhills (NRCS 2009a). The 5-year review for the species (USFWS 2009b) recommended conducting additional surveys in the Nebraska Sandhills because additional populations may be identified and surveys have not been conducted since 2000 (USFWS 2009b).

The spread of invasive plants into prairie swales has had an adverse effect on western prairie fringed orchid populations (USFWS 2009b). Invasive plants that may displace the western prairie fringed orchid through competition include: leafy spurge (*Euphorbia esula*), Kentucky bluegrass, and musk thistle (*Carduus nutans*) (USFWS 2009b). Other threats to the long-term survival of western prairie fringed orchid include the effects of herbicide and pesticide on the species and its pollinators, overgrazing, intensive haying, conversion of habitat to cropland, habitat fragmentation, river channelization, river siltation, drainage and other actions that lower water levels in the rooting zone of the plant, collection of plants from small populations, lack of management leading to woody encroachment, interseeding of non-native species into wet prairies, and road and bridge construction (USFWS 2009b, 1996b; NGPC 2013c).

***Occurrence in the Study Area***—The known distribution of the western prairie fringed orchid includes counties in the study area (NGPC 2011b); NPPD's final route would cross potential habitat (NPPD 2015d). Based on data from the NNHP, 67 occurrences of western prairie fringed orchid are found in the study area (NGPC 2013b). These occurrences are located in the counties of Cherry, Garfield, Holt, Loup, and Wheeler. Additional counties have potential for western prairie fringed orchid including Blaine, Brown, Hooker, Lincoln, Logan, McPherson, Rock, and Thomas (as cited in NPPD 2015d).

Potentially suitable habitat (i.e., somewhat dry prairies, calcareous tallgrass prairies, sedge meadows, and roadside ditches [USFWS 1996b]) for western prairie fringed orchid was identified through a desktop habitat assessment. Based on a review of the data, in coordination with a local species expert, Robert Steinauer, 1,459 acres of potential orchid habitat occurs in the Project area (NPPD 2015d). Robert Steinauer and Beth Colket (a POWER Engineers botanist) conducted presence/absence surveys in June 2015 during the flowering period for the western prairie fringed orchid (NPPD 2015d). Surveys were conducted in potential orchid habitat identified during the desktop assessment within the ROW of NPPD's final route and areas outside the ROW potentially affected by the Project in areas where landowners had granted right-of-entry. Surveys for the western prairie fringed orchid and the small white lady's slipper orchid were conducted at the same time. As the field surveys progressed, areas identified during the desktop assessment were screened out by the local expert because of the lack of one or more potentially suitable habitat features. In Loup and eastern Blaine counties, habitat not associated with a nearby wetland was screened out and in western Blaine and Thomas counties, habitat not associated with large wetland complexes was screened out because of the low potential for occurrence of the two orchid species that far west. Approximately 1,244 acres of desktop potential orchid habitat were surveyed or screened for western prairie fringed orchid. Approximately 265 acres of potentially suitable western prairie fringed orchid habitat and 979 acres of non-suitable habitat were verified during the survey (NPPD 2015c). Using the 2015 field survey results and updated desktop potential habitat data (using updated Project preliminary design data), approximately 734.9 acres of potentially suitable habitat were identified for survey in 2016. Areas identified as supporting potentially suitable orchid habitat in 2015 were re-visited in 2016. Surveys were not conducted on 304.9 acres of the 734.9 acres identified because of no right-of-entry from landowners. A total of 439.5 acres was surveyed in June 2016 during the western prairie fringed orchid flowering period (NPPD 2016f). During this survey, approximately 188.3 acres of potentially suitable western fringed orchid habitat was revisited or discovered (NPPD 2016f).

Two western prairie fringed orchid occurrences were located near known occurrences at Carson Lake and at one location close to Big Cedar Creek (NPPD 2015d). No western prairie fringed orchids were found at or near known occurrences in eastern Garfield County during the 2015 surveys (NPPD 2015d). Approximately 10 western prairie fringed orchids were observed at a known occurrence in Garfield County during the 2016 surveys (NPPD 2016f). Three occurrences of western prairie fringed orchids were found and documented during the 2016 orchid survey in western Garfield County (NPPD 2016f). Flowering within a western prairie fringed orchid population is highly variable from year to year depending on environmental factors. Prior to construction, NPPD would conduct an additional presence/absence survey between June 20 and July 1. If the orchid were found to be present, the area would be staked and avoided during construction activities.

#### 3.7.13.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Pre-construction surveys would be conducted during the appropriate survey window (i.e., between mid-June and July, the recognized flowering period) prior to the onset of construction activities in areas assessed as having good habitat quality and in any disturbance areas (based on final design) that support suitable habitat not surveyed in 2015 or 2016 to confirm that occupied habitat has been avoided. If occupied habitat in addition to what was identified in June 2015 and June 2016 is identified during the pre-construction survey, the Project design would be adjusted to avoid impacts by spanning or micro-siting locations of structures and disturbance areas, fencing of the occurrence during construction, or other adjustments to avoid impacts. These modifications would be completed in coordination with and with concurrence from the Service and NGPC. Therefore, no direct mortality of individual plants or loss or degradation of occupied habitat would occur during construction.

Temporary disturbance in field-verified suitable habitat would be short term and may include access, fly yards, construction yards, pulling and tensioning sites, and structure work areas. Field-verified suitable western prairie fringed orchid habitat would be avoided during final design to reduce potential effects on habitat. Construction activities may result in potential direct, short-term effects on 102 acres of field-verified suitable western prairie fringed orchid habitat. An additional 67 acres of habitat may by suitable for the western prairie fringed orchid; however, right-of-entry to those areas was not granted by the landowners and could not be verified. Existing stream crossings would be used and any new temporary crossings of wetlands and streams required for access would be achieved by using temporary bridges, culverts, and matting, which would not alter hydrology. Disturbances in field-verified suitable habitat would be avoided. Access roads, fly yards, construction yards, pulling and tensioning sites, and structure work areas would not be located in field-verified suitable habitat. NPPD would implement BMPs to prevent and minimize sediment runoff from construction areas from entering receiving wetlands and streams that may provide suitable western prairie fringed orchid habitat.

Because structures would be sited in upland areas, maintenance and repair activities at these structures would be less likely to affect western prairie fringed orchid habitat. Access to these structures would be evaluated by NPPD in coordination with the Service.

#### Alternative A—Indirect Effects

Indirect effects on the western prairie fringed orchid would be the same as described for the blowout penstemon.

#### Alternative B—Direct Effects

As described under the Affected Environment section, five occurrences of western prairie fringed orchids were found during the survey of potentially suitable habitat at three locations (NPPD 2015d, 2016d). Approximately 265 acres of suitable western prairie fringed orchid habitat was identified in the Project ROW and off-ROW potential disturbance areas during the 2015 survey and 188.3 was identified during the 2016 survey (NPPD 2015d, 2016d). Approximately 519.9 acres of the potentially suitable habitat in the Project area identified during the desktop habitat assessment could not be field verified because right-of-entry was not granted by landowners (NPPD 2015d, 2016d). Note that these acres include the entire ROW, the majority of which would not be disturbed and pre-construction surveys would be conducted during the appropriate survey window to confirm that occupied habitat has been avoided. If occupied habitat in addition to what was identified in June 2015 and June 2016 is identified during the pre-construction survey, NPPD would adjust the Project design to avoid impacts by spanning or micro-siting locations of structures and disturbance areas, fencing of the occurrence during construction, or other adjustments to avoid impacts. Therefore, no direct mortality of individual plants or loss or degradation of occupied habitat would occur during construction.

The effects during construction to western prairie fringed orchid under Alternative B would be the same as Alternative A. Because structures would be sited in upland areas, maintenance and repair activities at these structures are less likely to affect western prairie fringed orchid habitat.

#### Alternative B—Indirect Effects

Indirect effects on the western prairie fringed orchid would be the same as described in the section about the blowout penstemon.

## 3.7.14 North American River Otter (State-listed Threatened Species)

### 3.7.14.1 Affected Environment

The North American river otter is listed as a threatened species at the state level in Nebraska. This carnivorous mammal species is characterized by a long, slender, dark brown body with a long and heavy tail. The North American river otter is closely associated with riverine and other habitats where prey resources are abundant, including lakes, ponds, and marshes. In Nebraska, river otter habitat typically consists of large prairie rivers. This species experienced major population declines

Source: NGPC

*North American river otter (Lutra canadensis)* resulting from fur trapping in the nineteenth and early twentieth centuries, leading to its extirpation throughout much of the interior United States. However, reintroduction efforts have led to established populations over much of its former range, including throughout much of Nebraska (NGPC 2013d). Currently, the North American river otter is found throughout most of the continental United States and Canada, as well as Alaska (NatureServe 2015c). Currently, the primary threat to this species is degradation of aquatic habitats from harmful land use practices (NatureServe 2015c).

***Occurrence in the Study Area***—This species is a permanent resident of the study area and is known to occur along all of the major rivers, streams, and waterbodies that would be crossed by NPPD's final route. The estimated current range of the North American river otter in the study area includes portions of Lincoln, Brown, Blaine, Loup, Rock, Garfield, Holt, and Wheeler counties (NGPC 2015c). The North American river otter has been documented in the study area on 17 occasions since 1988 (NGPC 2013b).

#### 3.7.14.2 Direct and Indirect Effects

##### Alternative A—Direct Effects

Direct effects on the North American river otter from Project construction under Alternative A include temporary disturbance due to noise and the presence of construction crews, vehicles, and equipment at river and stream crossings. Injury or mortality of river otters from colliding with construction vehicles or equipment is unlikely because river otters would likely be able to avoid collisions by fleeing to adjacent upstream or downstream habitats, resulting in temporary displacement of individuals. Waterbodies within the river otter range that would be crossed by the proposed R-Project transmission line under Alternative A include the North Platte River, Calamus River, South Loup River, Middle Loup River, North Loup River, and Big Cedar Creek. Disturbances to river otters may occur at any of these locations during Project construction. This distribution is based on previous occurrences documented and the NGPC range map (NGPC 2013b, 2013d). Construction of the R-Project is expected to result in the removal of approximately 16 acres of riparian habitat that may support river otter dens along the North Platte River, Calamus River, and Big Cedar Creek resulting in long-term impacts of low intensity. Pre-construction surveys and mitigation measures described below would avoid or minimize most direct effects on the North American river otter.

Operation of the R-Project would not affect the North American river otter. Maintenance activities, which begin at year 30 and continue every 10 years thereafter, and infrequent emergency repairs may temporarily affect the river otter over the duration of the Project. Direct effects from maintenance activities would be of low intensity and short-term.

Avoidance and mitigation measures described below would effectively avoid or minimize potential adverse effects on the North American river otter. Thus, effects on this species under Alternative A would be of low intensity in the short and long term.

#### Alternative A—Indirect Effects

Indirect effects on the North American river otter under Alternative A could include changes in food resource abundance associated with water quality degradation caused by erosion or sediment runoff from construction and maintenance activities, which may occur upstream of locations where the river otter is present. However, BMPs to be implemented in accordance with the R-Project SWPPP would minimize water quality impacts, rendering potential indirect effects on the North American river otter negligible. Indirect effects on the river otter may also include reduced fecundity and/or population sizes in years subsequent to Project implementation as a result of increased energy expenditure or missed breeding opportunities from disturbances associated with R-Project construction, operation, and maintenance activities. Overall, indirect effects on the river otter under Alternative A would be negligible.

#### Alternative B—Direct Effects

Potential direct effects on the North American river otter under Alternative B would be nearly the same as Alternative A. Potential impacts would include temporary displacement of individuals from noise or visual disturbances during construction and permanent loss of riparian habitat at stream and river crossings resulting from ROW clearing. Noise disturbances would be slightly less intense under Alternative B because helicopters would not be used; however, ground equipment would be used for a longer duration. Habitat loss resulting from ROW clearing would be the same as described for Alternative A because the ROW would be the same under both action alternatives, resulting in the removal of 16 acres of riparian habitat.

Alternative B would result in low-intensity, short- and long-term, direct effects on the North American river otter. These impacts would be minimized by ability of this species to avoid direct impacts and the implementation of avoidance, minimization, and mitigation measures described for Alternative A.

#### Alternative B—Indirect Effects

Indirect effects on the North American river otter would be the same as described for Alternative A.

### 3.7.14.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the North American river otter:

- Complete surveys of river otter dens prior to the initiation of construction in accordance with protocols established in the NGPC River Otter Survey Protocol (NGPC 2011e). Avoid all occupied river otter dens by 100 yards from February 15 to June 15.
- Avoid in-water work during construction of the R-Project.
- Use existing stream crossings for construction access where available; use temporary bridges or culverts that do not alter stream flow or the channel to minimize effects where existing crossings cannot be used.

- Implement BMPs described in the R-Project SWPPP to control erosion and sediment runoff from construction areas before it reaches receiving waterbodies.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review to ensure permit requirements are met and successful restoration is achieved.

### 3.7.15 Swift Fox (State-listed Endangered Species)

#### 3.7.15.1 Affected Environment

Source: NGPC

*Swift fox (Vulpes velox)*

The swift fox is listed as an endangered species at the state level in Nebraska. This species was previously a candidate species for Federal listing under ESA, but it was removed from the Service's candidate species list in 2001 (66 FR 1295). This small member of the Canidae family is distinguished by its red, tan, and/or gray coat and with a black-tipped tail. Historically, this species was widely distributed across the central United States, south to Texas, and throughout the Canadian prairie provinces of Alberta, Saskatchewan, and Manitoba. Swift fox populations declined substantially during the first half of the twentieth century because of fur trapping and shooting or poisoning by farmers and ranchers who regarded the species as a nuisance. These practices reduced the species' range and caused its extirpation in many parts of its former range (NatureServe 2015d). Subsequent reintroduction programs have been successful in some areas; the swift fox currently occupies approximately 40 percent of its former range, which is limited to the central United States, including western Nebraska (NGPC 2011c; NatureServe 2015d).

Habitat for the swift fox consists primarily of shortgrass or mixed-grass prairie. This species prefers large open expanses of low-relief plains and tends to avoid densely wooded areas (NatureServe 2015d). Threats to this species include loss or degradation of habitat from the conversion of native prairie to agricultural lands and mineral extraction mines. Other threats include collisions with vehicles as well as competition with and predation by coyotes (NatureServe 2015d).

***Occurrence in the Study Area***—In Nebraska, the swift fox, which is currently believed to occur in approximately the western third of the state, is not known to occur in the Sandhills (NGPC 2011c). The swift fox has been reported in the study area in Cherry, Brown, and McPherson counties, but it may also occur in portions of Lincoln County (Bly 2011; NGPC 2011c; NGPC 2013b). Reports of this species in the study area are rare; however, the study area is sparsely populated and this species tends to be reclusive, making accurate estimates of abundance difficult (NatureServe 2015d; NPPD 2015a).

#### 3.7.15.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

The swift fox is more common in western Nebraska and has rarely been reported in the study area (Cherry, Brown, McPherson, and possibly Lincoln counties). Because NPPD's final route does not pass through Cherry, Brown, or McPherson County and only passes through part of Lincoln County, direct effects on this species would not likely occur. This species is not known to occur in the Nebraska Sandhills, so Project activities would not affect it there.

**Alternative A—Indirect Effects**

Indirect effects on the swift fox would not occur because the swift fox is not present in the Sandhills of Nebraska.

**Alternative B—Direct Effects**

Potential direct effects on the swift fox under Alternative B would generally be the same as described for Alternative A. Thus, Alternative B would have no effect on the swift fox.

**Alternative B—Indirect Effects**

Alternative B would not result in indirect effects on the swift fox.

#### 3.7.15.3 Avoidance, Minimization, and Mitigation Measures

NPPD does not propose any specific mitigation measures for this species because the swift fox is not known to occur in areas that would be affected by the Project.

### 3.7.16 Blacknose Shiner (State-listed Endangered Species)

#### 3.7.16.1 Affected Environment

The blacknose shiner is listed as an endangered species at the state level in Nebraska. This minnow species occurs in the Atlantic, Great Lakes, Hudson Bay, and Mississippi River basins from Nova Scotia to Saskatchewan, south to Ohio, Illinois, south-central Missouri, and west to Nebraska and South Dakota. Habitat for this species consists of streams, lakes, and ponds with cool temperatures, good water quality, and abundant aquatic vegetation (NatureServe 2015e). In Nebraska and other parts of the Central Great Plains, the blacknose shiner is found in cool, spring-fed streams that maintain a constant year-round temperature (NGPC 2012a; NPPD 2015a).

Source: NGPC

*Blacknose shiner (Notropis heterolepis)*

Threats to this species consist of habitat degradation, specifically increased turbidity and siltation in streams resulting from the conversion of native grasslands for agricultural purposes (NatureServe 2015e).

***Occurrence in the Study Area***—The blacknose shiner has been extirpated throughout much of its historical range, including most of Nebraska (NatureServe 2015e). The blacknose shiner is currently believed to be present in the study area only in Brush Creek in Cherry County, but it has not been documented since 1990 (NGPC 2012a; NGPC 2013b), likely because of difficulty in securing permission to survey the stream that flows through private property. This species was previously known to also occur in the Elkhorn River, but it is no longer believed to be present there (NGPC 2013b).

### 3.7.16.2 Direct and Indirect Effects

#### Alternative A—Direct Effects

Construction, operation, or maintenance activities under Alternative A would not likely affect the blacknose shiner. This species is currently believed to be present only in Brush Creek, in Cherry County. It was last documented there in 1990 (NGPC 2012a; NGPC 2013b) and is probably still present given that land use around Brush Creek (hay production and grazing) have remained the same. No construction activities would occur in the area of Brush Creek, which is located approximately 22 miles northwest of the Thedford Substation expansion site and the proposed R-Project transmission line route under Alternative A. Thus, Alternative A would not affect the blacknose shiner.

#### Alternative A—Indirect Effects

The blacknose shiner would not be indirectly affected by water quality degradation caused by erosion or sediment runoff from construction and maintenance activities because the only known population in the study area is found approximately 22 miles northwest of the Project area and not in receiving waters.

#### Alternative B—Direct Effects

Direct effects on the blacknose shiner under Alternative B would be the same as Alternative A because the route would be the same under both alternatives and no construction activities would occur in the area of Brush Creek where this species potentially occurs. Therefore, Alternative B would not directly affect the blacknose shiner.

#### Alternative B—Indirect Effects

Alternative B would not indirectly affect the blacknose shiner, as described for Alternative A.

### 3.7.16.3 Avoidance, Minimization, and Mitigation Measures

NPPD does not propose any specific mitigation measures for this species because the blacknose shiner is not known to occur in areas that would be affected by the Project.

### 3.7.17 Finescale Dace (State-listed Threatened Species)

#### 3.7.17.1 Affected Environment

Source: NGPC

*Finescale dace (Phoxinus neogaeus)*

The finescale dace is listed as a threatened species at the state level in Nebraska. This insectivorous minnow species is found in the New England, Great Lakes, and Great Plains regions of the United States and occurs throughout most of Canada. The finescale dace is widely distributed across the upper drainages of the Mississippi and Missouri rivers (NatureServe 2015f). This species is typically found at sites with clear, slow-moving or stagnant water with heavy aquatic vegetation and predominantly silt substrate (Isaak et al. 2003; NatureServe 2015f). The finescale dace prefers cool water temperatures and frequently occurs in areas absent of large predators. Spawning within the Great Plains populations of finescale dace typically occurs from mid-April to mid-May (Isaak et al. 2003). Threats to the finescale dace include habitat degradation resulting from land conversion, alterations to hydrology, and agricultural runoff (Isaak et al. 2003).

***Occurrence in the Study Area***—In Nebraska, populations of finescale dace are believed to exist in various waterbodies throughout the state, including the North Loup, Middle Loup, South Loup, and North Platte rivers (NGPC 2012b). This species has been documented in the study area as recently as 2006, although records are scarce, and surveys have not been conducted with any regular frequency (NGPC 2013b; NPPD 2015a). Counties in the study area in which the finescale dace is believed to occur include Lincoln, Logan, Hooker, Thomas, Cherry, Brown, Blaine, and Rock (NGPC 2012b). Table 3.7-4 presents specific locations of documented occurrences of this species in the study area.

**Table 3.7-4. Finescale Dace Occurrences in Study Area**

| Waterbody | Year Last Observed |
|---|---|
| Beaver Creek | 1976 |
| Goose Creek | 1995 |
| Calf Creek | 1995 |
| Pass Creek | 1991 |
| Brush Creek | 1990 |
| Big Creek | 2006 |
| Middle Loup River | 1997 |
| North Branch Middle Loup River | 1995 |

| Waterbody | Year Last Observed |
|---|---|
| South Branch Middle Loup River | 1972 |
| South Loup River | 1961 |
| North Platte River | 1995 |

Source: NGPC (2013b); NPPD (2015a)

#### 3.7.17.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Direct effects on the finescale dace that are associated with construction of the R-Project under Alternative A would be limited to river crossings on the North Platte, Middle Loup, and South Loup rivers and slackwater areas, downstream side channels and drainages, which are known to support populations of this species. No in-water work would be required under Alternative A. Construction activities may result in increased sediment loads in finescale dace habitat. Construction equipment would use adjacent existing bridges when crossing the North Platte, Middle Loup, and South Loup rivers. The use of existing river crossings would limit direct effects on previously disturbed areas.

Operation of the R-Project transmission line would not affect the finescale dace. Direct impacts from maintenance activities would be similar to those described for construction activities. Impacts from routine maintenance of the R-Project would occur beginning at year 30 and every 10 years after that during the life of the transmission line. However, timing and frequency of emergency repairs cannot be predicted.

Spawning within the Great Plains populations of finescale dace typically occurs annually from mid-April to mid-May (Isaak et al. 2003). Thus, construction or maintenance activities that involve river or stream crossings and associated side channels and drainages at locations known to support finescale dace populations may have the greatest impact during this period. However, disruptions of spawning behavior are unlikely because equipment would not enter areas with water.

Avoidance, minimization, and mitigation measures described below, along with BMPs described in NPPD's SWPPP, would effectively avoid or minimize most effects on the finescale dace, resulting in direct, low-intensity, adverse impacts in the short and long term.

**Alternative A—Indirect Effects**

Indirect effects under Alternative A could include water quality degradation caused by erosion or sediment runoff from construction and maintenance activities that may occur upstream of water bodies that support finescale dace populations. NPPD would avoid or minimize indirect effects by implementing BMPs that are designed to control erosion and sediment runoff from construction areas before it reaches receiving waterbodies. These BMPs are described in NPPD's SWPPP and may include, but are not limited to, conservation of riparian areas, installation of silt fences, straw bales, temporary bridges, vegetation restoration, netting, and sediment traps. Indirect effects on the finescale dace would be negligible in the short and long term.

#### Alternative B—Direct Effects

Potential direct effects on the finescale dace under Alternative B generally would be the same as Alternative A. Construction activities may result in increased sediment loads in finescale dace habitat, particularly in the North Platte, Middle Loup, and South Loup River crossings. These impacts would be slightly greater under Alternative B because the placement of monopole structures in Thomas and Brown counties would require the use of heavy equipment to access pole locations near the North Loup and Middle Loup River crossings, and equipment would be used for longer durations. Alternative B would result in direct, short-term, low-intensity, adverse impacts to the finescale dace during Project construction. These impacts would be partially offset by the implementation of avoidance, minimization, and mitigation measures described for Alternative A.

#### Alternative B—Indirect Effects

Indirect effects from the R-Project under Alternative B would generally be the same as Alternative A and could include water quality degradation caused by erosion or sediment runoff from construction and maintenance activities. Additional access improvements needed to accommodate heavy equipment near the North Loup and Middle Loup River crossings may increase the potential for ground disturbance at these locations, increasing the potential for sediment runoff. Indirect effects on the finescale dace under Alternative B would be negligible in the short and long term.

### 3.7.17.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under to avoid, minimize, or mitigate effects on the finescale dace:

- Avoid in-water work during construction and maintenance of the R-Project.
- Span rivers where the finescale dace may exist and avoid activities that may erode channel banks or increase sedimentation of such watercourses, including the side channel and slackwater areas.
- Use existing bridges when crossing the North Platte, Middle Loup, and South Loup rivers.
- Use existing stream crossings for construction access where available; use temporary bridges or culverts that do not alter stream flow or the channel to minimize effects where existing crossings cannot be used.
- Implement BMPs described in the R-Project SWPPP to control erosion and sediment runoff from construction areas before it reaches receiving waterbodies.

### 3.7.18 Northern Redbelly Dace (State-listed Threatened Species)

#### 3.7.18.1 Affected Environment

Source: NGPC

*Northern Redbelly Dace (Phoxinus eos)*

The northern redbelly dace is listed as a threatened species at the state level in Nebraska. This small omnivorous minnow species is distinguished by brilliant streaks of red along the sides of breeding males. Range, distribution, and habitat requirements for this species are very similar to those of the finescale dace. The northern redbelly dace occurs in the New England, Great Lakes, and Great Plains regions of the United States and occurs throughout most of Canada, north to the Northwest Territories. This species is widely distributed across the upper drainages of the Mississippi and Missouri rivers. Northern redbelly dace habitat includes cool water lakes, ponds, and pools, as well as small creeks with aquatic vegetation and silt substrate (NatureServe 2015g). Spawning within the Great Plains populations of northern redbelly dace typically occurs from late-May to July and may occur more than once per year (Stasiak 2006).

***Occurrence in the Study Area***—In Nebraska, the northern redbelly dace occurs in several major waterbodies including portions of the Dismal River, North Platte River, and South Loup River (NGPC 2013b). The northern redbelly dace is known to occur in the study area and is present in Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, and Rock counties (NGPC 2011d; NGPC 2013b). Specific locations of documented occurrences of this species in the study area are shown in Table 3.7-5. However, surveys for northern redbelly dace have not been conducted with any regular frequency, making current distribution and population estimates uncertain (NGPC 2013b; NPPD 2015a). Threats to this species are the same as listed for finescale dace, given their similar habitat requirements and range overlap, consisting of habitat degradation resulting from land conversion and agricultural activities (Stasiak 2006).

**Table 3.7-5. Northern Redbelly Dace Occurrences in Study Area**

| Waterbody | Year Last Observed |
|---|---|
| Beaver Creek | 1939 |
| Goose Creek | 1995 |
| Reiser-Shockley Swamp | 1995 |
| Calf Creek | 1995 |
| Pass Creek | 1996 |
| Brush Creek | 1990 |
| Wamaduze Creek | 1992 |
| Big Creek | 1994 |
| South Fork Dismal River | 1987 |

| Waterbody | Year Last Observed |
|---|---|
| South Loup River | 1974 |
| North Platte River | 1995 |

Source: NGPC (2013b); NPPD (2015a)

#### 3.7.18.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Direct effects on the northern redbelly dace under Alternative A would be similar to those described for the finescale dace because of the similarity in range and habitat requirements between the two species. Direct effects associated with construction would be limited to river crossings at the North Platte River and South Loup River (NGPC 2013b). None of the other waterbodies in the study area known to support the northern redbelly dace would be spanned by NPPD's final route under Alternative A (NPPD 2015a). Direct adverse effects during construction could include increased sediment loads in northern redbelly dace habitat. No in-water work has been proposed under Alternative A. Direct effects on this species may be further limited by the use of existing bridge crossings on the North Platte and South Loup rivers.

Operation of the R-Project transmission line would not affect the northern redbelly dace. Maintenance activities, including routine inspection, emergency repairs, and tree management at the North Platte River crossing, could result in temporary adverse impacts. Direct effects from maintenance activities would be similar to those described for construction activities.

Spawning within the Great Plains populations of the northern redbelly dace typically occurs from late-May to July (Stasiak 2006). However, existing bridges would be used to cross rivers and streams; thus disruptions to spawning behavior are unlikely.

Avoidance, minimization, and mitigation measures described below, along with BMPs described in NPPD's SWPPP, would effectively avoid or minimize effects on the northern redbelly dace, resulting in low-intensity impacts in the short and long term.

**Alternative A—Indirect Effects**

Indirect effects on the northern redbelly dace under Alternative A could include water quality degradation caused by erosion or sediment runoff associated with construction and maintenance activities that may occur upstream of waterbodies supporting the northern redbelly dace populations. Indirect impacts may be avoided or minimized by the implementation BMPs designed to control erosion and sediment runoff from construction areas before it reaches receiving waterbodies. These BMPs are described in NPPD's SWPPP and may include, but are not limited to, conservation of riparian areas; installation of silt fences, straw wattles, or straw bales; use of temporary bridges, vegetation restoration, jute netting, and use of sediment traps. Indirect effects on the northern redbelly dace would be negligible in the short and long term.

#### Alternative B—Direct Effects

Direct effects on northern redbelly dace under Alternative B would be the same as Alternative A because steel monopoles would be along the segments of the route that cross the North Platte and South Loup rivers under both alternatives. Therefore, Alternative B would have low-intensity, adverse impacts on the northern redbelly dace in the short and long term.

#### Alternative B—Indirect Effects

Indirect effects on the northern redbelly dace under Alternative B would be the same as Alternative A.

### 3.7.18.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under to avoid, minimize, or mitigate effects on the northern redbelly dace:

- Avoid in-water work would during construction and maintenance of the R-Project.
- Span rivers where the northern redbelly dace may exist and avoid activities that may erode channel banks or increase sedimentation of such watercourses.
- Use existing bridges when crossing the North Platte and South Loup rivers.
- Use existing stream crossings for construction access where available; use temporary bridges or culverts that do not alter stream flow or the channel to minimize effects where existing crossings cannot be used.
- Implement BMPs described in the R-Project SWPPP to control erosion and sediment runoff from construction areas before it reaches receiving waterbodies.

## 3.7.19 Small White Lady's Slipper Orchid (State-listed Threatened Species)

### 3.7.19.1 Affected Environment

The small white lady's slipper orchid is a Nebraska threatened species. The small white lady's slipper orchid is a perennial orchid with upright stems and 3 to 4 lance-shaped leaves that clasp the stem. The orchid typically has one flower, rarely two, shaped like a slipper and white with rose-purple streaks. The species flowers in Nebraska from mid-May through early June (NRCS 2009b; NatureServe 2016c). Throughout its range, the orchid is found in wet prairie, mesic blacksoil prairie, wet blacksoil prairie, glacial till hill prairie, sedge meadow, calcareous fen, and glades, generally with calcareous soils (NatureServe 2016c). All of Nebraska's known

Source: USFWS

*Small white lady's slipper (Cypripedium candidum)* populations occur in native, sub-irrigated wet meadows that have sandy loam soils and are dominated by typical wet meadow species, including big bluestem and sedges.

Small white lady's slipper orchid occurs in the northeastern and mid-western United States including eastern and central Nebraska. Historically, the small white lady's slipper orchid occurred in many counties across the eastern two-thirds of Nebraska. Currently, only four Nebraska counties have documented populations of small white lady's slipper orchid, including Howard, Pierce, Platte, and Sherman (NRCS 2009b). All known populations have less than 200 plants each (NRCS 2009b). The orchid appears to be intolerant of cattle grazing and the majority of the sites where the orchid occurs are relatively undisturbed (NRCS 2009b). Threats to this plant include conversion of wet meadows to cropland, alteration of groundwater from irrigation wells, reduced flow in streams adjacent to meadows, cattle grazing, herbicide use, and habitat fragmentation (NRCS 2009b).

***Occurrence in the Study Area***—The small white lady's slipper orchid could potentially occur in suitable habitat (i.e., north sedge wet meadows, northern cordgrass wet prairie, and wet-mesic tallgrass prairie) along NPPD's final route (NPPD 2015d). Based on data from the NNHP, three occurrences of small white lady's slipper orchid appear in the study area, all located in Holt County and presumably extant (NGPC 2013b). Additional counties that have potential for small white lady's slipper orchid include Blaine, Brown, Cherry, and Rock (as cited in NPPD 2015d).

Potentially suitable habitat for small white lady's slipper orchid was identified by a desktop habitat assessment. Based on a review of the data, in coordination with a local species expert, Robert Steinauer, 1,459 acres of potential orchid habitat in the Project area were identified (NPPD 2015d). It is thought that the western prairie fringed orchid and small white lady's slipper orchid use the same kind of habitat. Presence/absence surveys were conducted for the small white lady's slipper orchid by Robert Steinauer and Beth Colket, botanist with POWER Engineers, in June 2015 (NPPD 2015d). Surveys were conducted in potential orchid habitat identified during the desktop assessment within the ROW of NPPD's final route and areas outside the ROW potentially affected by the Project in areas where landowners had granted right-of-entry. Surveys for the western prairie fringed orchid and the small white lady's slipper were conducted at the same time. As the field surveys progressed, areas that were identified during the desktop assessment were screened out by the local expert because of a lack of one or more potentially suitable habitat features. Approximately 736 acres of desktop potential orchid habitat was surveyed or screened for small white lady's slipper orchid. Approximately 191 acres of potentially suitable small white lady's slipper orchid habitat and 545 acres of non-suitable habitat were verified during the survey (NPPD 2015d). Using the 2015 field survey results and updated desktop potential habitat data (using updated Project preliminary design data), approximately 734.9 acres of potentially suitable habitat were identified for survey in 2016. Areas identified as supporting potentially suitable orchid habitat in 2015 were re-visited in 2016. Surveys were not conducted on 304.9 acres of the 734.9 acres identified due to no right-of-entry from landowners. A total of 439.5 acres was surveyed in June 2016 during the flowering period (NPPD 2016f). During the 2016 survey, approximately 132.5 acres of potentially suitable habitat was revisited or discovered (NPPD 2016f).

No small white lady's slipper orchids were found during the survey (NPPD 2016f, 2015d). Prior to construction, NPPD would conduct an additional presence/absence survey between June 20 and July 1.

#### 3.7.19.2 Direct and Indirect Effects

**Alternative A—Direct Effects**

Pre-construction surveys would be conducted in areas that support suitable habitat but were not surveyed in 2015 or 2016 to confirm that occupied habitat has been avoided. Surveys would be conducted during the appropriate survey window prior to the onset of construction activities and following final design. If occupied habitat is identified during the pre-construction survey, NPPD would adjust the Project design, in coordination with and concurrence from NGPC, to avoid impacts to this state listed species by spanning or micro-siting locations of structures and disturbance areas, fencing of the occurrence during construction, or other adjustments to avoid impacts.

The NGPC range map for the small white lady's slipper orchid includes the Elkhorn Headwaters, lower Loup rivers, and middle Niobrara (Schneider et al. 2011), which intersect the Project counties of Brown, Holt, and Rock (NGPC 2011f, 2013e). The portions of Brown and Rock counties intersected by NPPD's final route are more than 20 miles south of the NGPC range map, so it is unlikely this species would be present where the route would cross these counties. Even though the range of the small white lady's slipper orchid does not cross into the Project counties of Garfield and Wheeler, the route is located in these counties along the Holt County boundary line, so these areas are much closer to the range of the small white lady's slipper orchid.

While the known range of the species is not intersected by NPPD's final route potentially suitable habitat was identified through the desktop habitat assessment and surveys. The desktop analysis indicates that construction activities associated with the Project may result in direct, short-term effects of approximately 65 acres of field-verified suitable habitat for small white lady's slipper orchid, although the route is entirely outside the known range for this species except for some existing gravel access roads in Holt County (NGPC 2011f). An additional 32.5 acres of overland travel would be conducted using low-ground pressure tracked or rubber tired equipment in potential and/or suitable habitat for small white lady's slipper orchid, but this additional overland travel would not be considered a direct, short-term effect because ground disturbance would be negligible. Direct effects on the small white lady's slipper orchid habitat would be the same as those described for the western prairie fringed orchid. While it is assumed that small white lady's slipper orchid plants would be discovered if present, unoccupied potentially suitable habitat could be colonized in the future. Temporary disturbance of unoccupied potentially suitable habitat may occur if construction activities are located in hydric soils having the habitat characteristics described above. However, all construction activities, particularly substations and structure foundations, have been sited to avoid wetland habitats, including potentially suitable small white lady's slipper orchid habitat, to the extent practicable. Because structures would be sited in upland areas, maintenance and repair activities at these structures would be less likely to affect small white lady's slipper orchid habitat. The disturbance of potentially suitable small white lady's slipper orchid habitat would be temporary, and disturbed areas would be restored following the completion of construction activities. The direct, short-term disturbance of approximately 65 acres of field-verified suitable small white lady's slipper orchid habitat would be low intensity and is a relatively small proportion of the availability of potentially suitable habitat throughout the region.

#### Alternative A—Indirect Effects

Indirect, long-term effects on individual small white lady's slipper orchid plants located adjacent to potential disturbance areas could occur from alteration of hydrology as a result of construction activities. All stream and wetlands crossings would be designed so as not to alter the existing hydrology, thus avoiding and minimizing this potential effect. Mitigation practices described in Section 3.3, *Water Resources*, and Section 3.4, *Wetlands*, would reduce the amount of sediment entering wetlands and streams that may provide potentially suitable small white lady's slipper orchid habitat.

Other indirect effects on small white lady's slipper orchid are the same as the effects discussed in the blowout penstemon section above.

#### Alternative B—Direct Effects

As described for Alternative A, potentially suitable habitat for small white lady's slipper orchid was identified by a desktop habitat assessment and pre-construction surveys would be conducted during the appropriate survey window to confirm that occupied habitat has been avoided. If occupied habitat is identified during the pre-construction survey, NPPD would adjust the Project design to avoid impacts by spanning or micro-siting locations of structures and disturbance areas, fencing of the occurrence during construction, or other adjustments to avoid impacts.

As described for Alternative A, it is unlikely this species would be present where the route would cross these counties. However, as discussed for Alternative A, while the known range of the species is not intersected by NPPD's final route, potentially suitable habitat was identified through the desktop habitat assessment and surveys. The desktop analysis indicates that construction activities associated with the Project may result in direct, short-term effects of approximately 97.5 acres of field-verified suitable habitat for small white lady's slipper orchid, although the route would be located entirely outside the known range for this species except for some existing gravel access roads in Holt County (NGPC 2011f). Direct effects on the small white lady's slipper orchid habitat would be the same as described for the western prairie fringed orchid. The disturbance of potentially suitable small white lady's slipper orchid habitat would be temporary, and disturbed areas would be restored following the completion of construction activities. The direct, short-term disturbance of approximately 65 acres of field-verified suitable small white lady's slipper orchid habitat would be of low intensity and is a relatively small proportion of the availability of potentially suitable habitat throughout the region.

#### Alternative B—Indirect Effects

Other indirect effects on small white lady's slipper orchid would be the same as the effects discussed under Alternative A and in the blowout penstemon section above.

### 3.7.19.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures to avoid, minimize, or mitigate effects on the small white lady's slipper orchid:

- Locate construction yards/staging areas, fly yards and assembly areas (and batch plants and borrow areas, if needed) in previously disturbed areas, where available, and outside potentially suitable and suitable habitat for the small white lady's slipper orchid where possible.
- Implement a noxious and invasive weed control program to reduce the potential for spread or invasion by weeds.
- Avoid field-verified orchid habitat where possible.
- Avoid occupied small white lady's slipper orchid habitat.
- Conduct a pre-construction survey during the appropriate survey window prior to the onset of construction activities to confirm that occupied habitat has been avoided.
- Require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally and state-protected species (the program would emphasize stipulations of the draft HCP, permit, and other Project-wide environmental requirements).
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review and approval to ensure permit requirements are met and successful restoration is achieved.

### 3.7.20 Effects Summary

Under either action alternative, the R-Project would result in short- and long-term, adverse effects on special status species and habitats. The majority of impacts would be direct and would occur during the construction, operation, and maintenance. Effects on special status species could include injury or mortality of individuals, disturbance of behaviors, and loss or degradation of habitat. The two action alternatives would result in similar types of effects on special status species because the location of the transmission line under both action alternatives would follow NPPD's final route. However, Alternative B would result in greater effects on special status species than Alternative A due to the increased ground disturbance required to construct the line using steel monopoles only. Operation of the transmission line would pose a long-term collision risk to all special status bird species, including whooping cranes. This risk would be the same under both action alternatives.

Under the action alternatives, most special status species would be affected to some extent, but adverse impacts to most species would be of low intensity, assuming successful implementation of the HCP. However, both Alternative A and Alternative B would result in moderate-intensity, short- and long-term, adverse effects on the beetle, based on the amount of anticipated take calculated for each alternative with implementation of avoidance and minimization measures in the draft HCP. Combined with the stated avoidance, minimization, and mitigation measures (listed above) for protecting and managing beetle habitat from offset impacts, impacts on the species would not be significant under either action alternative.

Both action alternatives would also result in low-intensity, short-term and long-term, adverse effects on the whooping crane due to the location of the R-Project in the Central Flyway, which poses an ongoing risk of collision. Table 3.7-6 provides an overview of potential effects of Alternatives A and B on each special status species known to occur or potentially occur in the study area, along with a summary of proposed avoidance, minimization, and mitigation measures for each species.

Potential effects on the American burying beetle have been determined to be not significant assuming successful implementation of the draft HCP. Likewise, effects on other special status species would not be significant with the implementation of the stated avoidance, minimization, and mitigation measures.

**Table 3.7-6. Potential Effects on Special Status Species under the Action Alternatives**

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| **Birds** | | | | |
| Bald eagle | Permanent and temporary habitat loss; risk of collision with transmission line; temporary disturbance to individuals during construction and maintenance activities; missed nesting or foraging opportunities | Pre-construction surveys; seasonal restrictions within 0.5 mile of nests and winter roosts; compliance with APLIC standards; installation of bird flight diverters; implementation of Worker Educational Awareness Program regarding ESA-protected species; trash removal at construction sites; implementation of MBCP; no helicopter use within 0.5 mile of active nests (during nesting season); establishment of an escrow account; and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Golden eagle | Permanent and temporary habitat loss; risk of collision with transmission line; temporary disturbance to individuals during construction and maintenance activities; missed nesting or foraging opportunities | Compliance with APLIC standards; installation of bird flight diverters; implementation of Worker Educational Awareness Program regarding ESA-protected species; trash removal at construction sites; implementation of the MBCP; establishment of an escrow agreement; and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| Interior least tern | Temporary disturbances to migratory individuals at North Platte River and South Platte River crossings during construction and maintenance activities; risk of collision with transmission line | Avoidance of potential nesting habitat, installation of bird flight diverters; implementation of Worker Educational Awareness Program regarding ESA-protected species; and implementation of the MBCP | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Piping plover | Temporary disturbance to migratory individuals at North Platte River and South Platte River crossings during construction and maintenance activities; risk of collision with transmission line | Avoidance of potential nesting habitat, installation of bird flight diverters; implementation of Worker Educational Awareness Program regarding ESA-protected species; and implementation of the MBCP | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Rufa red knot | Temporary disturbance of wetland habitat; disturbance to migratory individuals during construction and maintenance activities; and risk of collision with transmission line | Avoidance/spanning of wetland habitats; use of low-ground-pressure equipment and temporary matting if wetlands must be crossed; wetland restoration and monitoring upon project completion; installation of bird flight diverters; implementation of Worker Educational Awareness Program regarding ESA-protected species; implementation of the MBCP; establishment of an escrow agreement; and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| Whooping crane | Permanent and temporary habitat loss; risk of collision with transmission line; temporary disturbance to migratory individuals during construction and maintenance activities; and missed foraging opportunities | Compliance with the Service's Region 6 guidance; daily pre-construction surveys during spring and fall; use of existing stream crossings where possible; use of low-ground-pressure equipment and temporary matting if wetlands must be crossed; implementation of Worker Educational Awareness Program regarding ESA-protected species; installation of bird flight diverters; marking of additional NPPD-owned lines within the 95% sighting corridor; implementation of the MBCP; establishment of an escrow agreement; and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| **Mammals** | | | | |
| Northern long-eared bat | Permanent and temporary habitat loss due to tree removal; temporary disturbance to individuals during construction and maintenance activities | No tree clearing in the Service-identified white-nose syndrome zone (Holt, Wheeler, Garfield, and Loup counties) during the pup season (June 1–July 31); implementation of Worker Educational Awareness Program regarding ESA-protected species | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| North American river otter | Temporary disturbance to individuals during construction and maintenance activities; degradation of riverine habitat; missed breeding opportunities; and changes in food resource abundance due to water quality degradation | Completion of pre-construction den surveys; avoidance of otter dens by 100 yards from February 15–June 15; no in-water work; use of existing stream crossings where possible; and implementation of water quality management measures outlined in R-Project SWPPP | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Swift fox | No effect | None | No effect | No effect |

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| **Reptiles** | | | | |
| Blanding's turtle | Permanent and temporary habitat loss; risk of injury to and/or mortality of individuals during construction and maintenance activities; and temporary disturbance of individuals resulting in missed foraging or breeding opportunities | Avoidance/spanning of wetland habitats; use of low-ground-pressure equipment and temporary matting if wetlands must be crossed; employment of construction monitors to find and relocate turtles in work areas; installation of turtle-proof fencing (e.g., silt fence) around work areas and excavation sites and/or covering of open pits during active season; inspection of pipes and culverts for turtles; implementation of Worker Educational Awareness Program regarding ESA-protected species; establishment of an escrow agreement; and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| **Fish** | | | | |
| Blacknose shiner | No effect | None | No effect | No effect |
| Finescale dace | Temporary disturbance to individuals at stream crossings during construction and maintenance activities; and temporary degradation of habitat | No in-water work; spanning of rivers and avoidance of erosion and sedimentation in streams where species occurs; use of existing bridges when crossing the North Platte, Middle Loup, and South Loup rivers; and implementation of water quality measures outlined in R-Project SWPPP | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| Northern redbelly dace | Temporary disturbance to individuals at North Platte River and South Loup River crossings during construction and maintenance activities; and temporary degradation of habitat | No in-water work; spanning of rivers and avoidance of erosion and sedimentation in streams where species occurs; use of existing bridges when crossing the North Platte and South Loup rivers; and implementation of water quality measures outlined in R-Project SWPPP | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Topeka shiner | No effect. | None | None | None |
| **Insects** | | | | |
| American burying beetle | Permanent and temporary habitat loss; injury and/or mortality of individuals during construction and emergency repair activities; temporary disturbance or displacement of individuals; missed foraging or breeding opportunities | Avoidance/spanning of wetland habitats; use of low-ground-pressure equipment and temporary matting if wetlands must be crossed; use of existing roads; strategic siting of work areas; use of helical pier foundations in the Sandhills; helicopter construction; partial winter construction; limited nighttime construction; use of sodium vapor lighting and downshield lighting; limited mowing in some areas; limited removal of carrion; restoration of beetle habitat; implementation of Worker Educational Awareness Program regarding ESA-protected species; establishment of an escrow agreement; and implementation of the Restoration Management Plan | Moderate-intensity, short- and long-term, adverse effects | Moderate-intensity, short- and long-term, adverse effects |

| Species | Potential Impacts | Avoidance, Minimization and Mitigation Measures | Effect Determination | |
|---|---|---|---|---|
| | | | Alternative A | Alternative B |
| **Plants** | | | | |
| Blowout penstemon | No impacts to individual blowout penstemon and to potentially suitable and suitable habitat because of no disturbance to blowouts | Avoidance of potentially suitable and suitable habitat; avoidance of identified occurrences; completion of pre-construction surveys | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Small white lady's slipper orchid | Permanent potentially suitable and/or suitable habitat loss; and temporary disturbance or degradation of potentially suitable and suitable habitat | Avoidance of potentially suitable and suitable habitat; avoidance of identified occurrences; completion of pre-construction surveys; control of erosion and sediment runoff; establishment of an escrow agreement; and preparation and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |
| Western prairie fringed orchid | Permanent potentially suitable and/or suitable habitat loss; and temporary disturbance or degradation of potentially suitable and suitable habitat | Avoidance of potentially suitable and suitable habitat; avoidance of identified occurrences; completion of pre-construction surveys; control of erosion and sediment runoff; establishment of an escrow agreement; and implementation of the Restoration Management Plan | Low-intensity, short- and long-term, adverse effects | Low-intensity, short- and long-term, adverse effects |

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## 3.8 Land Use

Issuance of a permit and subsequent implementation of the R-Project would affect land use and land ownership in the study area. The study area is generally located in central and north-central Nebraska on predominantly private lands. This section is divided into two parts: the first (Section 3.8.1) identifies the applicable regulations and describes the affected environment for land use in the study area and the second (Section 3.8.2) evaluates and compares the effects of the alternatives on land use resources and qualitatively measures impact intensity based on the criteria provided in Table 3.1-2.

### 3.8.1 Affected Environment

The study area is located in central and north-central Nebraska and is generally characterized by a rural landscape of rolling, dissected hills, tributaries to larger creeks, terraces, and stabilized sand dunes. The study area includes ranchland, rolling prairies, grassland, farmland, loess hills, and the Sandhills, a stabilized sand dune complex. Covering almost 20,000 square miles, the Sandhills is the largest sand dune formation in the western hemisphere and is renowned for its constant springs, scattered shallow wetlands and lakes, an expanse of prairie grasses, and high quality rivers and streams. This area also contains the largest underground water source on the continent, the Ogallala Aquifer. The Sandhills, one of the least developed areas in Nebraska, contains a variety of native plant communities ranging from wetlands to dry upland prairie. Wet meadows and lakes are interspersed with the dunes, creating habitat for many species. Southeasterly flowing streams, such as the North Loup, Middle Loup, Calamus, Cedar, and Dismal rivers, drain much of the central and eastern Sandhills. The area was designated a National Natural Landmark in 1984. The National Natural Landmark program, administered by NPS, recognizes and encourages the conservation of outstanding examples of the natural history of the United States.

Approximately 95 percent 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/calf production regions. A few Sandhill ranches owned by local residents raise bison as well. Crop production in the Sandhills peaked in the 1970s when center-pivot irrigation technology was refined. Much of the native grassland on the periphery of the Sandhills was converted to cropland at that time. Irrigated crop production was found to be unsustainable given the soil characteristics found in the Sandhills. Since then, many formerly cropped lands have been reseeded to grass and placed into the Conservation Reserve Program (CRP); approximately 58,000 acres of CRP lands in the 14 counties encompass the study area (NPPD 2015a).

#### 3.8.1.1 Land Ownership, Jurisdiction, and Regulatory Framework in the Study Area

This section describes land ownership and identifies Federal, state, and local agencies with land jurisdiction in the study area. To provide context and to characterize the region, general information is provided for the study area as a whole (see discussion in Section 3.1, *Approach to*

*Characterizing Baseline Conditions and Conducting Effects Evaluation*). More detailed information is provided about applicable regulations, plans, and standards for areas where transmission facilities would be constructed under the action alternatives. The distribution of land ownership and major land uses in the study area is depicted in Figure 3.8-1.

More than 95 percent of the land in the study area is privately owned (including a small proportion owned by NGOs); the rest is under state or Federal jurisdiction (Table 3.8-1; also refer to Figure 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. 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 R-Project Study Area**

| Ownership/Jurisdiction | Acres | Percent of Study Area |
|---|---|---|
| Federal | 13,720 | 0.3 |
| State | 201,409 | 4.5 |
| Private | 4,289,812 | 95.2 |

Source: NPPD (2015a)

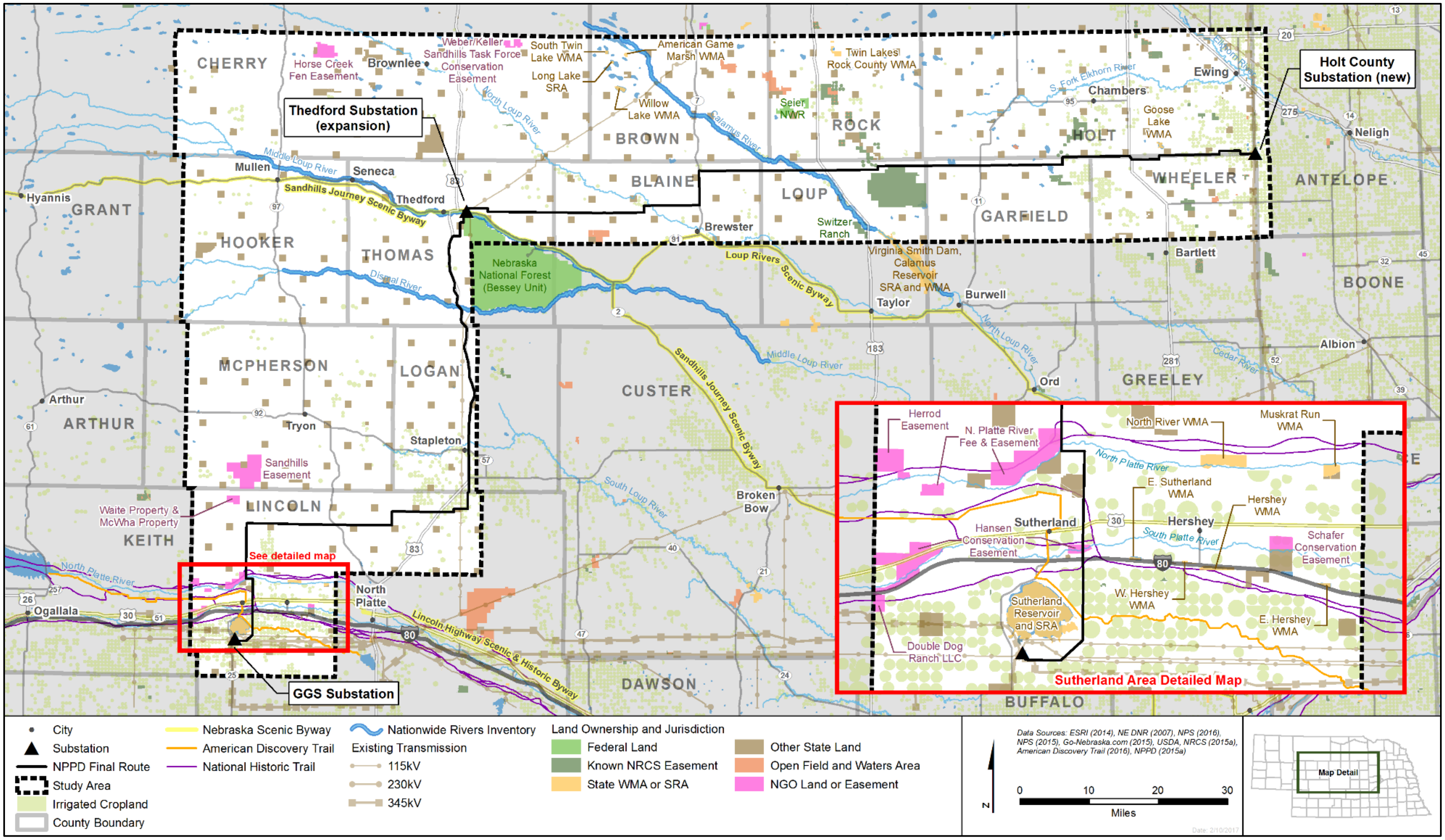
The following subsections describe the Federal, state, and local government land use resources in the study area and identify applicable regulations, plans, and standards.

### Federal Jurisdictions

Federal agencies with management responsibility for lands potentially affected by the Project are the NRCS and the Farm Service Agency (FSA), both of which are agencies of USDA. The Federal Highway Administration (FHWA) issues regulations, plans, and standards applicable to U.S. highways and interstate highways, but it does not have jurisdictional responsibility; instead, NDOR has jurisdictional responsibility for highway ROWs. The regulatory authority of FAA at and near airports is discussed in Section 3.11, *Transportation*. Lands managed by USFS, the Service, and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) are also present in the study area and are described briefly below, although they would not be affected by the proposed Project.

#### *Natural Resources Conservation Service and Farm Service Agency*

NRCS and FSA manage several types of land conservation programs through voluntary agreements between landowners and these Federal agencies. In general, the agreements restrict the landowners from converting agricultural, conservation, or otherwise non-developed land to developed land. Easements acquired through these programs grant the agencies an interest in property but do not convey property ownership to NRCS or FSA. Ownership rests with the landowner.




## Figure 3.8-1. Land Use in the R-Project Study Area

NRCS administers a number of financial assistance programs that operate in the study area, providing cost-share assistance and other payments to farmers and ranchers who implement conservation practices that improve the condition and sustainability of the natural resources affected by their agricultural operations. NPPD’s final route would cross lands enrolled in the Conservation Stewardship Program (CSP), a voluntary conservation program that encourages farmers and ranchers to improve the condition of the natural resources on their lands. Through the CSP, NRCS provides annual land use payments to participants who undertake conservation activities and improve, maintain, and manage existing conservation activities.

The study area also includes lands in the Farm and Ranch Lands Protection Program, Wetlands Reserve Program, and Agricultural Conservation Easement Program managed by NRCS. Lands enrolled in these programs are managed through voluntary agreements between landowners and the NRCS. NPPD’s final route would not cross any lands enrolled in these programs, so they are not discussed further in this DEIS.

The two FSA land conservation programs with enrolled lands in the study area are the CRP and the Conservation Reserve Enhancement Program (CREP). CRP contracts and CREP conservation easements may include land use restrictions that are not necessarily compatible with the construction of a transmission line.

The CRP is a voluntary program established to protect cropped lands that are vulnerable to erosion. The CRP provides participants with an annual per-acre rent plus half the cost of establishing a permanent land cover (usually grass or trees). In exchange, the participant retires highly erodible or environmentally sensitive cropland from farm production for 10 to 15 years. Sensitive lands also include land converted from crops to wildlife habitat or special shallow water areas, filter strips along surface waters, and grass covers for erosion control.

Federal funding for the CRP is limited. Offers for CRP contracts are ranked according to an index that includes the following factors:

- Wildlife habitat benefits resulting from covers on contract acreage
- Water quality benefits from reduced erosion, runoff, and leaching
- On-farm benefits from reduced erosion
- Benefits that will likely endure beyond the contract period
- Air quality benefits from reduced wind erosion
- Cost

The CREP is an offshoot of the CRP and is very similar to CRP. It is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. Like CRP, CREP contracts require a 10- to 15-year commitment to keep lands out of agricultural production. The program is a partnership among producers; tribal, state, and Federal governments; and in some cases, private groups.

Access to information about the location of agricultural land enrolled in the CRP and CREP is restricted. The 2008 Food, Conservation and Energy Act (Section 1619; 7 U.S.C. § 8791) prevents disclosure of specific information about individual landowners and the programs they participate in. Consequently, the only way to determine the location is to ask the landowner whether the acreage affected by the R-Project is enrolled in either of those programs.

#### *Federal Highway Administration*

FHWA regulations, plans, and standards apply to highways constructed and maintained with Federal-aid monies. When considering whether a ROW on a Federal-aid highway should accommodate an electric power facility, the U.S. Department of Transportation's Secretary is required to take the following actions:

- Ascertain the effect such use will have on highway and traffic safety, since in no case shall any use be authorized or otherwise permitted, under this or any other provision of law, which would adversely affect safety.
- Evaluate the direct and indirect environmental and economic effects of any loss of productive agricultural land or any impairment of the productivity of any agricultural land which would result from the disapproval of the use of such ROW for the accommodation of such utility facility.
- Consider such environmental and economic effects together with any interference with or impairment of the use of the highway in such ROW, which would result from the use of such ROW for the accommodation of such utility facility (23 U.S.C. § 109(l)(1)).

#### *Other Federal Agencies with Land Management Jurisdiction in the Study Area*

USFS manages the Nebraska National Forest, a portion of which lies in the study area (Bessey Ranger District–Bessey Unit). The Nebraska National Forest is unique to the nation because it is the largest human-made forest in the United States, having 22,000 acres of hand-planted trees. The Charles E. Bessey Nursery, the nation's oldest Federal tree nursery, is also located in the Nebraska National Forest.

The Service manages the John W. and Louise Seier NWR near Rose, Nebraska, and administers the refuge through the Fort Niobrara/Valentine NWR Complex.

Reclamation's Nebraska-Kansas Area Office administers the Virginia Smith Dam and Calamus Lake in the study area. The Twin Loups Reclamation District operates and maintains the dam and lake facilities. NGPC is the managing agency for recreational facilities and activities at the Calamus Reservoir SRA and for wildlife management activities at the Calamus WMA.

### State Jurisdiction

State agencies with land jurisdiction in the study area include NBELF, NGPC, and NDOR. In addition, the Nebraska Power Review Board must approve all transmission lines exceeding 700 volts and located outside a power supplier's own service area. Similarly, the Nebraska Public Service Commission issues orders to utilities to construct, operate, and maintain electric utility lines that carry more than 700 volts and that are outside the limits of any incorporated city or village. However, neither the Nebraska Power Review Board nor the Nebraska Public Service Commission has siting authority concerning transmission lines.

#### *Nebraska Board of Educational Lands and Funds*

NBELF serves in the dual capacity of landowner and land manager of state-held surface and subsurface lands throughout Nebraska, collecting rents on agricultural leases and mineral leases. Most of the State of Nebraska's jurisdiction in the study area covers land set aside as school trust parcels, which the NBELF oversees and manages. NBELF holdings typically cover sections 16 and 36 of a given township. In its capacity as landowner, NBELF makes expenditures for conservation, improvement, and management of the land placed in its care. NBELF is responsible for processing applications for ROWs and easements across surface lands. Lands leased by NBELF for agricultural and recreational purposes are present in the study area.

#### *Nebraska Game and Parks Commission*

NGPC manages 12 WMAs and 3 SRAs in the study area (Table 3.8-2). NGPC's Wildlife Division manages WMAs primarily for the enhancement of wildlife habitat and for public hunting and fishing. Other allowable activities at WMAs include hiking, bird watching, nature study, and primitive camping. SRAs possess resource values primarily associated with active outdoor recreation pursuits, day-use activities, and camping. All of Nebraska's major water-oriented areas fall in this classification.

#### *Nebraska Department of Roads*

NDOR permits aerial electric power lines in state, Federal, and interstate highway ROWs, subject to its *2001 Policy for Accommodating Utilities on State Highway Right-of-Way*. Under that policy, power transmission facilities must be constructed in accordance with the current NESC standards, and the poles must be placed outside the fenced ROW, where feasible. Highway ROWs disturbed by the construction of aerial electrical power and communication lines must be returned to normal grade and elevation and all excess material must be removed. All vegetation destroyed by the construction of aerial electrical power and communication lines within highway ROWs must either be replaced by the permittee or be mitigated by a cash settlement to NDOR (NDOR 2001).

### 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 14 counties. The study area also includes the villages of Brewster, Chambers, Ewing, Hershey, Mullen, Stapleton, Sutherland, and Thedford, as well as the unincorporated communities of Brownlee, Seneca, and Tryon.

Municipalities (i.e., cities and villages) in Nebraska are divided into five classes, based on population. A municipality can extend its planning and zoning authority from 1 to 3 miles beyond its borders, depending on its classification. All of the municipalities in the study area fall within classifications that allow them to extend their planning jurisdictions up to 1 mile.

**Table 3.8-2. Wildlife Management Areas and State Recreation Areas in the R-Project Study Area**

| Area Name | Acres | Location (County) |
|---|---|---|
| **Wildlife Management Areas** | | |
| American Game Marsh | 160 | Brown |
| East Hershey | 20 | Lincoln |
| East Sutherland | 27 | Lincoln |
| Goose Lake | 349 | Holt |
| Hershey | 53 | Lincoln |
| Muskrat Run | 224 | Lincoln |
| North River | 681 | Lincoln |
| South Twin Lake | 160 | Brown |
| Twin Lakes—Rock County | 270 | Rock |
| Calamus | 4,818 | Loup and Garfield |
| West Hershey | 22 | Lincoln |
| Willow Lake—Brown County | 511 | Brown |
| **State Recreation Areas** | | |
| Long Lake | 155 | Brown |
| Sutherland Reservoir | 3,017 | Lincoln |
| Calamus Reservoir | 1,188 | Loup and Garfield |

Source: NGPC (2015e)

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 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 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 zoning ordinances implement the comprehensive plan through development standards and regulations. Local government land use plans, policies, and regulations as they relate to the R-Project are summarized in Table 3.8-3. However, as a political subdivision of the state with the power of eminent domain, NPPD is not subject to county or municipal zoning.

**Table 3.8-3. Pertinent Local Government Land Use Plans, Policies, and Regulations**

| Jurisdiction | Document Title, Date of Adoption | Plans, Policies, and/or Regulations Relative To Utilities/Transmission Lines |
|---|---|---|
| Blaine County | Comprehensive Development Plan 2000 | No policies specific to siting transmission lines.<br>Transitional agriculture zones extend outward 2.5 miles north and south and 1.5 miles east and west of Brewster's and Dunning's corporate limits. |
| Garfield County | Comprehensive Plan Amendment 2006 | No policies specific to siting transmission lines.<br>A transitional agricultural zone extends outward from the Calamus Reservoir, though the Plan does not specify the distance. Likely 1.0 to 2.0 miles. |
| | Zoning Resolution 2006 | Public utility substations and utility distribution systems and similar structures and uses are permitted as principal uses and structures in the General Agricultural District. |
| Holt County | Zoning Regulations Amended and Approved 2010 | Public utilities are permitted by right in the Open Zone District, which is the County's only zoning district. |
| Lincoln County | Comprehensive Development Plan Update 2012 to 2030 | Policy 3.1.2 encourages public power districts to work with the County and local governments as new electrical transmission lines are planned and constructed. |
| | Zoning Resolution 2012 | Public utility buildings and structures are permitted as principal uses in the Transitional Agricultural District.<br>Major transmission lines are permitted as principal uses in the Village Area Development, Commercial, and Industrial districts.<br>Power transmission lines are permitted as conditional uses in the Rural Estates Residential, Urban Density Residential, and Mobile Home Residential districts. |
| Logan County | Comprehensive Development Plan 2001 | No policies specific to siting transmission lines.<br>Transitional agricultural areas extend outward 1 mile east and west and 2 miles north and south of urban areas, such as Stapleton. |
| | Zoning Regulations 2002 | Public utility substations and utility distribution systems and similar structures and uses are permitted as principal uses and structures in the General Agricultural, Environmentally Sensitive Agricultural, Transitional Agricultural, and River Corridor Agricultural districts. |
| Loup County | Comprehensive Plan 2001–2011 | No policies specific to siting transmission lines. |

| Jurisdiction | Document Title, Date of Adoption | Plans, Policies, and/or Regulations Relative To Utilities/Transmission Lines |
|---|---|---|
| | Zoning/Subdivision Regulations 2001 | Public utilities and utility distribution systems are permitted as special uses in the Agriculture and Rural Conservation districts.<br>The above utilities are permitted as principal uses and structures in the Residential, General Commercial, and Highway Commercial districts. |
| Thomas County | Comprehensive Plan 2011 | No policies specific to siting transmission lines.<br>A transitional agriculture zone buffers Thedford's east side for approximately 0.5 mile. |
| | Zoning Regulations March 2002 | Public utility and utility distribution systems are permitted as special uses in the Agricultural and Rural Conservation districts. Such utilities are permitted as principal uses in the Industrial District. |
| Wheeler County | Future Land Use Plan 2009 | No policies specific to siting transmission lines. |
| | Zoning Regulations 1998 | Public utility substations and utility distribution systems are permitted as outright allowable principal uses and structures in the Agricultural and Rural Recreational Residential districts. |
| Village of Sutherland | Comprehensive Plan, 2021 Adopted April 2011 | No policies specific to siting transmission lines. |

Source: NPPD (2015a)

Note: Although the study area overlaps portions of Antelope, Brown, Cherry, Hooker, McPherson, and Rock counties, implementation of Alternative A would not entail Project-related construction in any of those counties, or within 1 mile of the villages of Brewster, Chambers, Ewing, Hershey, Mullen, Seneca, or Thedford. Therefore, those jurisdictions' land use policies and zoning regulations are not included in this table.

In addition to the local jurisdictions identified above, the Nebraska Natural Resources Commission created 23 NRDs that cover the state. NRDs are local government entities with broad responsibilities to protect natural resources. District boundaries are defined by major river basins. Elected boards of directors govern districts. The NRDs are charged under state law with 12 areas of responsibility:

- Erosion prevention and control
- Prevention of damages from flood water and sediment
- Flood prevention and control
- Soil conservation
- Water supply for any beneficial uses
- Development, management, use, and conservation of groundwater and surface water
- Pollution control

- Solid waste disposal and drainage
- Drainage improvement and channel rectification
- Development and management of fish and wildlife habitat
- Development and management of recreational and park facilities
- Forestry and range management

The study area includes portions of the Twin Platte, upper Loup, lower Loup, and upper Elkhorn NRDs.

#### Non-governmental Organization Lands

Several NGOs own, manage, or have interest in land in the study area. These NGOs include but are not limited to the Sandhills Task Force, Ducks Unlimited, and The Nature Conservancy. NGO lands total less than 1 percent of the land in the study area (NPPD 2015a).

### 3.8.1.2 Existing Land Uses

Discussions in this section describe the land cover types and land uses in the 7,039-square-mile study area. Land cover refers to the physical material at the surface of the earth, while land use addresses how people use the land. Land cover types in the study area include grasslands, cultivated cropland, pasture/hay, developed lands, and other lands. Land uses include recreation, conservation, agriculture and livestock grazing, industrial activities (e.g., manufacturing and energy), ROW corridors (e.g., roads, railroads, transmission lines, and pipelines), and urban and rural development. In some instances, particularly with agricultural lands, land cover and land use can be viewed as the same.

The following subsections identify commercial and industrial, public and semi-public (including utilities), and agricultural land uses in the study area. Conservation easements are also described. Information for the following discussions was drawn from the *NPPD R-Project Routing and Environmental Report* (NPPD 2015a).

#### 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. Most of these are located in or around communities and near the on- and off-ramps of Interstate (I) 80. Land is also leased for commercial/recreational purposes such as for hunting. Industrial development in the study area includes manufacturing and processing facilities, warehouses, and other facilities, which are situated predominantly in or near communities and U.S. Highway 30.

#### 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.

There are eight school districts in the study area: Hershey Public Schools, Sutherland Public Schools, Stapleton Public Schools, McPherson County Schools, Thedford Public Schools, Mullen Public Schools, Chambers Public Schools, and Ewing Public Schools.

Wellhead protection areas are another land use in the study area. The State of Nebraska has implemented a Wellhead Protection Program that allows municipalities to designate protection areas around wells and well fields in order to protect the quality and quantity of water in underlying aquifers.

### Utilities

Existing utilities in the study area consist of electric power transmission and distribution lines; long-distance and local telephone aerial wires; buried copper and fiber optic cables; aerial and buried cable television lines; natural gas lines; and domestic water lines and canals. According to the Federal Communications Commission, 53 communication towers exist in the study area (NPPD 2015a).

### Agriculture

Land in the study area is used primarily for agriculture. Approximately 4.2 million acres (94 percent) of the 4.5-million-acre study area are grazed grassland, and a small amount of this total consists of irrigated cropland (NPPD 2015a). Typical land cover types associated with agricultural uses include native grasslands, pasture and rangeland, and to a lesser extent, irrigated croplands. Pasture and rangeland uses dominate the northern and western parts of the study area; croplands are more common in the northeast and southwest. Corn, hay, and soybeans are the primary crops grown in the study area. Hay is more prevalent in the northern portions of the study area, while corn and soybeans are more prevalent in the northeast and southwest.

Ranching is a predominant agricultural use in the study area, with more than 90 percent of the Sandhills region in 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. The development of these uses near farmsteads in the study area occurred for the same reasons original farmsteads were constructed: water availability, higher crop production potentials, and the desire to have the feeding facilities located near the producers' farming or ranching operations.

Farming is the other major agricultural use in the study area. Most crops in the study area are irrigated, primarily through the use of center-pivot irrigation and gravity-fed systems. Center-pivot sprinklers are anchored to one location and swivel up to 360 degrees to irrigate a complete circle, typically covering 160 acres or more. Irrigated land may have existing subsurface drainage systems (drain tiles) and surface irrigation ditches. Approximately 73 percent of the cropland in the study area is irrigated. Winter wheat and alfalfa are the principal dryland crops. Aerial spraying (crop dusting) is also employed in some agricultural areas to control insects, weeds, and diseases. The quantity of farm land receiving aerial crop spraying is unknown. As a result, it is assumed for this analysis that any dryland or irrigated farmland could receive aerial spraying.

Agricultural storage uses include vacant farmsteads and mechanical equipment and grain storage (e.g., corn and soybeans). These storage facilities are usually close to a farmstead, and some exist as standalone structures. Grain storage is seasonal.

Farmsteads are scattered throughout the study area. The majority of farmsteads were likely developed in areas where the soils are conducive to crop production and near a major transportation route. Shelterbelts (i.e., rows of trees, shrubs, and other vegetation planted to provide protection for fields, livestock, and residences) designed for winter protection are generally located north and west of farmsteads, livestock concentration areas, working facilities, or other areas to be protected. Field windbreaks designed to reduce soil erosion are generally single-row windbreaks planted parallel to cropping patterns. Farmstead development is less common in portions of the study area 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. Crop producers rely on irrigation wells as a more reliable source of water than natural precipitation, but the demand for groundwater has, in some instances, resulted in declining water levels in some aquifers. A detailed discussion of groundwater wells is provided in Section 3.3, *Water Resources*.

Agricultural infrastructure includes irrigation systems, stock-watering systems, drainage-tile systems, terraces, grass-lined spillways, and springs that feed ponds to water livestock. Stock-watering systems consist of a groundwater well and a tank to supply water to livestock, or impoundments to catch groundwater from springs. Terraces and grass-lined spillways are located on slopes to reduce erosion.

#### Conservation Programs and Easements

Federal, state, and local agencies, as well as non-government 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 3.8-4; Figure 3.8-1). Federal programs operated by NRCS and FSA are described above, in the discussion of Land Ownership, Jurisdiction, and Regulatory Framework.

The study area contains lands enrolled in several conservation programs administered by the FSA and NRCS, but only those in the CSP, CRP, and CREP have the potential to be affected by the Project. Because of restrictions on the disclosure of specific information about individual landowners enrolled in the CRP and CREP, it was not possible to specify the amounts and locations of parcels enrolled in those programs for this analysis. Areas known to be enrolled in conservation programs (except CRPs and CREPs) are depicted in Figure 3.8-1.

**Table 3.8-4. Non-governmental Organization Conservation Easements in the R-Project Study Area**

| Site Name | Easement Holder | County | Location (township, range, section number(s)) |
|---|---|---|---|
| Schafer conservation easement | Ducks Unlimited, Inc. (Wetlands America Trust) | Lincoln | T14N R32W Sec 25-26, 35-36 |
| Hansen conservation easement Phase 1 | Ducks Unlimited, Inc. (Wetlands America Trust) | Lincoln | T14N R33W Sec 33-34<br>T14N R34W Sec 31-33 |
| Double Dog Ranch, LLC | Ducks Unlimited, Inc. (Wetlands America Trust) | Lincoln | T13N R34W Sec 5-7 |
| North Platte River fee | The Nature Conservancy | Lincoln | T14N R33W Sec 5, 7, 8, 18<br>T14N R34W Sec 12-13 |
| North Platte River easement | The Nature Conservancy | Lincoln | T14N R33W Sec 5<br>T14N R34W Sec 16 |
| Herrod easement | Ducks Unlimited, Inc. (Wetlands America Trust) | Lincoln | T14N R34W Sec 7-8, 17 |
| McWha Property conservation easement | Nebraska Land Trust | Lincoln | T16N R34W Sec 12<br>T16N R33W Sec 18 |
| Waite Property conservation easement | Nebraska Land Trust | Lincoln | T16N R33W Sec 7, 18 |
| Sandhills easement | The Nature Conservancy | McPherson | T17N R33W Sec 10-11, 14-15, 17-23, 26-29, 33-34 |
| Horse Creek Fen easement | The Nature Conservancy | Cherry | T27N R33W Sec 9-11, 13-16, 21-23 |
| Weber/Keller Sandhills Task Force conservation easement | Sandhills Task Force | Cherry | T27N R26W Sec 5-9<br>T27N R27W Sec 1, 12 |

Source: NPPD (2015a)

NPPD's final route would border or cross two of the conservation easements listed in Table 3.8-4 (Hansen Phase 1 and North Platte River), so they are described in greater detail here. The Hansen Phase 1 easement was acquired through a North American Wetlands Conservation Act grant. Grants awarded through that act are intended, in part, to support the long-term protection of habitats needed by waterfowl and other migratory birds. The North Platte River easement was established in part through ESA Section 7 consultation between the Service and FERC to offset adverse effects of Kingsley Dam located on the North Platte and Platte rivers.

### 3.8.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term impacts of the No-action Alternative and the two action alternatives on land use in the project area. Definitions for duration and intensity developed for this Project are described in Table 3.1-2.

Assessments of the effects of the alternatives are based on the following considerations:

- The potential for conflicts with local zoning or with management plans for state or Federal lands crossed by the transmission line or related facilities
- Potential effects on landowners and land uses, as indicated by:
  - The number of parcels crossed by the transmission line ROW and associated facilities
  - The number of landowners affected by the transmission line ROW and associated facilities
  - The number of occupied residences within 300 feet and 500 feet of the transmission line ROW and associated facilities
  - The number of towns or villages within 0.25 mile of the transmission line ROW and associated facilities
  - Acres of different agricultural land cover types (cultivated crop and pasture/rangeland) in the transmission line ROW and associated facilities
  - The number of center-pivot irrigation conflicts with the transmission line ROW and associated facilities
  - The number of cultivated fields bisected by the transmission line ROW and associated facilities
  - The number of conservation easement areas crossed by the transmission line ROW and associated facilities
  - Lost conservation values of conservation easement areas crossed by or near the transmission line ROW and associated facilities

Section 3.8.2.4 presents the avoidance, minimization, and mitigation measures that NPPD would implement under either action alternative to avoid or reduce adverse effects on land use.

#### 3.8.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect land and there would be no conflict with local zoning and management plans or lost or degraded conservation values associated with conservation easements on state, Federal, or private lands.

#### 3.8.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Under Alternative A, the Service would issue a permit to NPPD for the take of the endangered beetle in accordance with Section 10(a)(1)(B) of the ESA, and NPPD would construct, operate, and maintain the 225-mile-long, 345 kV R-Project transmission line along NPPD's final route, as described in Chapter 2. Issuance of a permit and subsequent implementation of the R-Project transmission line along NPPD's final route under Alternative A would result in direct and indirect effects on land use in the short and long term. Specific effects on land use as a result of the various construction, operation, and maintenance activities under Alternative A are described below.

### Direct Effects

Discussions in this subsection identify the potential direct effects of Project construction, operation, and maintenance, including emergency repairs, on land uses in the Project area. The R-Project's consistency with land management regulations, plans, standards, and conservation values of conservation easements is assessed first, followed by discussions of potential effects on existing land uses in the Project area. The effects analyses below are based on the expectation that avoidance, minimization, and mitigation measures, described at the end of this section, would be implemented as appropriate during Project construction, operation, and maintenance.

#### *Consistency with Land Management Regulations, Plans, and Standards*

Under Alternative A, the R-Project transmission line ROW and all proposed transmission facilities would be located in areas where such facilities are not prohibited by Federal, state, or local planning regulations. The transmission line ROW or related facilities would not conflict with local zoning.

The R-Project would cross some lands enrolled in the CSP, and in one area, approximately 500 feet of CRP lands. The locations of CRP- and CREP-enrolled parcels are not available for this analysis because of confidentiality restrictions. If the presence of R-Project transmission facilities necessitates modifications to existing agreements with NRCS or FSA, NPPD would assist affected landowners. If NPPD's assistance is requested, NPPD would, with the landowner's permission, work with the agency to identify the information needed for such modifications. NPPD would also provide supporting information, such as the number of acres affected, as requested by the agency. If any land is removed from these programs due to the easements required by NPPD for the R-Project, NPPD would reimburse affected landowners for any costs incurred or losses experienced.

NPPD's final route would cross the ROWs of I-80, four U.S. highways, and five Nebraska highways (see Section 3.11, *Transportation*). NPPD would site and construct transmission line structures in accordance with FHWA and NDOR policies for accommodating utilities in highway ROWs. NPPD would obtain the necessary permits for all ROWs, both on-ground and aerial, occupied by the transmission line.

Under Alternative A, the transmission line ROW would cross NBELF lands. NPPD would coordinate with NBELF to ensure facilities are sited to accommodate NBELF's plans for school trust parcels. For example, the placement of structures may be adjusted to avoid conflicts with center-pivot irrigation sprinklers. In these ways, Alternative A is expected to be consistent with state government regulations, plans, or standards.

NPPD's final route would pass through areas under the jurisdiction of the village of Sutherland and Blaine, Garfield, Holt, Lincoln, Logan, Loup, Thomas, and Wheeler counties. Implementation of Alternative A would be consistent with documented land use policies and zoning regulations of any of these jurisdictions. NPPD's final route would cross lands located in zoning districts where transmission line development is not prohibited.

### Land Uses

Alternative A could result in adverse effects on land uses if construction, operation, and maintenance of transmission line facilities would displace, alter, or otherwise physically affect any existing or planned agricultural, residential, commercial, industrial, governmental, institutional, or public or private infrastructure uses or facilities. Potential effects on planned uses are addressed in the assessment of consistency with land use planning documents, above. The following discussions address the potential for effects on existing land uses.

***Agriculture*****—**Construction, operation, and maintenance of NPPD's transmission line under Alternative A would result in low- to moderate-intensity impacts on land uses, based on the following factors:

- In the short term, existing land uses such as agriculture and grazing within the transmission line ROW would experience temporary construction-related disturbances (low intensity).
- In the short and long term, grazing, haying, and calving operations would experience low intensity impacts.
- In the long term, outside the footprint of Project features (e.g., transmission tower structures, substations, permanent access roads), most pre-existing land uses would be able to continue with only intermittent, infrequent interruptions from operation and maintenance of transmission facilities (low intensity).
- Approximately 52 acres of land along the 225-mile route would be converted from agricultural to non-agricultural uses (e.g., for structures, substations, and permanent access roads) (low intensity).
- Construction of substation facilities would necessitate land ownership changes in one parcel in Thomas County and one parcel in Holt County (moderate intensity).

The R-Project transmission line ROW would cross 519 parcels, affecting 219 landowners (NPPD 2015a). Agriculture is the dominant existing land use in areas that would fall within the ROW. Approximately 3,790 acres of pasture and rangeland, 530 acres of dryland cropland, and 173 acres of irrigated cropland would be within the ROW (NPPD 2015a). Construction of transmission facilities would result in two potential conflicts with center-pivot sprinklers. NPPD would work with the landowners to site structures to avoid such conflicts. Construction of transmission facilities would result in two potential conflicts with center-pivots. NPPD would work with the landowners to site structures to avoid such conflicts. Construction of the transmission facilities would bisect 10 cultivated fields. Substation areas would be acquired in fee and converted to utility use.

NPPD would negotiate with private landowners to acquire easements for the proposed transmission line's ROW on private lands. While negotiations would occur on a case-by-case basis, in general, NPPD would offer to pay each landowner 80 percent of the fair market value of the land needed for the transmission line ROW. NPPD would also compensate landowners for the value of land occupied by transmission structures, paying the equivalent value of 0.5 acre for steel poles and of 1.0 acre for lattice towers. An easement would permit the landowner to continue the existing use of the land for most activities, such as ranching or farming operations. However, due to safety considerations, buildings, structures, wells, or trees taller than a certain height would not be allowed in the transmission line ROW. NPPD would work with landowners on a case-by-case basis when siting structure locations to avoid removing shelterbelts and other features that landowners need to have NPPD avoid. See Section 3.17.2.2, *Socioeconomics*, for a more detailed discussion of measures for avoiding or minimizing adverse effects on ranching or farming operations.

In a study on the effects of introducing a new transmission line on property values, Pitts and Jackson (2007) found that the value can initially decrease 1 to 10 percent (particularly for residential property located near the ROW), but this diminution is temporary and usually decreases over time, disappearing completely in 4 to 10 years. Several case studies have found no evidence of adverse impacts from the introduction of a high voltage transmission line on the resale value of properties used primarily for agricultural production (Chalmers, 2012a, 2012b, 2012c). Property value impacts dissipate with time and distance from a transmission line introduction, thus the R-Project is anticipated to have a low-intensity, short-term impact on land values within the Project area.

In addition to the areas occupied by the R-Project transmission line ROW and associated facilities, approximately 500 acres in the study area would be affected by the draft HCP commitment to mitigate the adverse effects on beetles by purchasing and/or leasing occupied beetle habitat from a willing landowner and placing it in the public domain for perpetuity. Compensatory mitigation lands would be protected from development or conversion to row crops. NPPD, FWS, and NGPC would develop a management plan for the mitigation lands after they are acquired.

Construction-related effects on agricultural uses may include crop damage, interference with planting schedules and harvest operations, impeded access to fields or other plots of land, and obstruction of farm vehicles and equipment. Any of these impacts may temporarily withdraw land from production and reduce agricultural productivity on the affected land. Construction equipment and vehicles may also compact agricultural soils, potentially affecting subsequent agricultural operations (see Section 3.2, *Geology and Soils*, for further analysis of effects on agricultural soils). Livestock operations may also be temporarily affected. Hay production would be decreased in areas disturbed by construction. 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. As described in 3.17, *Socioeconomics*, NPPD would work with ranchers to avoid removing shelterbelts, calving areas, and other features landowners wish to protect.

Approximately 1,458 acres would be temporarily disturbed at monopole and lattice tower work areas; wire-pulling, tensioning, and splicing sites; construction yards; helicopter fly yards; and well relocation sites and along temporary access routes and distribution power line relocation routes. To minimize the risk of disturbance, NPPD would coordinate with landowners before construction activities, including helicopter use. See Section 3.17, *Socioeconomics*, for more information about potential effects on agricultural operations. The duration of the effects of disturbance to pasture or rangeland would depend the time needed to restore disturbed areas to pre-Project conditions and may last longer than a single season. NPPD would compensate landowners for economic costs related to damage to agricultural uses.

As discussed in Section 3.5.2, *Vegetation, Direct and Indirect Effects*, NPPD would establish an escrow account for the Project and submit an escrow agreement to the Service for review and approval. The escrow agreement would include stipulations for successful reclamation criteria of disturbed beetle habitat and steps that would be taken in the event reclamation does not meet the stipulations. Recovery of all disturbed R-Project-related areas would be governed by provisions contained in the Restoration Management Plan. Revegetation of areas disturbed by construction activities would be conducted in consultation with private landowners, local NRCS offices, and other rangeland experts. Areas used as grassland range would be reseeded with a native seed mix.

Expansion of the Thedford Substation would require the acquisition of approximately 13 acres of land currently used for livestock grazing. No residences are located within the siting area of the proposed Thedford Substation; the nearest residence is approximately 500 feet away, across Nebraska Highway 2 and the Burlington Northern Santa Fe Railway line. Construction of the Holt County Substation would require the acquisition of approximately 12 acres of land currently used for crop production. No residences are located within the siting area of the proposed Holt County Substation; the nearest residence is approximately 0.5 mile away. Expansion of the GGS Substation would be limited to the existing station footprint and would not affect land uses at that location.

Long-term effects on ranchlands and farmlands would occur where transmission facilities, such as poles, would permanently convert the land upon which they are situated to other uses. The loss of productive lands may result in financial impacts to farmers or ranchers. As noted above, NPPD would compensate landowners for 80 percent of the value of land occupied by transmission facilities. The amount of financial loss would depend on the existing uses (e.g., grazing, hay production, calving, or crop production) of the affected lands. Financial impacts on croplands would depend on the type of crop because crop values vary from year to year. Potential effects on prime farmland are analyzed in Section 3.2, *Geology and Soils*.

Other potential long-term impacts of transmission facility construction in agricultural areas include the following:

- Loss of uses that are incompatible with the transmission line ROW (e.g., trees, structures, or other objects that may present fire or electrical hazards)
- Problems for turning field machinery and maintaining efficient fieldwork patterns

- Loss of grazing and haying areas resulting from the slow rate of vegetation re-establishment
- 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
- Interference with the movement of irrigation equipment
- Encumbrance of future field consolidation or land subdivision
- Hindrance or prevention of aerial spraying[4]

These effects may also occur in areas where approximately 28 miles of existing overhead distribution power lines would be relocated to avoid conflicts with the R-Project ROW. The lines would not be moved far from their current locations. For example, lines along public roads would be moved to the opposite side of the road. The long-term effects of the relocated distribution lines are therefore expected to be similar to those of the existing lines, although effects related to poles and overhead wires would be eliminated along approximately 6 miles of the route where existing distribution lines would be relocated underground. For both the R-Project transmission facilities and the relocated distribution lines, NPPD would apply the design features and avoidance, minimization and mitigation measures identified in Section 3.8.3 and in Sections 3.5, *Vegetation*, and 3.17, *Socioeconomics*, to minimize or eliminate impacts to agricultural operations.

Over the long term, the construction of transmission facilities is not expected to adversely impact the ranching land use in the study area. NPPD would work with ranchers to avoid removing shelterbelts, calving areas, and other features landowners wish to protect. After construction is complete and disturbed areas are restored to pre-Project conditions, ranching activities are expected to return to normal conditions. Following the re-establishment of vegetation disturbed by construction, as stipulated in the escrow agreement, cattle would be allowed to graze in the transmission line ROW.

Safe and reliable operation of the new transmission line would be maintained through regular inspection of the poles, conductors, insulators, access areas, and vegetation in the ROW. The inspections, which would begin in year 30 of the life of the Project, would consist of two patrols each year, one aerial and the other alternating between a ground patrol and an aerial patrol. Special patrols would be conducted following storm conditions. NPPD would inspect the line to look for problems caused by weather, wear and tear, vandalism, and vegetation re-growth. Some patrols would be conducted from helicopters flying at the approximate height of the transmission structures because these inspections require close views of the structure components. Fixed-wing

[4] Transmission lines and structures present substantial obstacles to be avoided, requiring additional attention from pilots. Transmission lines can be hazardous when multiple lines exist side-by-side, lines change direction (especially at a 90-degree angle), new transmission lines and poles are installed, or lines are not clearly visible.

aircraft would be used for inspections that can be done from a broader perspective and higher elevations requiring less detail. NPPD would manage vegetation in the transmission line ROW by a variety of methods, including tree trimming, tree removal, mowing, and using approved herbicides to target species that are incompatible with the safe operation, maintenance, and access to the transmission system. NPPD would notify landowners before entering properties for scheduled repair work involving heavy equipment.

Aerial patrols could stress or spook cattle, potentially resulting in injury to the animals or to fences. Because any disturbance of cattle would be brief (lasting only a few minutes as aircraft pass overhead) and would occur only once or twice a year, aerial patrols are not expected to result in substantial adverse effects on ranching operations. Routine maintenance and inspection activities (described above) are not expected to adversely affect adjacent land uses or facilities.

Emergency repairs may temporarily disturb an estimated total of 293 acres during the life of the R-Project; the extent to which emergency repairs may affect agricultural uses is unknown because the timing and locations of emergency repairs are not known and cannot be predicted. NPPD's typical practice is to notify landowners before entering properties for scheduled repair work involving heavy equipment. If emergency conditions necessitate immediate action, however, landowners would be contacted as soon as is reasonably practicable. NPPD would compensate landowners for all damages and losses incurred as a result of repairs to the transmission line, whether the losses are caused during planned repairs or by emergency repairs.

The total acreage of agricultural lands in the transmission line ROW would be less than 4,500 acres, approximately 0.1 percent of the agricultural acreage in the study area. The total area converted for non-agricultural uses (e.g., for towers, substations, and permanent access roads) would be approximately 52 acres (NPPD 2015a), an even smaller proportion of the study area total. As discussed in Section 3.17, *Socioeconomics*, NPPD would work with landowners to avoid or minimize long-term impacts on calving areas. Potential long-term losses of grazing areas because of difficulties with re-establishing native grasses in temporarily disturbed areas would be addressed in the escrow agreement. Because construction of transmission facilities would affect a minute proportion of the agricultural acreage in the study area, no substantial effects on agricultural activities are expected.

***Utilities*****—**NPPD's final route would cross 115 kV and 230 kV transmission lines near the GGS Substation, a 115 kV transmission line along U.S. Highway 83, and a 69 kV line operated by the Elkhorn Rural Public Power District near the eastern terminus of the proposed line. In these locations, NPPD would ensure that its construction activities provide sufficient space between the R-Project facilities and existing utilities to avoid damaging these utilities. Approximately 28 miles of existing distribution power line would have to be relocated to avoid conflicts with the proposed transmission line. Potential effects on wellheads and other drinking water sources are discussed in Section 3.3, *Water Resources*.

***Residential, Commercial, and Other Land*****—**The transmission line ROW would occur within 500 feet of 12 occupied residences, passing less than 300 feet from three of those. The ROW would come within 0.25 mile of two incorporated villages (Sutherland and Stapleton). NPPD's final route would not come within 0.25 mile of any schools or within 500 feet of any cemeteries.

One church (St. Johns Church, near Brewster) would be less than 500 feet from NPPD's final route.

Construction activities would create fugitive dust, noise, and traffic in routing construction equipment along existing roads and along temporary access to transport building materials between construction staging areas and work sites.

Commercial, industrial, governmental, and institutional lands that would be crossed by NPPD's final route are in already-developed areas near I-80 and U.S Highway 30. Based on the presence of existing infrastructure, including highways, railways, and transmission lines, in those areas, the addition of the R-Project transmission line would not substantially alter the landscape and is not expected to result in any long-term effects on commercial or industrial land uses. Recent case studies on the resale value of properties with a high voltage transmission line located on the property or in general proximity to a transmission line found that impacts dissipate with time and distance and completely disappear after 4 to 10 years (Chambers, 2012a, 2012b, 2012c). Consequently while the R-Project may have a low-intensity impact on property values in the short-term, the impact would be negligible in the long term.

***Conservation Easements*****—**NPPD's final route would cross the eastern block of the Hansen Phase I conservation easement along the South Platte River. The potential for short-term resource damage from construction activities would be minimized through the implementation of avoidance, minimization, and mitigation measures to protect soils, vegetation, and wildlife. The use of low-ground-pressure tracked and rubber-tired equipment for ground-based access to the transmission line ROW is expected to minimize impacts to soils and vegetation over the long term. The length of the transmission line crossing would be approximately 1,960 feet. Based on an anticipated span length of 1,350 feet, one or two steel monopole towers could be constructed in the conservation easement area. Lands occupied by one or two poles would no longer provide the conservation values that inspired the original creation of the conservation easement. Those areas occupied by the poles would represent a minute portion of the more-than-220-acre conservation easement. Establishment and maintenance of the transmission line ROW may necessitate the permanent removal of trees and other vegetation, and the presence of transmission line structures may pose a risk of collision for migratory birds, diminishing the conservation value of the easement. NPPD would work with the landowner and the conservation administrator to determine the appropriate compensation for lost conservation value in accordance with the terms and provisions of the easement document.

NPPD's final route would also run outside the eastern boundary of the North Platte River Easement. No towers or other facilities would be built in the easement area. As with the Hansen Phase 1 conservation easement, however, the presence of transmission lines and towers may pose a risk of collision for migratory birds, diminishing the conservation value of the easement. NPPD would work with the landowner, the Field Supervisor of the Nebraska Ecological Service's Field Office, and the conservation administrator to determine the appropriate compensation for lost conservation value in accordance with the terms and provisions of the easement document. NPPD's final route would not cross or border any other conservation easements in the Project area.

**Indirect Effects**

No permanent indirect effects on land uses in the project area from the transmission line, substations, or access roads are anticipated. Construction of the transmission line is not expected to substantially increase the electrical supply in the project area, so the Project is not expected to foster economic or population growth.

By providing transmission access for future wind energy projects, the R-Project could lead to the development of more wind power generation in the study area. The number and location of any such projects is difficult to predict. The potential effects of future wind energy projects on land uses in the study area would be determined through NEPA analyses developed for those projects, if required. Additional information about the potential effects of future wind energy projects is presented in Chapter 4, *Cumulative Impacts*.

#### 3.8.2.3 Alternative B: Tubular Steel Monopole Structures Only

Under Alternative B, NPPD would construct the R-Project using steel monopole structures only. Installation of steel monopoles requires the establishment of work areas large enough to accommodate laying down the entire length of the poles. In addition, steel monopoles would be erected with ground-based equipment instead of helicopters. As a result, R-Project construction under Alternative B would result in a greater amount of temporary and permanent land disturbance at structure work areas and would entail more use of ground-based equipment (e.g., concrete trucks, cranes) than would be needed under Alternative A.

The route under Alternative B would be the same as under Alternative A and would be located in areas where such facilities are not prohibited by Federal, state, or local planning regulations. Other than the use of monopoles instead of lattice towers, all other aspects of the Project, including the Service's issuance of a permit and NPPD's performance of operation and maintenance activities, would be the same as Alternative A. The primary differences identified above would occur only in areas where lattice towers would be installed under Alternative A.

The types of direct and indirect, short-term and long-term effects of Alternative B on agricultural uses, utilities, and residential, commercial, and other land uses (including lands enrolled in the CSP, CRP, or CREP) would be the same as those described for Alternative A, but the intensity of those effects, specifically the amount of land disturbance, would be greater than under Alternative A. The route would cross the same parcels and affect the same public and private landowners. As under Alternative A, NPPD would establish an escrow account and finalize the Restoration Management Plan for the Project, work with landowners to avoid conflicts with center-pivots, negotiate with private landowners to acquire easements, and compensate landowners for the value of land occupied by transmission structures. In addition, NPPD would apply the design features and avoidance, minimization, and mitigation measures identified below and in Sections 3.5, *Vegetation*, and 3.17, *Socioeconomics*, to minimize or eliminate effects on agricultural operations. NPPD would also work with ranchers to avoid removing shelterbelts, calving areas, and other features landowners wish to protect.

Because construction of the R-Project under Alternative B would result in a greater amount of temporary and permanent disturbance of beetle habitat than under Alternative A, more area would need to be purchased and/or leased from a willing landowner for placement in the public domain. As under Alternative A, compensatory mitigation lands would be protected from development or conversion to row crops. NPPD would develop a management plan for the mitigation lands when they are acquired.

Because Alternative B would result in a greater amount of temporary land disturbance at structure work areas (including temporary access routes) and for emergency repairs (approximately 365 acres), the area of land temporarily unavailable for agricultural production would be greater under Alternative B than under Alternative A. On the other hand, the amount of area needed for helicopter fly yards and assembly areas would be lower because helicopters would not be used for lattice tower installation. Overall, approximately 1,872 acres would be temporarily disturbed, an increase of approximately 413 acres over Alternative A. The effects of temporary disturbance in cropland areas would likely be limited to a single growing season when construction is underway. As under Alternative A, the effects of disturbance to pasture or rangeland is likely to last longer than a single season.

Based on the increased area of temporary disturbance needed for construction access, combined with the assumption that approximately 10 percent of temporary access routes would be subject to permanent disturbance, Alternative B is expected to result in the conversion of approximately 77 acres of land to non-agricultural uses (25 more acres than under Alternative A). Similar to Alternative A, this would be a minute proportion of the agricultural acreage in the study area and is not expected to cause any substantial effects on agricultural activities over the long term.

The portions of the route that would cross the eastern block of the Hansen Phase I conservation easement and border the North Platt River conservation easement would be built with steel monopole towers under either alternative. Consequently, the effects of Alternative B on the conservation values of those easements would be the same as Alternative A.

### 3.8.3 Avoidance, Minimization, and Mitigation Measures

In addition to the pertinent measures identified in Section 3.5, *Vegetation*, and Section 3.17, *Socioeconomics*, NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on land use:

- Locate construction staging areas and tensioning and pulling sites adjacent to existing roads, where practicable based on availability and landowner approval.
- Use existing roads and two-tracks for access during construction based on availability and landowner approval; use low-ground-pressure tracked or rubber-tired equipment for overland access to minimize the potential for ground damage.
- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas where practicable based on availability and landowner approval.
- Restrict all construction vehicle movement outside the ROW to designated access routes and established roads other than for emergency situations.

- After construction, grade sites in cultivated agricultural areas to approximate original contours and compensate affected landowners for economic costs related to damage to agricultural uses.
- Time construction, whenever practicable, to minimize disruption of normal seasonal activities for agriculture (e.g., harvest) and coordinate construction activities with relevant agencies and/or landowners before construction.
- Provide advanced notice of construction activities, including use of helicopters, to landowners and residents potentially affected by construction activities to allow landowners to manage livestock as needed to avoid adverse effects on livestock operations.
- Provide adequate access to existing land uses during construction, and notify landowners of alternative access.
- Work with landowners on a case-by-case basis when siting structure locations to avoid removing shelterbelts and other features that landowners want NPPD to avoid.
- Avoid nighttime construction in proximity to noise-sensitive land uses (e.g., residences and recreation areas).
- Immediately after sections of grazing fencing are removed, install a temporary barrier across the section of removed fencing to prevent movement of grazing animals through the fenced area, and after construction in the area is complete, repair the section of removed fencing. Immediately close any gates opened to allow construction vehicles and equipment access to a construction area.
- Coordinate with landowners regarding relocation of cattle for grazing during construction at specific locations.
- Site structures to avoid conflicts with center-pivot sprinklers and minimize agricultural conflicts.
- Where overland travel is required to access the ROW for inspection or maintenance, use low-ground-pressure vehicles for ground patrols to minimize the potential for ground damage.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Following construction, revegetate temporary work and access areas to restore grasslands, and stabilize disturbed areas either through use of physical methods (e.g., matting or jute blankets) or vegetative cover.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review and approval to ensure permit requirements are met and successful restoration is implemented.

- Compensate private agricultural landowners for economic costs resulting from Project-caused removal of lands from the CRP or the CREP, as applicable.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.8.4 Effects Summary

Under either action alternative, the R-Project would result in short- and long-term, low- to moderate-intensity effects on land use. In the short term, construction of the transmission facilities may damage crops, interfere with planting schedules and harvest operations, impede access to fields or pasture lands, obstruct farm vehicles and equipment, or generate noise and fugitive dust that disturb livestock. These effects would likely be limited to a single growing season in cropland areas, possibly longer in pasture and rangeland areas and would, therefore, be of low intensity. Moreover, implementation of the R-Project under either action alternative would affect only a small proportion of the agricultural operations in the study area. Over the long term, most Project-related effects on land uses would also be low intensity. The Project would be consistent with local zoning and with management plans for state and Federal lands. Existing land uses at almost all locations would be able to continue without interruption. Moderate-intensity impacts to land ownership would result from NPPD's fee-purchase of approximately 25 acres of agricultural lands for new or expanded substations and from the fee-purchase and/or leasing of occupied beetle habitat for to mitigate for adverse effects on the beetle. The presence of transmission facilities along the eastern boundary of the North Platte River Easement crossing the eastern block of the Hansen Phase I conservation easement may not be compatible with the conservation purposes of those easements, also resulting in moderate-intensity impacts. The land use of acreage purchased for compensatory mitigation of the American burying beetle take is not anticipated to change and would remain in its current use whether used for grazing or hay production.

The implementation of avoidance, minimization, and mitigation measures described in Section 3.8.3 would reduce the magnitude and intensity of potential effects on land use. Consequently, implementation of Alternative A would not significantly affect land use resources.

The types of direct and indirect, short-term and long-term effects on land uses under Alternative B would be the same as under Alternative A, but the amount of area temporarily or permanently disturbed for construction and operation and maintenance of the Project would be greater under Alternative B. However, these areas would represent minute portions of the study area and the Project ROW, and NPPD would make the same commitments to avoid or minimize adverse effects on landowners as under Alternative A. For these reasons, Alternative B would have the same intensity of effects on land uses as Alternative A in both the short term and the long term and would not significantly affect land use resources.

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## 3.9 Recreation and Tourism

This section assesses the potential effects of the alternatives on recreation areas and recreational opportunities. Recreational development and tourism are also addressed. Section 3.9.1, *Affected Environment,* describes the recreation areas and recreational opportunities in the study area. The effects of the alternatives (including no action) are evaluated and compared in Section 3.9.2, *Direct and Indirect Effects*.

### 3.9.1 Affected Environment

This section presents an overview of recreation areas and recreational opportunities, including hunting and fishing, in the study area. Information is also provided about lands managed or identified by various agencies for parks, recreation, and/or preservation purposes. To provide context and to characterize the region, general information is provided for the study area as a whole (see discussion in Section 3.1, *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*). More detailed information is provided about recreation areas and recreational opportunities where transmission facilities would be constructed. The locations of recreation areas in the study area are depicted in Figure 3.8-1 in Section 3.8, *Land Use*. Developed recreation facilities include campgrounds, day-use areas, picnic areas, boat launches, and public parks. Dispersed recreation activities include hiking, biking, fishing, hunting, wildlife viewing, camping, sightseeing, and off-highway vehicle (OHV) use.

The study area contains numerous areas owned, managed, or identified by various agencies for parks, recreation, and/or preservation purposes. Recreational activities on public lands include those associated with NWRs, National Forests, SRAs, WMAs, scenic byways, and trails. Some private lands are open for hunting, fishing, camping, and golfing. Others are leased to hunters for a fee. Hunting and fishing are especially popular along the North and South Platte rivers and tributaries and in and around the many farm ponds and small lakes found in the study area. Communities, counties, school districts, and NRDs also provide outdoor recreation facilities.

The Sandhills region has great potential to expand and publicize its tourism and recreational development. Many people are attracted to the region, drawn by opportunities to participate in nature-based recreational activities, such as wildlife watching (including bison, butterflies, prairie chickens, and cranes), river floating, stargazing, and photography, and other recreational activities such as train watching. Organizations such as the Great Plains Ecotourism Council and the University of Nebraska's Center for Great Plains Studies are actively promoting nature-based tourism in the region. In 2012, the Center for Great Plains Studies created a map of the top 50 ecotourism sites in the Great Plains, based on a survey of naturalists in nine states with knowledge of Great Plains ecotourism (Center for Great Plains Studies 2016). One of the top 10 Great Plains ecotourism sites identified through that effort, the Switzer Ranch and Nature Reserve, is in the study area.

The following subsections identify recreation areas and recreational opportunities offered by Federal, state, and other agencies in the study area.

#### 3.9.1.1 Federal Recreation Areas and Opportunities

**National Forest and National Wildlife Refuge**

The Bessey Unit of the Nebraska National Forest provides a variety of outdoor recreational opportunities, include canoeing, swimming, auto tours, hiking, biking, horseback riding, hunting, fishing, wildlife and scenery observation, and OHV use. No designated campgrounds or other developed recreation sites are present on National Forest System lands in the study area. Special places include the Scott Lookout Tower and Charles E. Bessey Nursery.

The John W. and Louise Seier NWR is currently closed to the public. Birdwatching, wildlife observation, hunting, and photography are among the opportunities that may be provided to the public in the future. No projected date has been set for the opening of the refuge; one will be established upon the completion of a management plan (USFWS 2014b).

**National Trails**

The National Trails System Act of 1968 (16 U.S.C. §§ 1241–1251) authorized the creation of the National Trail System, consisting of National Historic Trails, National Scenic Trails, and National Recreation Trails. Four National Historic Trails have been identified in the study area. These trails, administered by NPS, recognize prominent past routes of exploration, migration, and military action and include lands in both public and private ownership. Nebraska's role as a preferred route for western migration makes the state central to the National Historic Trail System. In most areas outside state parks or national monuments, segments of National Historic Trails are privately owned, preventing continuous public access. Highways or secondary roads frequently parallel National Historic Trails, providing some access. Automobile routes have been designated and signed to provide travelers with a sense of the trail experience.

The following four National Historic Trails in the study area generally follow the course of the South Platte River:

- The Oregon Trail enters Nebraska near Steele City and follows the south bank of the Platte River westward. A segment of the Oregon-California Trails is evident in the study area and would crossed by NPPD's final route (Figure 3.10-1).
- The California Trail follows the Platte River Road westward from Fort Kearny.
- The Pony Express Trail generally follows the Oregon Trail route through the study area, diverging from the Oregon Trail in northeastern Colorado.
- The Mormon Pioneer Trail generally proceeds along the north bank of the Platte River westward from Omaha A segment of the Mormon Trail is evident in the study area and would be crossed by NPPD's final route (Figure 3.10-1).

Additional information about National Historic Trails in the study area is presented in Section 3.10, *Cultural Resources.*

A portion of the American Discovery Trail is in the study area. The American Discovery Trail enters the study area just east of Sutherland Reservoir, following Canal Road westward along the north shore of Sutherland Reservoir. The American Discovery Trail then extends north to cross I-80, the South Platte River, and U.S. Highway 30. North of U.S. Highway 30, the American Discovery Trail continues west along the Sutherland and Keith-Lincoln County canals, which lie just south of the North Platte River. The American Discovery Trail route continues along the Sutherland Outlet Canal to Lake Maloney (Figure 3.8-1).

Overall, the American Discovery Trail is a 6,800-plus-mile continuous, multi-use, non-motorized trail stretching from Cape Henlopen State Park in Delaware to Point Reyes National Seashore in California. The American Discovery Trail incorporates trails designed for hiking, bicycling, and equestrian use. Connecting 5 national scenic trails, 10 National Historic Trails, 23 National Recreational Trails, and many other local and regional trails, the American Discovery Trail is the backbone of the National Trails System. Over the years, several bills have been introduced in Congress to include the American Discovery Trail in the National Trails System and to create a new category of national trails named *Discovery Trails* with the American Discovery Trail being the first so designated. The American Discovery Trail is also one of 16 National Millennium Trails designated in 2000 by the White House Millennium Council.

#### Nationwide Rivers Inventory

NPS compiles and maintains the NRI, which is a register of rivers that may be eligible for inclusion in the National Wild and Scenic Rivers System. The intent of the NRI is to provide information to assist in making balanced decisions regarding use of the nation's river resources. The NRI is a listing of free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. The NRI is managed by the Rivers, Trails, and Conservation Assistance Program, which is the community-assistance arm of NPS. To be listed on the NRI, the free-flowing river segment must possess one or more of the following outstandingly remarkable values (ORVs): scenery, recreation, geology, fish, wildlife, prehistory, history, cultural, or other values. NPPD's final route would cross the three NRI river segments present in the study area—the Dismal, Middle Loup, and Calamus rivers (see Table 3.9-1 and Figure 3.8-1).

A presidential directive issued on August 2, 1979, requires Federal agencies to consult with the Rivers, Trails, and Conservation Assistance Program before taking actions that could result in adverse effects that effectively foreclose the Wild, Scenic, or Recreational River status of rivers in the NRI. Examples of potentially adverse effects on inventoried rivers include the following:

- Destruction or alteration of all or part of the free-flowing nature of the river
- Introduction of visual, audible, or other sensory intrusions that are out of character with the river or that alter its setting
- Deterioration of water quality
- Transfer or sale of property adjacent to an inventoried river without adequate conditions or restrictions for protecting the river and its surrounding environment

**Table 3.9-1. Nationwide Rivers Inventory River Segments in the R-Project Study Area**

| River | Location (counties) | Reach | Length (miles) | ORVs | Description |
|---|---|---|---|---|---|
| Calamus[a] | Garfield, Loup, Brown, and Rock | North Loup River to source | 71 | Scenery, Wildlife, Cultural | Meandering river in Grand Valley surrounded by low rolling hills; wintering bald eagle population; high potential for cultural resources of NRHP quality. |
| Dismal | Blaine and Thomas | Middle Loup River to source (confluence of North and South Forks) | 68 | Scenery | In Sandhills region, offers vistas of rolling prairie; trout fishery in upper reaches; highest-priority fishery resource. |
| Middle Loup | Blaine, Thomas, Hooker, and Cherry | Milburn Diversion Dam to source (confluence of North and South Branches) | 89 | Scenery, Fish, Wildlife | Good scenic qualities with occasional bluffs, scattered trees, good clear flow; highest-priority fishery resource; wintering bald eagles. |

Source: NPS (2009)

[a] When the Calamus River was originally listed in 1982, the listed segment extended 80 miles. In 1995, the 9-mile-long Calamus Reservoir was excluded from the NRI listing.

Actions that diminish the free-flowing characteristics or ORVs of a river segment could prevent the segment from qualifying for inclusion in the National Wild and Scenic Rivers System. Actions that increase the degree of evidence of human activity (i.e., the level of development) could lower the classification of the river segment (e.g., from Wild to Recreational).

#### 3.9.1.2 State Recreation Areas and Opportunities

As described below, state-managed recreation areas and recreational opportunities in the study area include SRAs, WMAs, trails, and scenic and historic byways.

**Nebraska Game and Parks Commission**

NGPC manages three SRAs in the study area: Long Lake SRA, Sutherland Reservoir SRA, and Calamus Reservoir SRA. Some SRAs are on properties owned by agencies such as public power and irrigation districts, USACE, or Reclamation. Only Sutherland Reservoir SRA is discussed in detail in this section because it is the only SRA that is in the vicinity of NPPD's final route (Figure 3.8-1). Calamus Reservoir SRA is located more than 10 miles from NPPD's final route, and Long Lake SRA is located more than 20 miles from NPPD's final route.

Sutherland Reservoir is a 3,017-acre lake located 3 miles south of the I-80 exit at Sutherland. NPPD owns and manages Sutherland Reservoir as part of its hydropower system. NGPC oversees most of the recreation areas at the lake. The area offers primitive camping, picnic areas, boating, jet skiing, hiking trails, fishing, and a swimming beach. Fifty nonelectrical pad sites and 35 non-designated sites are available for primitive camping. Primitive campsites are located on the east and west sides of the lake, while a private camping area with electrical hook-ups and a nine-hole golf course are located along the north shore. Four boat-launching ramps and two swimming areas are available. NPPD maintains a roost and perch tree protection program for eagles. During the winter, bird watchers can observe numerous wintering bald eagles.

In addition to the 12 public WMAs identified in Table 3.8-2 (in Section 3.8, *Land Use*), NGPC manages privately owned tracts of land in the study area that are open to public hunting under the Open Fields and Waters Program (see Figure 3.8-1). The goal of the Open Fields and Waters Program is to attract new or inactive hunters and anglers, especially into activities with expanding opportunities, such as deer and turkey hunting. The program also provides for the enrollment of lakes, ponds, rivers, and streams to create expanded opportunities for anglers.

The study area includes one regional trail and one canoe trail administered by NGPC. A portion of the Cowboy Recreation and Nature Trail passes through the northeastern corner of the study area but does not intersect with or pass near NPPD's final route. NGPC has designated the Calamus River between Nebraska Highway 7 and the Calamus Reservoir as a canoe trail, i.e., a water route characterized by easy-moving water with few riffles, small waves, and few obstructions (NGPC 2004). This and other rivers in the study area, including the Dismal River and Middle Loup River, provide opportunities for canoeing, kayaking, tubing, and other water-based recreational activities.

The study area also includes portions of two Priority Regional Trails corridors, which are areas designated to provide a focus for regional trail planning. Trails in these corridors become the spines that link features into a thematic network for recreation, transportation, interpretation, and discovery (NGPC 2004). The northern end of the North Loup corridor extends into the study area around Calamus Reservoir, and the northwestern corner of the Seven Valleys corridor intersects the study area between the Dismal River and the Bessey Ranger District.

The Priority Regional Trails concept is intended to focus attention of organizations, governments, and trail advocates on opportunities for trail development in Nebraska. In many of the Priority Regional Trails corridors, trail efforts are actively underway; in others, they remain possibilities that have in some cases been discussed but remain unimplemented (NGPC 2004).

#### Nebraska Department of Roads

Since 1994, NDOR has implemented a byways program, using a review and selection process to identify nine roads across the state that follow corridors of unusual scenic and historical importance and interest. These byways have generated regional associations, often supported by Resource Conservation and Development Councils, to market the corridor and its communities. Portions of two byways are located in the study area.

##### *Sandhills Journey Scenic Byway*

This 272-mile stretch of Nebraska Highway 2 through the Sandhills from Grand Island to the railroad community of Alliance has been named one of the 10 most scenic routes in the nation. The scenery includes the Sandhills, remote countryside, expansive farmland, marshes and wetlands, and winding rivers. Much of the Sandhills is considered remote and sparsely populated, yielding high visibility of the night skies. Because of elevation around 2,500 feet and the dry nature of the region, the haze is low and the transparency high, creating opportunities for star gazing. With the exception of new billboard construction, the Sandhills Journey Scenic Byway Corridor Management Plan (adopted November 2008) does not prohibit new construction or development. The Sandhills Journey Scenic Byway is located in the study area and would be crossed by NPPD’s final route (Figure 3.8-1).

#### *Lincoln Highway Scenic and Historic Byway*

The Lincoln Highway Scenic and Historic Byway is the only byway that traverses the entire state of Nebraska. Now known as U.S. Highway 30, this historic route follows the Oregon, California, Mormon Pioneer, and Pony Express Trails and the Union Pacific Railroad, which is part of the first transcontinental railroad. The Lincoln Highway Scenic and Historic Byway is located in the study area and would be crossed by NPPD’s final route (Figure 3.8-1)

### 3.9.1.3 Other Recreation Areas and Opportunities

Local parks provide a wide range of facilities, such as ball fields, playgrounds, picnic areas, tennis and basketball courts, swimming pools, and golf courses. Local parks provide open spaces and can help buffer residential communities from commercial and industrial properties and facilities. County fairs also provide events such as 4-H activities, softball games, fishing tournaments, parades, tractor pulls, rodeos, and barrel racing. School playgrounds and facilities can also be a recreational resource. Many school facilities are open to the public after school hours. Rivers in the study area offer good opportunities for fishing, canoeing, and wildlife viewing.

Private landowners offer campgrounds for recreational vehicles, motorized trails and parks, golf courses, game lodges, fishing access to rivers and streams, photography, and wildlife and nature viewing. A growing number of private businesses also cater to nature enthusiasts by providing lodging (working-guest ranches), canoe/kayak rentals, tubing, tanking (i.e., floating downstream in water or feeding tanks used for livestock), geocaching, horseback riding, and access to large tracts of private lands for wildlife viewing, hunting, and fishing. Most private hunting areas are used for agricultural purposes as well as recreation. Semi-public opportunities include scout and church camps, and outdoor shooting and archery facilities.

Snowmobiles may be operated on private property with permission and on public land where designated and as regulated by the agency or governing body that controls such use. Snowmobiles are also allowed on county roads and county road ROWs.

The Sutherland Flat Rock Riders OHV Park is located just west of Sutherland Reservoir off Highway 25 about 2 miles south of Sutherland. The 30-acre park offers both dirt bike and ATV courses and is managed by the private Flat Rock Riders Association. NPPD owns the 30 acres where the park is located.

### 3.9.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term effects of the alternatives, including the No-action Alternative, on recreational use areas or facilities (e.g., trails, campgrounds) crossed or bordered by NPPD's final route and nearby areas or facilities where temporary road or site closures could influence use levels. Potential effects on recreational opportunities, including hunting, fishing, and other nature-based recreational activities, are also addressed. Effects on recreation-based tourism are expected to parallel those on recreation—that is, adverse effects on recreation areas or recreational opportunities are expected to translate into reductions in recreation-based tourism. Definitions for duration and intensity developed for this Project are described in Table 3.1-2. Assessments of the effects of the alternatives are based on the potential for construction, operation, or maintenance of transmission facilities to affect access to or use of recreational areas and facilities, as indicated by the presence of proposed transmission facilities in identified recreational areas. The avoidance, minimization, and mitigation measures that NPPD would employ under either action alternative to avoid or reduce adverse effects on recreation and tourism are identified in Section 3.9.3.

#### 3.9.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Therefore, access to recreational areas and facilities in the short term would not be affected and recreational use of these areas would not be affected in the long term.

#### 3.9.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

##### Direct Effects

Discussions in this section identify the potential direct effects of Alternative A construction, operation, and maintenance on recreational opportunities and recreational use areas or facilities (e.g., trails, campgrounds) crossed or bordered by NPPD's final route and nearby areas or facilities where temporary road or site closures could influence use levels. Analyses identify federal, state, and other recreation areas and facilities that would be crossed by NPPD's final route and describe potential short-term (i.e., during construction, maintenance, and emergency repairs) and long-term (i.e., during operation) effects of Alternative A.

NPPD has proposed a suite of avoidance, minimization, and mitigation measures, described later in this section, to avoid or reduce the magnitude of impacts on recreation facilities and opportunities (NPPD 2015a). The effects analyses below are based on the expectation that these measures would be implemented as appropriate during Alternative A construction, operation, and maintenance.

##### *Federal Recreation Areas and Opportunities*

NPPD's final route would be located more than 5 miles from the John W. and Louise Seier NWR. Temporary road closures during Project construction would have limited effects, if any, on access to the NWR (if the NWR opens to the public before construction is completed) because multiple roads provide access from both Highway 7 and Highway 183 to the NWR. Also, as discussed in Section 3.11, *Transportation*, no substantial disruptions of traffic flow in the study area are expected.

Temporary road closures during Project construction would have limited effects, if any, on access to the Nebraska National Forest because NPPD's final route would not cross the primary access route (Gaston Road) to the Bessey Unit of the Nebraska National Forest and no closures of that road would be required. NPPD's final route would follow, but be outside of, the western boundary of the Bessey Unit for approximately 1 mile and would not cross any National Forest System lands. Recreational users in that portion of the Forest may be aware of construction activities and of the presence of transmission towers and lines when construction is complete. It is unlikely, however, that use of these areas would change noticeably in response to the presence of transmission facilities because no developed recreation facilities are in that portion of the Forest and an existing 115 kV transmission line runs through the area. Potential aesthetic impacts on recreational users are addressed in Section 3.12, *Visual Resources and Aesthetics*.

NPPD's final route would cross four National Historic Trails—Oregon Trail, California Trail, Pony Express Trail, and Mormon Pioneer Trail—as well as the American Discovery Trail, near Sutherland. Possible construction-related effects on recreational users would include noise from construction vehicles, equipment, workers, and activities; fugitive dust from construction activities; access restrictions; and visual distractions that might degrade the recreational experience of users viewing the trails in a historical context. Some of these effects would be short term, localized, and limited to the construction phase of the Project. However, degradation of the visual experience of recreational users would be a long-term impact. During peak construction periods, traffic in the vicinity of these crossings may be delayed, affecting the traveling public. No substantial disruptions of traffic flow are expected, however. As discussed in Section 3.11, *Transportation*, NPPD would work with NDOR and the Nebraska State Patrol to determine and implement appropriate procedures for lane and road closures, including plans for the timing of such closures. Any closures would last for a few minutes at a time and would occur during a period of only a few days to a few weeks when construction activities are underway at a given location. Alternative A would, therefore, not be expected to adversely affect recreational use of National Historic Trails or the American Discovery Trail in either the short term or the long term. Potential effects on historical resources associated with those trails are addressed in Section 3.10, *Cultural Resources*. Potential aesthetic effects on trail users are addressed in Section 3.12, *Visual Resources and Aesthetics*.

NPPD's final route would cross NRI-listed segments of the Calamus, Dismal, and Middle Loup rivers. Construction activities would be short term and temporary and thus are not expected to affect the eligibility of these rivers for listing in the National Wild and Scenic Rivers System. Over the long term, the presence of transmission lines at the river crossings, and of transmission towers near those crossings, could constitute the introduction of visual intrusions that are out of character with these rivers or that alter their setting. Scenery is identified as an ORV for each of the NRI-listed segments. Transmission facilities would be readily apparent to recreational users and would increase the degree of evidence of human activity on these river segments. At one crossing location (Dismal River), the transmission line would be parallel to an existing bridge on Highway 83, where human activity is already evident. If the presence of the transmission facilities causes recreational use of these river segments to decrease, then such decreases would be considered a moderate-intensity impact. As required under the 1979 presidential directive on Wild and Scenic Rivers, the Service has consulted with the NPS Rivers, Trails, and

Conservation Assistance Program. In a letter dated April 15, 2016, NPS recommended measures to avoid or eliminate impacts on river values and mitigate unavoidable impacts to the greatest extent possible. NPPD incorporated a number of these measures into the Project (see Section 3.9.3, *Avoidance, Minimization, and Mitigation Measures*). NPS indicated no further consultation is required for this Project. Potential aesthetic effects on river users are addressed in Section 3.12, *Visual Resources and Aesthetics*.

#### *State Recreation Areas and Opportunities*

NPPD's final route would not pass through any SRAs or WMAs. The only such areas within 2 miles of NPPD's final route would be the Sutherland Reservoir SRA (0.25 mile away) and Goose Lake WMA (approximately 1 mile away). Potential effects on recreational users of the Goose Lake WMA from NPPD's final route may include temporary delays in access and potential visual intrusion of the landscape. Access delays are not likely to occur because Project construction is not expected to necessitate the closure of any primary roads that provide access to the WMA. The presence of transmission facilities 1 mile away is not expected to have any long-term effects on recreational use of the Goose Lake WMA, although the visual intrusion may detract from the experience of WMA users. Potential effects on the visual quality of the landscape near the WMA are discussed in Section 3.12, *Visual Resources and Aesthetics*.

Construction activities near the Sutherland Reservoir SRA would not affect access to the SRA because construction under Alternative A would not necessitate the closure of the access road. Construction-related noise, fugitive dust, and traffic are expected to have direct, adverse effects on visitors' enjoyment of recreational facilities on the reservoir's southern and eastern sides. Because construction activities would occur over a relatively brief period (a few days to a few weeks), and because access would not be affected, no substantial changes in use of those facilities would be likely; construction-related effects on recreational users of the Sutherland Reservoir SRA would thus be considered low intensity. Based on the presence of several existing transmission lines and power generation facilities at the GGS Substation near the Sutherland Reservoir, the addition of the R-Project transmission line would not substantially alter the landscape in this area and is not expected to result in any long-term changes in recreational use of the SRA.

NPPD's final route would cross a NGPC-designated canoe trail on the Calamus River and other rivers where recreational boating takes place. Possible construction-related effects on recreational users of these rivers would include noise and fugitive dust from vehicles, equipment, workers, and activities. Temporary road closures could cause delays in access to put-in and take-out sites. Any such effects would be brief and are not expected to adversely affect recreational users. No river reaches would be closed to recreational use during construction. If any recreational users approach an active construction area, NPPD would temporarily cease overhead work until the recreational users have left the area. Over the long term, the presence of the transmission line would not affect the accessibility of these river reaches to recreational users. Potential aesthetic impacts on river users are addressed in Section 3.12, *Visual Resources and Aesthetics*.

NPPD's final route would cross the Lincoln Highway Scenic and Historic Byway east of Sutherland and the Sandhills Journey Scenic Byway and Seven Valleys Priority Regional Trails Corridor east of Thedford. Possible construction-related effects on recreational users would include noise and fugitive dust from vehicles, equipment, workers, and activities. These effects would be short term, localized, and limited to the construction phase of the Project. In addition, traffic in the vicinity of these crossings may be delayed during peak construction periods, affecting the traveling public. As discussed in Section 3.11, *Transportation*, however, no substantial disruptions of traffic flow are expected.

Over the long term, the presence of transmission facilities crossing the Lincoln Highway Scenic and Historic Byway on U.S. Highway 30 would not substantially alter the landscape in this area because residential and commercial development and the Union Pacific Railroad have been present in this area for many years. Construction of transmission facilities across the Sandhills Journey Scenic Byway would be consistent with the management plan for that corridor, which explicitly allows new construction and development along the corridor (except for billboards, which are not allowed along scenic byways in Nebraska) (Sandhills Journey Scenic Byway Organization 2008). Where NPPD's final route would cross the Seven Valleys Priority Regional Trails Corridor, NPPD would work to minimize effects on the trail's lightly traveled county roads; therefore, Alternative A is not expected to adversely affect recreational use of the scenic byways or the priority regional trails corridor in either the short term or the long term. Potential aesthetic impacts on byway drivers and trail users are addressed in Section 3.12, *Visual Resources and Aesthetics*.

Because NPPD's final route would not cross the Cowboy Trail or the North Loup Priority Regional Trails Corridor, it is not expected to affect recreational use of either of these trails.

#### *Other Recreation Areas and Opportunities*

Possible direct impacts on recreational users of private lands, local parks, school grounds, and other recreational facilities would include noise from construction vehicles, equipment, workers, and activities; fugitive dust from construction activities; and access restrictions. These effects would be short term, localized, and limited to the construction phase of the Project and would thus be low intensity. Over the long term, the presence of transmission lines would not affect the accessibility of these areas to recreational users. Potential aesthetic impacts on recreational users of these facilities are addressed in Section 3.12, *Visual Resources and Aesthetics*. Because NPPD's final route would not pass within 2 miles of the Sutherland Flat Rock Riders OHV Park, it is not expected to affect use of that facility.

### Indirect Effects

Recreational users of some facilities and areas may temporarily shift use patterns in response to construction-related noise and disturbance, seeking recreational opportunities in other areas nearby. Any increases in visitation to other recreation areas would likely be temporary and would be limited to the period when construction activities are underway.

Hunting opportunities could be indirectly affected by Alternative A if construction noise and human activity displace game species from popular hunting areas. Any such effects would be localized and temporary and would be limited to the period when construction activities are underway.

The presence of new transmission facilities in the Project area is not expected to result in any long-term, indirect effects on recreational opportunities.

#### 3.9.2.3 Alternative B: Tubular Steel Monopole Structures Only

Under Alternative B, NPPD would construct the R-Project using steel monopole structures only. Installation of steel monopoles requires the establishment of larger work areas than is typically needed for lattice towers. In addition, steel monopoles would be erected with ground-based equipment instead of helicopters. As a result, construction of Alternative B would result in a greater amount of construction-related disturbance at structure work areas and for access routes and would entail more use of ground-based equipment (e.g., concrete trucks, cranes) than would be needed for Alternative A.

The R-Project would follow the same route under Alternative B as under Alternative A. Other than the use of monopoles instead of lattice towers, all other aspects of the Project, including the Service's issuance of a permit and NPPD's performance of operation and maintenance activities, would be the same as Alternative A. In almost all respects, therefore, the direct and indirect, short-term and long-term effects of Project construction, operation, and maintenance on recreational opportunities and recreational use areas or facilities under Alternative B would be the same as Alternative A. In areas where Alternative B would entail the installation of monopoles rather than lattice towers, the likelihood of construction-related effects on recreational users would be greater than under Alternative A.

Under Alternative B, monopoles, rather than lattice towers, would be installed in the following recreational use areas:

- Bessey Unit of the Nebraska National Forest
- NRI-listed segments of the Calamus and Middle Loup rivers
- NGPC-designated canoe trail on the Calamus River
- Sandhills Journey Scenic Byway

Recreational users in these areas and others where monopoles would be used would be more likely to experience construction-related effects (such as noise from construction vehicles, equipment, workers, and activities; fugitive dust from construction activities; access delays or restrictions; displacement of game species from popular hunting areas) under Alternative B, compared to Alternative A:

As described for Alternative A, construction-related effects on recreational users in all affected areas would be short-term, localized, and limited to the construction phase of the Project. As discussed in Section 3.11, *Transportation*, NPPD would work with NDOR and the Nebraska State Patrol to determine and implement appropriate procedures for lane and road closures, including plans for the timing of any road closures. No substantial disruptions of traffic flow, including access to recreational areas, are expected. For these reasons, the intensity of construction-related effects under Alternative B would be the same as Alternative A.

In general, the long-term effects on recreational opportunities and recreational use areas and facilities under Alternative B would be the same as Alternative A. The presence of transmission lines would not affect the accessibility of recreational areas to users. At most designated recreational sites, transmission facilities are not expected to have substantial visual impacts on most recreational users, either because the structures would be far away or because they would appear in an already-modified landscape. In areas where monopoles would be used instead of lattice towers (such as at the crossings of the NRI-listed segments of the Calamus and Middle Loup rivers), the visual impacts of the Project may be less than under Alternative A, at least at relatively short viewing distances. Nevertheless, while the overall visual impact of Alternative B would be less than that of Alternative A, the intensity of location-specific effects on visual quality would be the same as for Alternative A. The potential visual impacts of transmission facilities on recreational users are addressed in Section 3.12, *Visual Resources and Aesthetics*.

### 3.9.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate adverse effects on recreation and tourism:

- Time construction, whenever practicable (i.e., to the extent that timing adjustments can be incorporated into the Project schedule without affecting the Project completion date or cost), to avoid peak use periods (i.e., weekends and holidays) at natural resource areas, parks, and recreation areas and coordinate construction activities with relevant agencies and/or landowners prior to construction.
- Provide advance notice of construction activities to landowners and residents potentially affected by construction activities, provide adequate access to existing land uses during periods of construction, and notify landowners of alternative access.
- Avoid nighttime construction near noise-sensitive land uses, such as recreation areas.
- Span rivers and streams at locations with existing bridge crossings where such infrastructure is available.
- If any recreational river users approach an active construction area, temporarily cease overhead work until the recreational users have left the area.
- To reduce potential impacts on recreation values and safety, place transmission line structures at highway and trail crossings at the maximum feasible distance (within design and engineering limits) from the crossing.

- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.9.4 Effects Summary

Under either action alternative, the R-Project would result in short- and long-term, primarily low-intensity effects on recreation and tourism. The majority of adverse effects would be direct and would occur during Project construction. Construction-related effects could include noise from construction vehicles, equipment, workers, and activities; fugitive dust from construction activities; and access restrictions. At any given location, such effects would occur over a relatively brief period (a few days to a few weeks) and are not expected to result in substantial changes in the use of recreational areas or facilities; construction-related effects on recreational users would thus be considered of low intensity. Over the long term, the presence of transmission facilities in or near recreation areas (including National Historic Trails, NRI-listed river segments, and the Goose Lake WMA) may create visual disturbances that affect user experience. In most areas, the implementation of avoidance, minimization, and mitigation measures described previously would reduce the magnitude of potential effects on recreation and tourism and the impacts on recreational users would be of low intensity. However, if the presence of the transmission facilities causes recreational use of NRI-listed river segments to decrease, then such decreases would be considered moderate-intensity impacts. Implementation of Alternative A would not significantly affect recreational resources.

The direct and indirect, short-term and long-term effects on land uses under Alternative B would be the same as Alternative A, and the intensity of those effects would be the same. In areas where monopoles would be used instead of lattice towers (such as at the crossings of the NRI-listed segments of the Calamus and Middle Loup rivers), the visual impacts of the Project may be less than under Alternative A. Implementation of Alternative B would not significantly affect recreational resources.

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## 3.10 Cultural Resources

This section describes cultural resources that have been identified to date along NPPD's final route. Cultural resources are expressions of human culture and the physical remains of human activities. They include locations that were used, built, or modified by people, such as archaeological and historic sites, buildings, structures, objects, and landscapes. Natural features and biota considered important to human communities can also be considered cultural resources. Particular concentrations of these resources may be identified as historic districts or cultural landscapes. Cultural resources also include aspects of the physical environment that are a part of traditional lifeways and practices, and are associated with community values and institutions.

Source: NSHS RG. 3371, photographer unknown

*On the Oregon Trail. Starting in 1841, pioneers like these crossed the Nebraska plains heading west to the "land of promise."*

In general, prehistoric resources are those that predate written records and therefore are associated with cultural activities that occurred before European contact and settlement in the New World. Historic resources are those that date to the period of written records that came with the beginning of European settlement, and therefore have origination dates that vary from region to region.

Archaeological resources refer to areas of past human activity (either prehistoric or historic) defined by artifacts or human-built features. Architectural resources are generally parts of the historic built environment and include historic districts, buildings, structures, and objects. Ethnographic resources are directly associated with the cultural practices and beliefs of living cultures; the identification of these resources requires consultation with the communities that maintain active connections to these resources.

### 3.10.1 Regulatory Framework

The term "cultural resources" is not defined in NEPA or any other Federal law. However, several laws and executive orders deal with particular kinds of resources that are cultural in character. Most pertinent to the proposed Project are the following regulations:

- NEPA itself, and the CEQ regulations, require that agencies consider the effects of their actions on all aspects of the "human environment." Humans relate to their environment through their culture, so the cultural aspects of the environment must be considered in NEPA analyses. These aspects include, for example, cultural uses of the natural environment, the built environment, and human social institutions.
- The National Historic Preservation Act (NHPA) sets forth government policy and procedures regarding "historic properties," which are districts, sites, buildings, structures, and objects listed in, or eligible for listing in the NRHP, including artifacts, records, and material remains related to such properties. Section 106 of NHPA requires that Federal agencies consider effects of their actions on such properties, following regulations issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR 800).

#### 3.10.1.1 Section 106 of the National Historic Preservation Act

**Federal Undertaking**

The Service's issuance of a federal permit is an "undertaking" under Section 106 of the NHPA. The Service has assumed the status of lead federal agency under Section 106 and is required to consider the effects of the proposed undertaking on any historic properties within the Project's Area of Potential Effects (APE). As the lead agency, the Service will coordinate with other jurisdictional agencies to ensure its Section 106 responsibilities are met. In addition, the Service is obligated to consult with the Nebraska SHPO, federally recognized Indian tribes, parties with special expertise, local governments, and any other interested parties or individuals regarding the proposed undertaking and its potential effects on historic properties. ACHP will be invited to consult if adverse effects to historic properties are identified.

**Section 106 Process**

The implementing regulations of Section 106 are found in 36 CFR Part 800. These regulations establish a process of: 1) identifying historic properties that may be affected by the proposed undertaking; 2) assessing the undertaking's effects on those resources; and 3) engaging in consultation that seeks ways to avoid, reduce, or mitigate any effects on NRHP-listed, eligible, or undetermined properties. These components of the process are described in more detail below.

**Identifying Historic Properties**

A historic property is defined as any district, site, building, structure, or object that is either listed in, or eligible for listing in the NRHP. Traditional Cultural Properties (TCPs) can be considered historic properties if they are associated with cultural practices or beliefs of a living community that: 1) are rooted in that community's history, and 2) are important in maintaining the continuing cultural identity of the community. TCPs are identified through consultation with

Native American tribes and other communities that may have a connection with areas within the APE. Resources with undetermined eligibility are considered as potentially eligible resources until determined otherwise.

To qualify for listing in the NRHP, cultural resources must be determined as significant (under at least one of four criteria of significance), must possess sufficient integrity to convey this significance, and must generally be at least 50 years old. Efforts to identify historic properties include reviews of background research, consultation, public scoping, sample field investigations, and field surveys.

A cultural resource is deemed significant if it qualifies under at least one of the following criteria (36 CFR 60.4 [a–d]):

- Criterion A: associated with events that have made a significant contribution to the broad patterns of American history
- Criterion B: associated with the lives of past significant persons
- Criterion C: embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- Criterion D: has yielded, or may be likely to yield, information important in history or prehistory

The resource must also possess sufficient historical integrity to be deemed significant. The seven aspects of integrity include location, design, setting, materials, workmanship, feeling, and association. Depending on the resource, certain aspects of integrity are more important for conveying its importance; not all aspects of integrity need to be present for a resource to retain the integrity required to convey its significance. Except under exceptional circumstances, a resource must be at least 50 years old to qualify as eligible for listing in the NRHP.

#### Assessing Effects

If the Service identifies historic properties that may be affected by the undertaking, the agency shall notify all consulting parties, including Indian tribes, to invite their views on the effects and to assess adverse effects. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for listing in the NRHP in a manner that would diminish the integrity of the property. Effects on a historic property include, but are not limited to, destruction or alteration of all or part of a property; isolation from or alteration of its surrounding environment; introduction of visual, audible, or atmospheric elements that alter characteristics of the property that qualify it for listing; transfer or sale of a federally owned property without adequate conditions or restrictions regarding preservation, maintenance, or use; and neglect of a property resulting in its deterioration or destruction.

#### Resolving Adverse Effects

To resolve adverse effects, the Service is obligated to continue the consultation process to develop and evaluate alternatives or modifications to the undertaking that may avoid, minimize or mitigate adverse effects on historic properties. Measures may include shifting the installation of ground-disturbing features such as transmission poles, rerouting access routes, excavating archaeological sites, or pursuing creative mitigation measures to offset unavoidable impacts.

The lead agency is responsible for implementing ways to follow the Section 106 process. As such, methods used to identify historic properties, assess effects, and develop treatment plans depend on guidance provided by the Service through its own policy. It also depends on the agency's ongoing consultation with other federal and state agencies, such as the Nebraska SHPO, and with applicable tribal governments.

### 3.10.1.2 R-Project Section 106 Consultation

The consultation process for the R-Project began as part of the NEPA scoping process. On October 30, 2014, the Service issued an NOI in the *Federal Register* to prepare an EIS under NEPA for the proposed Project. Along with the NOI, the Service notified the public of its intent to conduct a parallel Section 106 process in conjunction with the NEPA compliance process and asked for input regarding cultural resources. Three public meetings were held between November 18 and November 20, 2014, in Burwell, Sutherland, and Thedford, Nebraska.

On October 17, 2014, the Service initiated consultation with the following Native American tribes by letter:

- Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana
- Cheyenne and Arapaho Tribes, Oklahoma
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
- Northern Arapaho Tribe
- Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
- Oglala Sioux Tribe
- Omaha Tribe of Nebraska
- Pawnee Nation of Oklahoma
- Ponca Tribe of Nebraska
- Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Nation of Oklahoma
- Sac and Fox Tribe of the Mississippi in Iowa

- Santee Sioux Nation, Nebraska
- Standing Rock Sioux Tribe of North and South Dakota
- Winnebago Tribe of Nebraska
- Yankton Sioux Tribe of South Dakota

On December 1, 2014, the Northern Arapaho Tribe from St. Stephens, Wyoming, responded that if the viewshed does not contain any historic properties, there would be “no effect” to cultural and historical properties from NPPD’s final route. If there are any inadvertent discoveries, such as human remains, found during ground-disturbing activities related to the Project, the Northern Arapaho Tribe requests that they be contacted and provided a copy of the report. Additional letters will be sent to all tribes if there are any changes to the undertaking or Project alternatives.

On February 24, 2016, the Service sent a second letter to tribes detailing NPPD’s final route and requesting consultation.

On February 29, 2016, in response to an additional coordination letter that the Service sent on February 24, 2016, the Ponca Tribe of Nebraska responded that it has an interest in any work done in Knox, Antelope, Holt, and Garfield counties. The tribe would like to be kept informed of any work that will be done in those areas.

The Service will continue to solicit input from appropriate Indian tribes and formally invite them to participate in the Section 106 consultation process by identifying the APE and requesting comment.

The Service accepted the Nebraska SHPO’s request to be a cooperating agency for the NEPA process based on its special expertise with the NHPA. Informal communication with Nebraska SHPO began in September 2015. On October 26, 2015, and September 20, 2016, the Service conducted field visits with interested parties, including the Nebraska SHPO, to areas of interest in Lincoln County, including O’Fallon’s Bluff, the Mormon Pioneer Trail, and Birdwood Creek. On June 27, 2016, the Service sent a letter to the Nebraska SHPO to request formal consultation regarding the proposed APE, which was defined as the permit area plus the MBCP area, or approximately 200 miles of the 225-mile-long corridor, and also to request that the Nebraska SHPO review POWER Engineers’ 2015 Cultural Resources Report (Bedingfield and Webb 2015).

On July 21, 2016, the Nebraska SHPO responded to the Service’s June 27, 2016, letter regarding the APE and the 2015 Cultural Resources Report review. The Nebraska SHPO understood the APE to include the entire R-Project. A review of the five archaeological sites identified in the 2015 report and effects determinations were included in this letter.

A consultation meeting was held at the Nebraska SHPO office on September 21, 2016. At this meeting, the APE was revised to include the entire length of the R-Project (225 miles) and the APE for direct and indirect effects was discussed.

On November 29, 2016, the Service sent a letter to the Nebraska SHPO revising the APE based on a re-examination of what constitutes a Federal undertaking as defined in the NHPA regulations. The Service understands the Federal undertaking as limited to issuance of a permit for the beetle and implementation of terms and conditions and required measures in the associated HCP. The extent of the MBCP area is a recommendation, not a requirement, forwarded by the Service, and thus does not constitute part of the Federal undertaking. Based on the permit area for the beetle, the Service defines the APE as extending from Stapleton, Nebraska, to an existing Western transmission line near Clearwater, Nebraska, a distance of approximately 162 miles.

On December 6, 2016, the Service met with the Nebraska SHPO, NPPD, and POWER Engineers to discuss and determine appropriate cultural resource survey procedures.

On December 16, 2016, the Nebraska SHPO responded to the Service to formally disagree with APE revisions detailed in its November 29, 2016, letter. Consultation regarding the undertaking, the APE, and identification of resources is ongoing.

The Service is currently identifying other groups that may have an interest in, or specific expertise with, resources in the study area. In addition to the tribes listed above, the Service will formally invite other interested parties to become consulting parties in the Section 106 process.

### 3.10.2 Affected Environment

This section describes cultural resources that have been identified to date. Identification of cultural resources within the study area is ongoing. Efforts to identify and evaluate historic properties include, but are not limited to, reviews of NSHS records, public scoping, field investigations, and archaeological field surveys. To date, pedestrian surveys have been conducted by POWER Engineers in 2015 (Bedingfield and Webb 2015) and 2016 (Bedingfield and Tucker 2016) as right-of-entry has been obtained, and a final field season has been scheduled for 2017.

#### 3.10.2.1 Geographic Scope

The analysis of cultural resources for the Project is being conducted at various scales, starting with the largest scale of the study area. During the route selection process, NPPD defined a large study area encompassing 7,039 square miles. NPPPD’s study area for its route selection process was selected as the study area for the DEIS to characterize cultural resources in the region. This study area includes portions of the Central Great Plains, Nebraska Sandhills, and High Plains ecoregions, which contain cultural resources from human settlement and other activities over the last 10,000 to 12,000 years (NPPD 2015a).

The majority of the study area is located in the Sandhills ecoregion, composed of large, moderately stabilized sand dunes. These landforms developed 8,000 years ago and much of the archaeological evidence of the earliest human occupation in the area is located within or below the dunes, suggesting that there may be more evidence of prehistoric occupation of the area than what is visible on the surface (NPPD 2015a). The Sandhills is subject to continual Aeolian activity that may also obscure evidence of relatively recent human occupations. This region has been subjected to very little archaeological investigation to date. However, based on limited previous investigations, there is likelihood of intact buried cultural deposits throughout the region.

The probability of encountering archaeological sites is anticipated to be higher along major drainages in the study area, including the North and South Platte, Middle and North Loup, Dismal, and Calamus rivers. This assessment is based on archaeological knowledge of prehistoric use of the region, as explicated by the Nebraska SHPO to the Service in early communications regarding this Project. Architectural historic resources throughout the study area have been subjected to more extensive documentation and are concentrated within towns and villages. Intact, high-quality segments of historic transcontinental trails such as the Oregon-California Trails and the Mormon Trail are located in the southwestern portion of the study area and would be crossed by the R-Project.

#### 3.10.2.2 Area of Potential Effects

Under Section 106 of the NHPA, the APE is defined as the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR Part 800.16(d)). Section 106 obligates the Service, as the lead federal agency, to determine and document the APE in consultation with the Nebraska SHPO (36 CFR Part 800.4(a)). The Service has defined the APE as the permit area depicted in Figure 1-3, which is considered the extent of its jurisdiction. This area includes approximately 162 miles of the total 225-mile proposed transmission corridor (see Figure 1-3, which shows the HCP permit area). The width of the APE is different for direct and indirect effects. For purposes of evaluating potential direct effects of the federal undertaking, intensive pedestrian surveys were conducted in the following areas:

- Out to 150 feet on each side of the transmission line centerline for a 300-foot-wide survey corridor
- Out to 50 feet each side of the centerline of access routes that occur outside the transmission line survey corridor for a 100-foot-wide survey corridor
- The disturbance area and out to 50 feet beyond the disturbance area for pulling and tensioning sites, fly yards/assembly areas, and construction yards/staging areas

For purposes of evaluating potential indirect (i.e., visual) effects upon specific cultural resources and historic resources, in particular, a viewshed analysis is being conducted for all areas within 10 miles of the transmission centerline for a 20-mile-wide corridor. The APE revisions and survey extent resulted in part from the September 21, 2016, meeting at the Nebraska SHPO office; the Service documented the revised APE and survey extent in the November 29, 2016, letter to the Nebraska SHPO previously discussed. The direct and indirect APE survey extent and descriptions were mutually agreed upon among the Service, the Nebraska SHPO, and NPPD at a meeting in Columbus on December 6, 2016, and documented in a December 16, 2017, letter from the Nebraska SHPO to the Service. The direct and indirect APE survey extent and descriptions were mutually agreed upon among the Service, Nebraska SHPO, and NPPD at a meeting in Columbus on December 6, 2016, and documented in a December 16, 2017, letter from the Nebraska SHPO to the Service.

#### 3.10.2.3 Cultural History

The following section provides a cultural-historical background for the study area, drawn from relevant sections of the cultural resources survey report completed for this Project (Bedingfield and Webb 2015), as well as information about the Sandhills region obtained from the Nebraska SHPO (NSHS 1999) and the NSHS website (NSHS 1998).

The prehistory of present-day Nebraska is traditionally divided into four cultural periods known as the Paleoindian Period, the Archaic Period, the Plains Woodland Period, and the Central Plains Village Period. These periods are described below in the Prehistoric Setting section. Following the Central Plains Village Period, the Large Village and Nomadic Period continued after Euro-American contact and is described in the Historic Setting section below. The remainder of the Historic Setting section discusses Euro-American settlement of the area.

**Prehistoric Setting**

***Paleoindian Period (12,000 to 9,000 years ago)***

The first people to inhabit the area followed the seasonal movements of large game such as mammoth and large forms of bison and lived in temporary base camps. Their diet was supplemented by gathering edible wild plants. Long-term occupations from this period are generally rare, and none have been found in Nebraska (Bedingfield and Webb 2015; Holen 1990). One of the more well-known sites is the Hudson-Meng site located north of present-day Crawford, Nebraska, which is outside the study area in the northwestern corner of the state. Evidence of this early period has the following general attributes:

- Fragments of flaked-stone spear points
- Kill sites containing the bones of mammoths, ground sloths, camels, and extinct forms of bison

***Archaic Period (9,000 to 2,000 years ago)***

The Archaic Period in the area coincides with a global shift in climatic conditions and the extinction of many of the large Pleistocene animals. Grasslands, a warmer climate, and the appearance of smaller animal species, similar to those found today, replaced the cool, moist climate, forests and large animal populations of the Paleoindian Period. People continued to migrate in search of resources but became less nomadic and more regionalized. This period of occupation was interrupted by what appears to have been approximately 3,000 years of dry/warm weather conditions. No permanent villages from this period are known to exist in the area, but people may have returned to the same location seasonally. By 5,000 Before Present, the climate became more hospitable and people returned to the area. Evidence of this early period has the following general attributes:

- Greater diversity in tool types and styles
- Development of distinct regional styles of stone tools

#### *Plains Woodland Period (2,000 to 1,000 years ago)*

This period is marked by the introduction of some new technologies from sources to the west and from the eastern woodlands. The major innovations included the bow and arrow and pottery. Subsistence patterns changed dramatically during the Plains Woodland Period. While people continued to rely on hunting and gathering, they also began to plant corn and sunflowers for the first time. While hunting and gathering continued to be a major form of subsistence (NSHS 1999), people adopted a more sedentary lifestyle, constructed the first semi-permanent, year-round settlements, constructed small lodge structures made from woven saplings covered with brush or hides, and buried their dead in mounds. Evidence of this period has the following general attributes:

- Bow-and-arrow technology becoming more prevalent
- First appearance of pottery

#### *Central Plains Period (1,000 to 500 years ago)*

With the beginning of the Central Plains Period, human populations on the plains rapidly increased. The introduction of horticulture coincided with a more sedentary lifestyle. People began living in locations year-round and dwelling in substantial houses known as earthlodges. This development led to the establishment of small, permanent farmstead settlements throughout the eastern two-thirds of present-day Nebraska. These farmers lived in centralized villages and grew large quantities of corn, beans, squash and other crops. The population continued to increase over the period, and societies became more complex over time. Evidence of this period has the following general attributes:

- Extensive use of the bow and arrow
- Bone implements being present at most archaeological sites

### Historic Setting

#### *Large Village and Nomadic Period (500 to 100 years ago)*

By about 1600 A.D., known historic tribal groups, such as the Pawnee, Omaha, and Otto, were living in large villages with elaborate earthlodges in the eastern part of present-day Nebraska. The Caddoan Tradition encompasses the sites of the historically documented occupations of Pawnee and possibly the Arikara peoples in Nebraska. The primary area of settlement for these tribes was in the lower portions of the Loup River drainage, but earthlodge villages also are found in the Republican, Blue, and the eastern Platte valleys.

The Siouan-speaking tribes include the Omaha, Ponca, Oto-Missouria, Ioway, and Kansa. Their villages were located along the Missouri River and its lower tributaries of eastern Nebraska. The Caddoan and Siouans groups built and lived in large, permanent earthlodge village complexes where they tended large gardens of corn and other produce and hunted and fished. These communities sometimes consisted of hundreds of lodges housing thousands of people. Many of these tribes conducted semiannual bison hunting expeditions to central and western Nebraska and were closely involved with the Euro-American fur trade.

The western portions of the state appear to have been mainly occupied by nomadic hunters and gatherers, and some sites may have been related to the Plains Apache. Other tribes that occupied the western portions of present-day Nebraska include the Lakota, Cheyenne, Arapaho, Kiowa, and Crow. These groups were much more nomadic than the tribes in the east, lived in tipi villages that were frequently moved, and subsisted mainly on bison.

#### *Euro-Americans (AD 1700s to present)*

The first Anglo-Europeans to enter the area were Spanish and French explorers and traders coming from the American Southwest and the Mississippi Valley during the early 1700s or perhaps as early as the late 1600s. The first large-scale expedition was led by Pedro de Villasur in 1720. Later American expeditions included the Lewis and Clark Expedition (1804–1806), and Zebulon Pike’s Expedition (1806–1807). Between 1817 and 1823, Major Stephan H. Long directed a major expedition along the Platte and North Platte River valleys.

Longer-term settlement began with fur trading, military occupation, and missionary efforts beginning in the 1700s and continuing through the mid-1800s. The mid-nineteenth century also saw an increase in the crossing of the region for immigration to the West, the most notable being the Oregon-California Trails and the Mormon Trail, which NPPD’s final route would cross (Figure 3.10-1).

Beginning in the 1830s, both Americans and Europeans traveled westward by the thousands. These emigrants opened and used numerous trails and built ferries, bridges, forts, towns, and cities. The Oregon country provided great opportunities for emigrants and would-be settlers. The first emigrant wagon train bound for the Pacific Coast, the Bidwell-Bartleson party, left Independence, Missouri, in the spring of 1841. Reports of the richness of the Oregon country, and particularly of the Willamette River Valley, triggered a movement that by the late 1840s became one of the great mass migrations in history (NPS 1999).

With the discovery of gold in 1848, migration patterns changed. Emigrants bound for Oregon and those already settled in Oregon began to immigrate to California. Two years later, California gained statehood and attracted an increasing number of emigrants who opened numerous routes across the Sierra Nevada in their efforts to reach the goldfields of California. By 1850, those moving to California greatly exceeded those headed for Oregon. They followed the Oregon Trail through Wyoming and then blazed new routes across Idaho, Utah, Nevada, and California, which became known as the California Trail (NPS 1999).

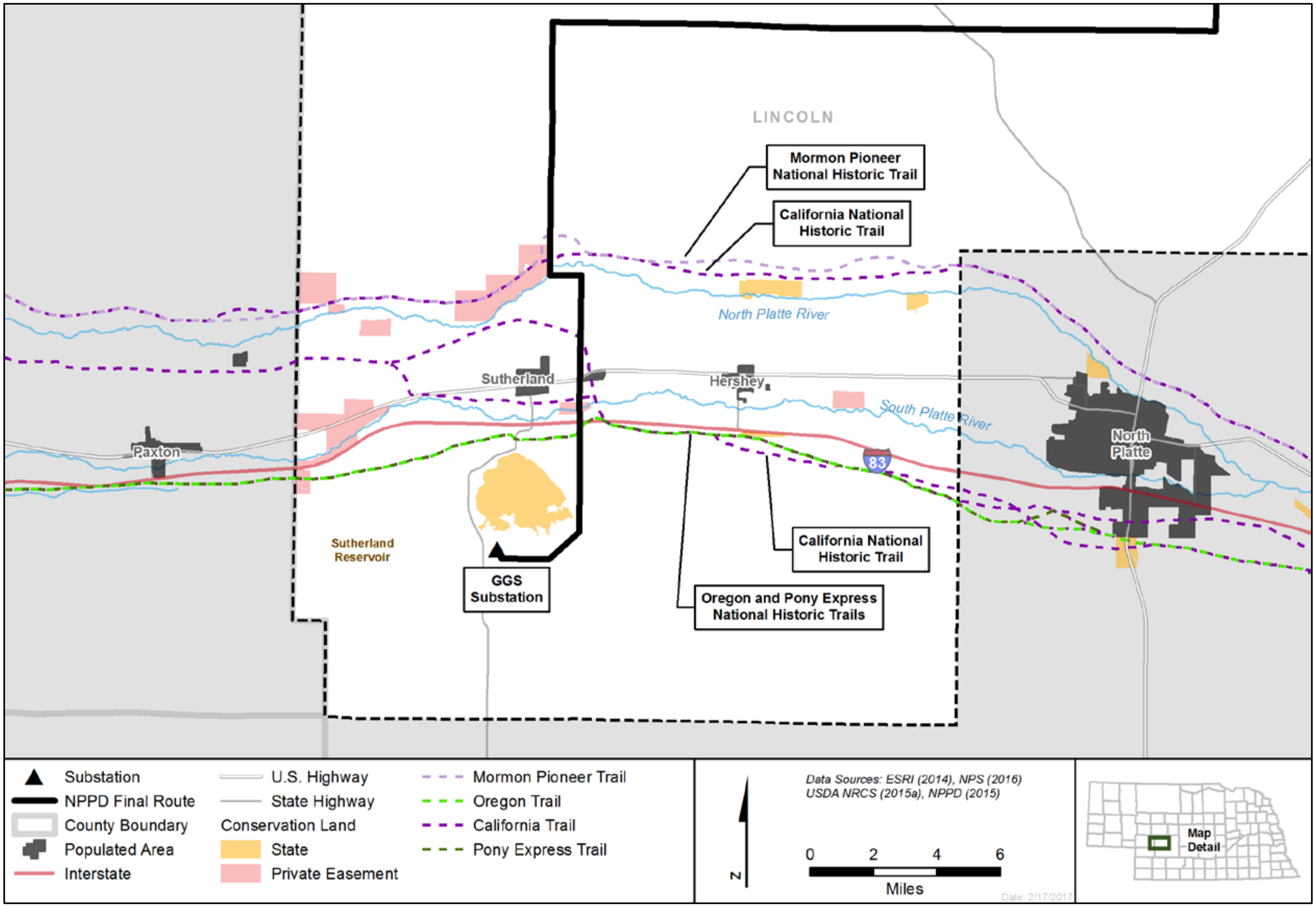



**Figure 3.10-1. Historic Trails and Associated Sites in the Vicinity of NPPD's Final Route**

The Mormon Pioneer Trail traversed five states from Nauvoo, Illinois, to Salt Lake City, Utah. The Pioneer Company of 1846–1847 established the first route, and from 1846 to 1869, 70,000 Mormons traveled west along the trail, which covered about 1,300 miles. From the principal settlement of the Latter Day Saints in Nauvoo, Illinois, the trail led Mormons to Salt Lake City, Utah, which was identified by Brigham Young and his followers as the Mormon heartland beginning in 1847. From Council Bluffs, Iowa to Fort Bridger in Wyoming, the trail follows much the same route as the Oregon-California Trails; these trails are collectively known as the Emigrant Trail. The Mormon Trail was used for more than 20 years, until the completion of the First Transcontinental Railroad in 1869. Among the emigrants were the Mormon handcart pioneers of 1856–60, who used handcarts instead of wagons to transport their belongings across the continent. Motivated to join their fellow Church members in Utah but lacking funds for full ox or horse teams, nearly 3,000 Mormon pioneers from England, Wales, Scotland, and Scandinavia made the journey from Iowa or Nebraska to Utah in 10 handcart companies.

In operation from 1860 to 1861, the Pony Express was a horseback mail service that operated from St. Joseph, Missouri, across the Great Plains, over the Rocky Mountains and the Sierra Nevada to Sacramento, California, using a series of relay stations. The Pony Express Route near Sutherland traversed basically the route of the Oregon-California Trails. A Pony Express station just west of O'Fallon's Bluff is identified alternately as Dorsey's, Dansey's, D'Orsay's, Halfway House or Elkhorn Station (Clark 2013). The route is thought to have used the Oregon-California Trails at O'Fallon's Bluff (see Figure 3-10.1).

The Kansas-Nebraska Act of 1854 and the Homestead Act of 1862 resulted in a wave of pioneers seeking land for permanent settlement in the plains area. The Kansas-Nebraska Act established the Nebraska Territory, which stretched from Kansas to Canada and from the Missouri River to the Rockies. Nebraska became the 37th state of the Union on March 1, 1867. The 1860s and beyond were a time of major settlement in the area, characterized by the emergence of agricultural and rural communities.

Farming and ranching soon developed as the state's primary enterprises. The Open Range period (1869–1885) witnessed the growth of a number of cattle operations. The 1904 Kinkaid Act, which allowed 640-acre homesteads in designated areas, encouraged further settlement in the area.

The transcontinental Union Pacific Railroad was constructed through Nebraska in the late 1860s, creating a boom that brought in farmers who settled on free land acquired under the Homestead Act and eventually the Kinkaid Act. Ranching developed as early as 1859, and by the 1870s, it was well established in the western part of the state. These ranchers, trying to preserve the open range, opposed the farmers' encroachment, but they were ultimately unsuccessful. Agriculture was challenging in this new territory, and ranching was especially hard hit by the extremely cold winter of 1880–1881. Farmers were plagued by prairie fires, insect infestations (probably grasshoppers) from 1856 to 1875, and recurrent droughts in the 1890s.

The Great Depression hit Nebraska hard, as grain and livestock prices fell by half, and unemployment was widespread in the cities. The greatest effect the crash had on Nebraska was the fall of farm prices because the state's economy was greatly dependent on its crops. Crop prices began to drop in the final quarter of the year and continued until December 1932 when they reached their lowest point in state history.

#### 3.10.2.4 Cultural Resource Investigations

Efforts to identify and evaluate cultural resources along NPPD's final route, both within and outside the APE, are ongoing. These efforts include the compilation of previous research information from NSHS and other available records, cultural resources surveys, public scoping, consultation, and field visits, as described in the following sections.

**Background Research**

During the siting process for its final route, NPPD contacted the Nebraska SHPO to obtain information about known archaeological and architectural resources within the larger study area. NSHS staff queried the archaeological database and historic structure database based on GIS shapefiles of the study area. Results were provided on March 3, 2013, and August 13, 2014. These queries identified 800 cultural resources within the study area, including 186 archaeological sites, 605 historic architectural resources, and 9 historic bridges (NPPD 2015a).

Archaeological resources in the study area include prehistoric and historic sites, such as large prehistoric villages, open camps, historic ranches, artifact scatters, and remnants of historic trails. Although the Sandhills region has been subjected to little previous survey, the area has the potential of containing additional prehistoric sites that have not yet been identified and may not be visible on the surface.

Historic architectural resources include farmsteads, school houses, post offices, commercial buildings, homes, gas stations, jails, and bridges. Although specific historic districts have not been identified to date, some of the architectural resources may qualify as contributing elements of potential future historic districts. The majority of these resources are located at the extreme eastern and southern areas of NPPD's final route, near larger towns in the region.

These existing resource data were synthesized, edited, and refined for purposes of the cultural resource surveys, which are being conducted in phases by POWER Engineers, as described in the following section (Bedingfield and Webb 2015; Bedingfield and Tucker 2016). Additional sources of information that were consulted include state and national registers, historic Government Land Office maps, land patent and status records, and pertinent literature available through the NSHS websites including Historic Building Survey reports.

Tables 3.10-1 and 3.10-2 present known archaeological and architectural resources located near NPPD's final route. The data were derived from NSHS records; however, NRHP status has been modified where applicable based on information gathered during the field surveys. NPPD updated the distance from the proposed transmission line based on modifications to the final route that occurred after the field surveys were completed. Table 3.10-1 presents three previously recorded archaeological sites, located near NPPD's final route—two Paleoindian sites and one site dating to the proto-historic Dismal River Complex.

**Table 3.10-1. Previously Documented Archaeological Sites near Project Area**

| Resource Number | Type | Previous Action | NRHP Significance | Condition | Distance from Project Centerline (feet)[a] |
|---|---|---|---|---|---|
| BL 4 | Paleo-Indian/Non-specific ceramic | Reported | Unknown | Disturbed | Unknown |
| BL 10 | Paleo-Indian/Plains Archaic/Non-Specific Late Prehistoric-Protohistoric/ Euroamerican | Reported | Unknown | Disturbed | 720 |
| LN 72 | Western Nebraska Protohistoric-Dismal River Complex | Surveyed | Unknown | Disturbed | 643 |

Source: From the Nebraska SHPO records, as documented in Bedingfield and Webb (2015) and Bedingfield and Tucker (2016).

[a] Distance derived by NPPD from GIS data based on most recent design modifications.

Table 3.10-2 presents the 22 previously recorded architectural resources—houses, farmsteads, abandoned ranches, a school, rest area, church, and bridge—identified within 0.5 mile of the Project centerline.

**Table 3.10-2. Previously Documented Architectural Resources near Project Area**

| Resource Number | Structure or Name | Assoc. Date (if known) | NRHP Significance[a] | County | Distance from Project Centerline (feet)[b] |
|---|---|---|---|---|---|
| AP00-126 | Farmstead | 1897 | Non-extant | Antelope | Not applicable |
| BL00-007 | Abandoned Ranch | 1905 | Recommended not eligible | Blaine | 570 |
| BL00-008 | St John's Lutheran Church-Wisconsin Synod | 1948 | Recommended not eligible | Blaine | 305 |
| BL00-026 | Hawley Flats School District #13 | 1912 | Recommended not eligible | Blaine | 2,462 |
| HT00-237 | Abandoned Farmstead | Unknown | Recommended not eligible | Holt | 200 |

| Resource Number | Structure or Name | Assoc. Date (if known) | NRHP Significance[a] | County | Distance from Project Centerline (feet)[b] |
|---|---|---|---|---|---|
| HT00-238 | Farmstead | Unknown | Not individually eligible, maybe contributing to future district | Holt | 2,238 |
| LN00-032 | Sutherland State Aid Bridge (Birdwood Bridge) | 1914–15 | Listed | Lincoln | 286 |
| LN00-206 | Abandoned Farmhouse | 1905 | Recommended not eligible | Lincoln | 1,879 |
| LO00-001 | Ranch | 1905 | Recommended potentially eligible under Criteria A and C | Logan | 718 |
| LO00-002 | Farmhouse | 1889 | More information needed | Logan | 465 |
| LO03-12 | Aban Lumber Company | 1881 | Non-extant | Logan | 2,634 |
| LO03-016 | House | 1903 | Non-extant | Logan | Not applicable |
| LO03-017 | House | 1901 | More information needed | Logan | 1,7678 |
| LO03-018 | House | 1901 | More information needed | Logan | 1,873 |
| TM00-031 | Rodocker Ranch | 1930 | Non-extant | Thomas | Not applicable |
| TM00-040 | Blue Star Highway Rest Area | 1948 | Not individually eligible, maybe contributing to future district | Thomas | 845 |
| TM00-041 | Figard Sod House | 1938 | Recommended potentially eligible under Criterion D | Thomas | 1,751 |
| TM00-043 | Field Corrals and Loading Chute | 1940 | Recommended not eligible | Thomas | 60 |
| WH00-001 | Abandoned School | Unknown | Recommended not eligible | Wheeler | 2,587 |
| WH00-003 | Abandoned Farmstead | 1890 | More information needed | Wheeler | 1,557 |
| WH00-004 | Pofahl, Theo Farmstead | 1915 | More information needed | Wheeler | 705 |
| WH00-007 | Abandoned Farmstead | Unknown | Non-extant | Wheeler | Not applicable |

Source: From the Nebraska SHPO records, as documented in Bedingfield and Webb (2015), Bedingfield and Tucker (2016), and NPPD (2015a)

[a] Based on recommendations from POWER Engineers (Bedingfield and Tucker 2016), Nebraska SHPO review pending.

[b] Distance derived by NPPD from GIS data based on most recent design modifications.

### Cultural Resources Survey Results

NPPD contracted POWER Engineers to conduct Class III cultural resource investigations of its final route. The pedestrian field surveys are being conducted in phases, as right-of-entry to private land is obtained. To date, POWER Engineers has documented results of two field surveys (Bedingfield and Webb 2015; Bedingfield and Tucker 2016), and a third and final survey is projected for 2017. The Service submitted the 2015 and 2016 resources reports to the Nebraska SHPO for review and comment. Other consulting parties will also have an opportunity to review the reports.

The 2015 and 2016 pedestrian surveys covered the following areas where right-of-entry was obtained:

- 300-foot-wide survey corridor along approximately 192 (discontinuous) miles of the proposed transmission corridor (consisting of the 200-foot-wide ROW plus 50-foot buffers on either side)
- 100-foot-wide survey corridor along approximately 60 miles of proposed access routes
- 295 acres of block surveys encompassing footprints of proposed ancillary features such as work areas and substations (including the Thedford and Holt County substations).

The first survey, completed between July 27 and September 1, 2015, totaled 4,259 acres, or approximately 39 percent of the total Project corridor (Bedingfield and Webb 2015). Five archaeological sites and two isolated finds were documented in 2015 (Table 3.10-3). Because of changes to the extent of the APE and design modifications of NPPD's final route, only two of the sites and one isolated find are located within the direct APE.

**Table 3.10-3. Findings of the 2015 Class III Cultural Resource Survey**

| Resource | Relationship to APE | Eligibility Status for the National Register of Historic Places |
|---|---|---|
| Sandhill Ruts, Mormon Historic Trail alignments[a] | Outside direct and indirect APE | Eligible, Criterion A (Nebraska SHPO) |
| O'Fallon's Bluff, Oregon-California Trail alignments[a] | Outside direct and indirect APE | Listed/eligible (Nebraska SHPO) |
| Segment of Old Highway 83/ U.S. Route 183 | Within direct and indirect APE | Potentially eligible, Criterion A (Nebraska SHPO) |
| Historic artifact scatter 1 | Within direct and indirect APE | Not eligible (Nebraska SHPO) |
| Historic artifact scatter 2 | Outside direct APE, within indirect APE | Not eligible (Nebraska SHPO) |
| Isolated Find (RP-IF-KB1) | Within direct and indirect APE | Not eligible (Nebraska SHPO) |
| Isolated Find (RP-IF-KB2) | Outside direct and indirect APE | Not eligible (Nebraska SHPO) |

Source: Bedingfield and Webb (2015)

[a] Discussed in more detail in the Cultural Resources outside the APE section below.

The Nebraska SHPO reviewed the 2015 cultural resources report and determined that the historic trail segments are either listed in or eligible for listing in the NRHP, as described in a consultation letter from the Nebraska SHPO to the Service on July 21, 2016. O'Fallon's Bluff was listed in the NRHP on July 12, 1974, and the Nebraska SHPO is revising the nomination form to include intact segments of the trail on adjacent private property. These resources are located in the study area and in or immediately adjacent to the proposed transmission corridor, but they are outside the federal APE. These sites are described in more detail in the Cultural Resources outside the APE section below.

The Nebraska SHPO recommended that the segment of Old Highway 83/U.S. Route 183 may be eligible for listing in the NRHP under Criterion A. Portions of this segment are located in the direct and indirect APE; this resource is discussed in the Historic Properties within the APE section below.

The Nebraska SHPO determined that the historic artifact scatter located within the direct APE is not eligible for listing in the NRHP. In addition, the historic artifact scatter outside the direct APE and the two isolated finds were determined as not eligible. Thus, these resources do not qualify as historic properties (consultation letter from the Nebraska SHPO to the Service, July 21, 2016).

The second field survey was conducted between April 5 and August 8, 2016, and covered 2,650 acres (Bedingfield and Tucker 2016). Three new archaeological sites were documented (Table 3.10-4), and 22 previously recorded historic architectural resources within 0.5 mile of the proposed centerline (see Table 3.10-2) were assessed for potential indirect visual effects. The 2016 report incorporated design modifications and additional survey areas generated by realignments of the Project centerline.

**Table 3.10-4. Findings of the 2016 Class III Cultural Resource Survey**

| Resource | Relation to APE | Eligibility Status for the National Register of Historic Places |
|---|---|---|
| North Platte Canal | Outside direct and indirect APE | Recommended as non-contributing to larger NRHP-eligible canal system (POWER Engineers) |
| Paxton-Hershey Canal[a] | Outside direct and indirect APE | Recommended as contributing to larger NRHP-eligible canal system (POWER Engineers) |
| Good Hope Cemetery | Outside direct and indirect APE | Recommended not eligible (POWER Engineers) |

Source: Bedingfield and Tucker (2016)

[a] Discussed in more detail in the Historic Properties outside the APE section below.

Of the 22 previously recorded architectural resources revisited during the 2016 survey (see Table 3.10-2), one structure (the Sutherland State Aid Bridge) is listed in the NRHP, and one historic ranch (LO00-001) is recommended as potentially eligible for listing. The Sutherland State Aid Bridge is located outside the APE and is discussed in more detail in the Cultural

Resources outside the APE section below. The ranch complex is located within the indirect APE and discussed in the Historic Properties within the APE section below. The remaining 20 resources are recommended as not eligible, or remain unevaluated because their viewshed would not be affected by the proposed Project, or they are no longer extant in their previously reported locations (Bedingfield and Tucker 2016). Concurrence and determination by the Nebraska SHPO on the recommendations of the 2016 report is pending.

### Cultural Resources Identified by the Public

During the public scoping process, potentially significant resources that may be affected by the R-Project were identified. Table 3.10-5 presents these resources and their current status.

**Table 3.10-5. Status of Cultural Resources Identified by the Public**

| Resource | Status |
|---|---|
| O'Fallon's Bluff (an important site on the Oregon-California Trails) | O'Fallon's Bluff is listed in the NRHP and discussed in the following section. Field survey by the Nebraska SHPO expanded the site to include a larger area of associated trail ruts.<br>The Oregon-California Trails comprise the Oregon Trail and the California Trail. These trails are discussed in the following section. |
| Sutherland State Aid Bridge | This property is listed in the NRHP and discussed in the following section. |
| Remnants of the Mormon Trail | This site is located along the Mormon Pioneer Trail and was documented and recommended eligible for listing in the NRHP. It is discussed in the following section. |
| Archaeological Site in Lincoln County—25LN113(LW-14) | Nebraska SHPO-sponsored Sand Hills Archeology Project found prehistoric subsurface deposits at the site. |
| St. John's Lutheran Church-Wisconsin Synod and cemetery | NRHP-Eligible, Nebraska SHPO Historic Structures Database No. BL00-008. Property was assessed in 2016 and recommended not eligible due to extensive modifications that detract from its integrity (Bedingfield and Tucker 2016) |

The Service will continue to gather information on resources as it is identified by the public and will coordinate with the Nebraska SHPO and NPPD.

### Historic Properties within the APE

Two potential historic properties are located within the APE—the Old Highway 83/U.S. Route 183 and an historic ranch in Logan County. Final determinations of eligibility will be made by the Service in consultation with the Nebraska SHPO and will be incorporated into this EIS.

***Old Highway 83/ U.S. Route 183—***This 18-mile segment of abandoned highway alignment was identified and documented during the 2015 cultural resources survey (Bedingfield and Webb 2015). The northernmost point of the recorded segment is located where the old road enters the Project APE, approximately 3 miles south of Thedford, and 0.5 mile north of where the proposed route would parallel Highway 83. The road is generally oriented north-to-south and parallels the west side of the extant U.S. Highway 83 (also known as the Veterans of Foreign Wars Memorial Highway) and portions of the Project APE in Thomas and Logan counties.

Source: Bedingfield and Webb (2015)

*Old Highway 83/U.S. Route 183, view north*

A wagon road appears on historical Government Land Office maps in the approximate location of the alignment. The existing portion of the abandoned highway in and near the Project APE was established as part of the federal highway system in 1926 and conforms roughly to the route of what was previously known as the Great Plains Highway. The recorded segment was originally designated as U.S. Route 183. Prior to completion of the highway during the 1930s, it was renamed U.S. Highway 83. Paving of portions of this segment between Thedford and Stapleton was not finished until 1959. During the 1980s, the highway was rerouted to its current location, and the old road was abandoned.

The 2015 documentation found the site retained integrity of location, setting, workmanship, and association, and recommended that the abandoned highway as a whole may be eligible for listing in the NRHP under Criterion A, for its association with the development of automobile transportation and the establishment of the federal highway system. Also, it may be considered significant on a state or local level as the last segment of the highway that was paved in 1959 (Bedingfield and Webb 2015). The Nebraska SHPO concurred that the highway is potentially eligible for listing in the NRHP under Criterion A (consultation letter, Nebraska SHPO to the Service, July 21, 2016).

***Historic Ranch in Logan County (LO00-001)***—This circa-1905 ranch is located on U.S. Highway 83 approximately 1.75 miles north of Stapleton. It was documented during the 2016 assessment of previously recorded historic architectural resources (Bedingfield and Tucker 2016). The ranch complex contains multiple buildings, including a frame house with enclosed porch, a smaller brick house, a concrete-block garage, a concrete-block workshop, a wooden barn with a gambrel roof and cupola, a corrugated metal shop/garage, other small outbuildings, and a fenced corral. The ranch retains historic integrity, and is recommended as potentially eligible for listing in the NRHP under Criterion A for its association with the historical development of agriculture in the region, and/or Criterion C for its well-preserved examples of early twentieth century architecture (Bedingfield and Tucker 2016). Consultation and comment by the Nebraska SHPO on eligibility status is pending and will be included in this EIS.

Source for all photos: Bedingfield and Tucker (2016)

*Frame House at LO00-001, view southwest*

*Brick House at LO00-001, view west-southwest*

*Barn at LO00-001, view northeast*

### Cultural Resources along the Project Route, but outside the APE

Important cultural resources outside the APE include those known resources that do not fall within the protections of the NHPA, but have been identified as historic properties, potential historic properties, or other cultural resources important to human communities. Cultural resources along the Project route, but outside the APE, include National Historic Trails, NRHP-listed properties, resources that are eligible or potentially eligible for the NRHP, and other resources that may be important to particular communities. The Service will work with NPPD and the Nebraska SHPO to protect important cultural resources within the R-Project ROW and associated areas of disturbance but outside the federal APE, to extent practicable.

### *National Historic Trails*

Four National Historic Trails are located in the study area:

- Oregon Trail (authorized by Congress in 1978)
- California Trail (authorized by Congress in 1992)
- Pony Express Trail (authorized by Congress in 1992)
- Mormon Pioneer Trail (authorized by Congress in 1978)

The geographically central corridor of these four historic trails (up the Platte, the North Platte, and the Sweetwater rivers to South Pass) has been called "the best natural road in the world." This corridor became the main route of westward expansion during the mid-nineteenth century (NPS 1999). Generally, the Mormon Trail followed the north side of the North Platte River in central Nebraska, and the other three trails stayed on the south side. However, the trails also often followed the same route, particularly at and near the O'Fallon's Bluff river crossing. See the Cultural History section and Figure 3-10.1 above for an overview of these resources.

Significant physical traces of three of these trails are located in the Project area and have been determined to be historic properties (discussed below). Physical traces of the Pony Express trail have not been identified in the area; however, it is likely that this trail overlapped the Oregon-California Trails near O'Fallon's Bluff.

### *Historic Properties outside the APE*

Four historic properties or potential historic properties have been identified outside the currently defined APE but within the Project corridor—the O'Fallon's Bluff site on the Oregon-California Trails, the Sand Ruts site on the Mormon Pioneer Trail, the Sutherland State Aid Bridge, and a segment of the Paxton-Hershey Canal. These resources are described below.

***O'Fallon's Bluff, Oregon-California National Historic Trails (Nebraska SHPO No. LN00-028), Listed in the NRHP on July 12, 1974***—O'Fallon's Bluff is a section of hills located along the South Platte River near Sutherland in Lincoln County. Because the bluffs come very close to the river, early travelers were forced to traverse the bluffs above the bottom land, making them vulnerable to Indian attacks. Some of the most clearly defined and well preserved remnants of the Oregon-California Trails remain here as evidence of the great westward migration of the mid-nineteenth century (Kivett 1973; NSHS 2012). Beginning in 1843, large numbers of travelers used these routes through O'Fallon's Bluff, and by 1849 at the start of the Gold Rush, it is estimated that 30,000 people passed through this area (Clark 2013).

O'Fallon's Bluff was named for Benjamin O'Fallon, an army major, Indian Agent, and fur trader who led several expeditions throughout the area. Born in Kentucky in 1793, O'Fallon was raised by his uncle, William Clark, of the Lewis and Clark Expeditions (Clark 2013).

Source: North Platte/Lincoln County Visitors Bureau

*O'Fallon's Bluff (view east)*

O'Fallon's Bluff is adjacent to a rest stop on I-80, where there is interpretive signage and an observation point. This area, delineated in the NRHP, is located immediately adjacent to the Project corridor to the east. The Nebraska SHPO is currently revising the existing NRHP nomination and expanding the boundary to include intact trail ruts located on private land to the west.

Source: Louis Berger

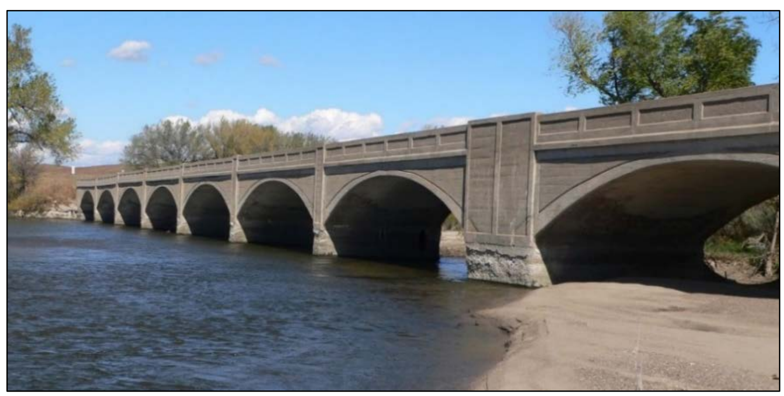
*Oregon-California Trail Ruts at O'Fallon's Bluff. Intact ruts visible ascending the hill in the center of the frame and GGS Substation visible on the horizon to the left (view west)*

Source: North Platte/Lincoln County Visitors Bureau

*Mormon National Historical Trail, 1997 reenactment of the 1847 wagon train*

***Mormon Pioneer National Historic Trail, Sand Hill Ruts***—A segment of the Mormon Pioneer Trail, known as the Sand Hill Ruts, is located adjacent to the Project corridor, near Sutherland in Lincoln County. Conspicuous ruts mark the spot where wagons once made a steep descent from the Sandhills into the North Platte River valley to reach a well-known camp near the river. An NPS interpretive sign has been erected at a viewpoint along Pioneer Trace/Prairie Trace Road. The sign reads, in part: "The many ruts and swales over this [ridge] mark the passage of hundreds of overland wagons as they descended toward the river valley. Those seen here were most likely made by later trains, since the Mormon pioneers took a more circuitous route to the north." The area visible from the interpretive sign was used for a reenactment during the 150th anniversary of the Mormon Trail.

The segment adjacent to the Project corridor has been determined eligible for listing in the NRHP (consultation letter, Nebraska SHPO to the Service, July 21, 2016). The NPS National Historic Trails' Comprehensive Management Plan (NPS 1999) identifies the Sandhill Ruts as a "high potential site."



Source: North Platte/Lincoln County Visitors Bureau

*Sutherland State Aid Bridge*

***Sutherland State Aid Bridge (LN00-032) Listed 1992/06/29***—Constructed between 1914 and 1915, this concrete spandrel-arch bridge spans the North Platte River along North Prairie Trace Road, approximately 2.5 miles north of Sutherland, in Lincoln County. The structure is 16 feet wide by 795 feet long and exhibits 14 concrete-filled spandrel arches. This bridge is significant to the history of Nebraska bridge building and is perhaps the best remaining example of early bridges built through the state aid grant program (Fraser 1991). Although some 77 structures were built throughout the state under this program between 1912 and 1936, only 17 remain in use. The Sutherland Bridge is also technologically significant as the best example of concrete arch construction in the state. Moreover, of the 17 multiple-span concrete arch bridges built under the state aid program in the 1910s and 1920s, all but the Sutherland Bridge have been destroyed or substantially altered, leaving this structure as the sole intact example of this important construction trend (NSHS 2012).

Source: Bedingfield and Tucker (2016)

*Paxton-Hershey Canal, view west from Bubble Road*

***Paxton-Hershey Canal—***A 1-mile segment of the Paxton-Hershey Canal in Lincoln County was documented during the 2016 archaeological survey (Bedingfield and Tucker 2016). Constructed in 1894, the Paxton-Hershey Canal irrigates cropland situated between the North Platte and South Platte rivers. The canal extends east for approximately 20 miles from a diversion dam on the south bank of the North Platte River, located approximately 1.75 miles northwest of Sutherland, to a point where it rejoins the North Platte River on the northwest side of the City of North Platte, 0.4 mile west of U.S. Highway 83. The documented segment is bisected by Bubble Road. The canal ranges in width from 30 to 40 feet and mainly irrigates grazing land and some agricultural fields at the western end of the segment. Associated features along this segment include two bridges, two pump houses, and side gates for controlling lateral flows. An historic artifact scatter associated with the water control features is located along Bubble Road. The 20-mile Paxton-Hershey Canal is recommended as potentially eligible for listing in the NRHP under Criterion A for its association with broader historical developments in the context of agriculture, specifically that of cropland irrigation, which was used extensively until 1970, when center-pivot irrigation techniques were widely adopted in preference to earlier gravity systems. The 1-mile canal segment near NPPD's final route retains integrity of location, setting, feeling, and association, and is recommended as contributing to the larger irrigation system.

***Archaeological Site 25LN113 (LW-14)***—A prehistoric archeological site identified during the Sand Hills Archeology Project is located directly under NPPD's final route. Artifacts were initially found on the surface, eroding out of an area above a layer of volcanic ash identified within a two-track road cut. Testing at the site following the initial discovery took place on June 23, 2016. Two 1-by-1-meter test units were placed southwest of the surface scatter found along the vehicle two-track. Materials, including lithic flakes, chipped stone tool fragments, fire-cracked rock, and bone fragments (some burned), were located to depths of approximately 50 centimeters below the soil surface. This depth indicates a potentially intact and non-ephemeral archeological site. Although some rodent disturbance and erosion are evident at the site, it appears to be largely intact and undisturbed. Functionally, the materials at the site indicate its past use as a campsite with evidence of flint knapping and hearth-related activities present. At this time, no cultural affiliation has been established. Additional investigations in the future are recommended if soil disturbance would be located anywhere in the vicinity of archeological site 25LN113.

The Nebraska SHPO has reviewed the initial testing of the site, and has confirmed it to be potentially eligible for listing in the NRHP under Criterion D. The site has potential to yield important information pertaining to Native American use and occupation of the Sand Hills, and prehistoric travel between the Platte River and the Sandhills lakes. However, further investigation will be needed to fully confirm its eligibility status.

### 3.10.3 Direct and Indirect Effects

Direct effects on cultural resources include physical destruction or damage to all or part of the property from ground-disturbing activities such as installation of transmission poles and facilities or construction and use of access routes and temporary work areas.

Indirect effects include the introduction of visual, atmospheric, or audible elements that would diminish the integrity of the property's significant historic features or characteristics. Indirect effects may include physical impacts from vibratory equipment; visual impacts (from transmission poles, lines, and facilities) to properties that require integrity of location, setting, or feeling to convey their historical significance; and changes of the character of a property's use or of physical features within a property's setting.

Under Section 106 of the NHPA, only historic properties (those cultural resources that are listed in or eligible for listing in the NRHP) are considered for potential direct and indirect effects resulting from the proposed Project. Impacts to ineligible cultural resources are deemed to be insignificant because the resources themselves have been determined as not significant.

Historic properties that have been identified along the Project corridor both inside and outside the APE are considered here for potential direct and indirect effects. Those historic properties and important cultural resources located outside the Section 106 APE are evaluated based on context and intensity. Intensity categories in Table 3.1-2 generally correspond to Section 106 determinations of "no effect," "no adverse effect," and "adverse effect" to historic properties. Historic properties within the APE are discussed within the parameters of the Section 106 process, where the lead federal agency is required to apply the "criteria of adverse effect" to determine whether an undertaking will affect historic properties.

No-intensity effects (relevant to cultural resources that are not eligible for listing in the NRHP or are outside the APE) or "no effect" (relevant to historic properties within the APE) would occur if NPPD's final route is located far enough away from the historic property to avoid affecting the property, directly or indirectly.

Low-intensity effects and some moderate-intensity effects (relevant to cultural resources that are not eligible for listing in the NRHP or are outside the APE) correspond to "no adverse effect" (relevant to historic properties within the APE). These effects would occur if the resource cannot be completely avoided, either directly or indirectly, but there would be no significant impacts to the historic integrity of the resource. For example, no adverse effect to a historic property would occur from alterations to the visual environment if the property does not gain its significance from its location, setting, or feeling. As another example, no adverse effect to an archaeological site would occur from construction activities that would take place within or adjacent to the site if there would be no physical or vibratory effects to significant features or any other characteristics of the site.

High-intensity effects and some moderate-intensity effects (relevant to cultural resources that are not eligible for listing in the NRHP or are outside the APE) correspond to "adverse effect" (relevant to historic properties within the APE). These effects would occur if:

- Significant cultural resources or historic properties would be disturbed, in whole or in part, through direct physical effects of ground disturbance from Project activities in a manner that diminishes their historic integrity.
- Significant cultural resources or historic properties would be damaged by vibrations during Project construction in a manner that diminishes their historic integrity.
- The setting of significant cultural resources or historic properties would be altered by changes to the visual or atmospheric environment from the Project in a manner that diminishes their historic integrity.

#### 3.10.3.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Consequently, the No-action Alternative would not affect existing cultural resources either directly or indirectly, or cause adverse effects to identified historic properties. Cultural resources, including historic properties, would neither be preserved in another manner nor damaged.

#### 3.10.3.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Under Alternative A, the Service would issue a permit to NPPD for the take of the endangered beetle in accordance with Section 10(a)(1)(B) of the ESA, and NPPD would construct, operate, and maintain the 225-mile-long, 345 kV R-Project transmission line and substations along NPPD's final route and implement the draft HCP, as described in Chapter 2. Construction of the Project would include construction of temporary and permanent access routes, installation of several hundred structures to support the transmission line, installation of the transmission line, expansion of two existing substations, construction of a new substation, relocation of approximately 28 miles of distribution power lines, and relocation of four existing wells serving livestock tanks and irrigation pivots. Maintenance would include emergency repairs following severe storm events over the 50 year life of the Project.

Alternative A was evaluated for potential effects to Section 106 properties within the direct and indirect APE and to cultural resources and/or historic properties located outside the APE. Database queries of the general study area identified 800 previously recorded cultural resources, including 186 archaeological sites, 605 historic architectural resources, and 9 historic bridges. Public scoping identified additional cultural resources. The 2015 and 2016 cultural resources surveys identified 8 archeological sites, 2 isolated finds, and assessed 22 previously recorded historic architectural resources within 0.5 mile of the proposed Project centerline.

Identification and evaluation of cultural resources along NPPD's final route and associated areas of disturbance are ongoing. Some significant cultural resources identified to date are anticipated to be outside the 162-mile permit area that defines the linear extent of the APE. In those instances, the Service would work with the Nebraska SHPO and NPPD to develop appropriate avoidance and/or minimization measures to reduce severity of potential adverse effects. Cultural resources both within and outside the APE are discussed below.

### Effects on Historic Properties within the Direct and Indirect APE

#### *Old Highway 83/U.S. Route 183*

Old Highway 83/U.S. Route 183 is potentially eligible for listing in the NRHP under Criterion A for its association with the rise of automobile travel and the federal highway system. Segments of this historic road located within the direct and indirect APE of Alternative A may be considered as contributing to the eligibility of this historic road alignment. Some portions of the old alignment would be used as access routes, and the transmission line would be within the viewshed of this site.

Physical disturbance to the historic roadbed would likely occur from the resource's use as a Project access road. However, the site gains its significance from its association with historical transportation route and not necessarily its material fabric or viewshed. Because such impacts are consistent with the historic function of the transportation corridor (including energy conveyance), they would not necessarily represent an adverse effect to the resource. Much like the historic changes that have occurred thus far, including transformation of old wagon routes and the Great Plains Highway into the extant transportation corridor, activity associated with the construction of another transmission line along the route represents a use of the corridor that is consistent with its historic purpose and function.

The landscape and views surrounding the site have transformed through time and include the construction of the new highway, the erection of multiple overhead power lines, and the scarring of adjacent land from underground fiber optic lines. The addition of the proposed transmission line would be consistent with existing infrastructure within the transportation corridor and is not anticipated to detract from the integrity of the site's setting, feeling, or association.

For these reasons, Alternative A would have no adverse direct or indirect effect on the characteristics of the site that may qualify it as a contributing element of the entire Old Highway 83/U.S. Route 183 alignment, which gains its significance under Criterion A. The Nebraska SHPO concurred that Alternative A would have no adverse effect on this potentially eligible resource (consultation letter from the Nebraska SHPO to the Service, July 21, 2016). Alternative A would present a long-term, low- to medium-intensity impact on this resource.

#### *Historic Ranch in Logan County (LO00-001)*

This ranch complex is recommended as potentially eligible under Criterion A for its association with the development of agricultural settlement and under Criterion C and a good and representative example of early twentieth century rural architecture. The landscape and viewshed from this potential historic property are open and rural, having little infrastructure development and long lines of sight. A small wooden power line and wooden fence along the roadway are consistent with this rural historic landscape.

The proposed transmission line would be located approximately 713 feet from the ranch complex and within its viewshed. Because of the proximity of the Project to this resource, the contrast introduced on the eastern horizon as viewed from this ranch would result in a high-intensity, long-term visual impact. This visual impact could compromise the resource's integrity of setting, feeling, and association. Views westward from U.S. Highway 83 toward the ranch would be unobstructed by the proposed transmission line, but the general setting and feeling would still be affected. Disturbances to aspects of setting and feeling would detract from the ranch complex's historic integrity, and would likely represent an adverse effect to the resource. Alternative A is likely to have a long-term, moderate- to high-intensity, indirect (visual) impact on this resource.

Source: Bedingfield and Tucker (2016)

*View toward NPPD's final route from historic ranch (LO00-001), view east-northeast*

### Effects to Significant Cultural Resources outside Direct and Indirect APE

#### *Oregon-California National Historic Trails, O'Fallon's Bluff Site*

O'Fallon's Bluff was listed in the NRHP in 1974, for exhibiting some of the most clearly defined and preserved segments of the Oregon-California Trails (Kivett 1973). NPPD's final route would run north-south over a section of extremely well-preserved and intact trail ruts that are highly visible in aerial imagery as well as on the ground. The high level of preservation is due to the fact that this area is located on private land that has never been plowed. This particular location represents one of the most intact segments along the entire length of the historic transcontinental Oregon-California Trails.

Figure 3.10-2 shows the alignment of NPPD's final route bisecting the intact portion of the ruts at the O'Fallon's Bluff site. Immediately to the east of NPPD's route is the I-80 rest stop at mile marker 159. Behind (south) of the rest stop is an observation area with interpretative panels and historic wagon wheels that help convey the history of westward migration to the public. The uninterrupted landscape of rolling bluffs on the south side of the river is important to the public interpretation and appreciation of the site. The view toward the trail ruts where the proposed transmission would be installed is currently unobstructed. GGS Substation is visible on the far horizon, approximately 6 miles to the southwest, but no other infrastructure is visible from this vantage point to the western or southern horizons.


Source: North Platte/Lincoln County Visitors Bureau

**Figure 3.10-2. Oregon-California National Historic Trails, O'Fallon's Bluff with NPPD's Final Route in Green**

The trail ruts at O'Fallon's Bluff gain their significance from their context and setting, as opposed to merely their physical expression. The introduction of a 345 kV transmission line through the middle of this site would constitute a high-intensity, long-term, adverse visual impact. The transmission towers and overhead lines would become the most dominant feature of the landscape, contrasting sharply with the undeveloped rural feel of the area. This visual impact would compromise the resource's integrity of setting, feeling, and association, which are important characteristics of the site that qualify it as a NRHP-listed property. In addition to the visual impact, the intrusion of the transmission line within the site would have a negative auditory and atmospheric impact on the historic property. The Nebraska SHPO stated that the introduction of a transmission line across an intact portion of this trail, and adjacent to a public observation point and interpretive area, "will greatly diminish the historic property's location, setting, feeling, and association by introducing adverse visual, auditory, and atmospheric integrity." The SHPO "strongly recommends that an alternative route for the transmission line be suggested" (consultation letter, Nebraska SHPO to the Service, July 21, 2016).

For these reasons, Alternative A would have a long-term, high-intensity indirect (visual, auditory, and atmospheric) effect on the O'Fallon's Bluff site.

#### *Mormon Pioneer National Historic Trail, Sand Hill Ruts Segment*

The Sand Hills Ruts segment of the Mormon Pioneer Trail is an excellent and relatively well-preserved grouping of historic trail ruts that is eligible for listing in the NRHP under Criterion A for its association with broader historical patterns of western migration. An NPS interpretive sign is located on the eastern side of Pioneer Trace Road with an open viewshed toward the site to the east. The landscape is rural and undeveloped.

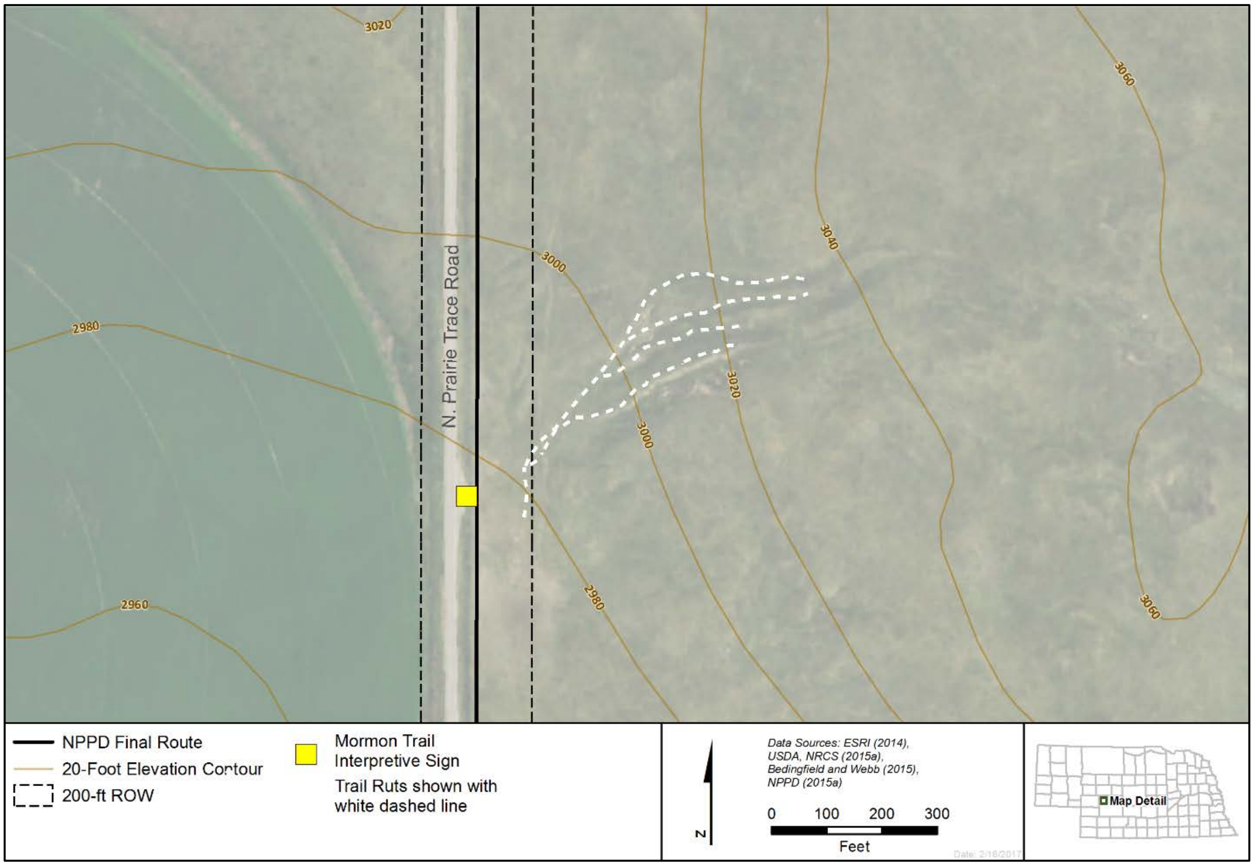
Source: Louis Berger Team

*Mormon Pioneer Trail, Sandhill Ruts (center distance) and NPS Interpretive Sign; NPPD's final route would be placed between the sign and the ruts*

The Sand Hill Ruts segment is immediately adjacent to NPPD's final route area and some of the ruts extend into the eastern edge of the ROW (Figure 3.10-3). The transmission line would be installed on the east side and parallel to the eastern fenceline along Prairie Trace Road, between the NPS interpretive sign and the currently unobstructed view to the east of the intact trail ruts descending the hill slope. One of the proposed transmission towers would be located close to the interpretive sign and the overhead lines and their travelling shadows would be visible from this observation point in the direction of the trail ruts. The visual intrusion of the transmission line into the viewshed would have an adverse impact the setting, feeling, and association of the property. Because of the proximity of the overhead lines to the observation point, indirect effects may be auditory and atmospheric as well as visual. The introduction of the transmission line into this viewshed would detract from the visitor experience and historical interpretation of this property. Thus, Alternative A would have a high-intensity, long-term, indirect (visual, auditory, and atmospheric) impact on characteristics of this historic property that qualify it for listing in the NRHP.

The Nebraska SHPO determined that Alternative A would "cause an adverse effect," or high-intensity impact, to the site, and that "the presence of the transmission lines will greatly diminish the historic property's location, setting, feeling and association by introducing adverse effect on its visual, auditory, and atmospheric integrity. Even though the transmission line would be located immediately west of the trail ruts, there would still be adverse visual effects from the ever-increasing lines of perpendicular shadow cast over the exposed ruts each afternoon.

In addition, the constant hum emanating from the lines may cause an adverse auditory effect that could cause visitors to either limit their stay at the resource's interpretive signage or diminish their ability to connect with the immigrant families and individuals who traveled these historic trails" (consultation letter from the Nebraska SHPO to the Service, July 21, 2016).




Source: Bedingfield and Webb (2015)

**Figure 3.10-3. Mormon Pioneer National Historic Trail, Sandhill Ruts**

### *Sutherland State Aid Bridge*

The Sutherland State Aid Bridge is listed in the NRHP under Criterion C, as the best example of a multi-span concrete arch bridge in the state (Fraser 1991). NPPD's final route would be located approximately 324 feet to the northeast and would be visible from the historic property. Given the distance between NPPD's final route and this property, vibratory impacts are not anticipated. No construction activities that would produce significant vibration and may impact this property are proposed.

Transmission towers and overhead lines, which would generally parallel the orientation of the bridge, would be most visible at and near the bridge's northern end. Though existing transmission lines and dense vegetation would soften some of the visual contrast that the Project might introduce near the southern and middle portions of the bridge, the introduction of Project elements in the relatively open viewshed at the bridge's northern end would likely represent a strong visual contrast. Because of the Project's proximity to this historical resource, the introduction of new visual elements on the horizon would introduce moderate to strong levels of visual contrast and could adversely affect the resource's integrity of setting, feeling, and association. In addition, Lincoln County is proposing to build a new bridge between the Sutherland State Aid Bridge and the proposed transmission line, which would introduce another element into the general viewshed. Alternative A is anticipated to have a long-term, moderate- to high-intensity indirect (visual) impact to the Sutherland State Aid Bridge.

#### *Archaeological Site 25LN113 (LW-14)*

This prehistoric site was identified during the Sandhills Archeology Project and is located within the proposed Project corridor. The Nebraska SHPO confirmed that the site is potentially eligible for listing in the NRHP, pending further investigation. As the potential impacts from the proposed Project are identified and assessed, the Service will work with NPPD to develop specific avoidance and minimization measures for this potentially significant archaeological site. Efforts will be made to avoid direct impacts to the site.

### 3.10.3.3 Alternative B: Tubular Steel Monopole Structures Only

Potential effects from Alternative B are anticipated to be similar to Alternative A because both alternatives would follow the same route. In general, under Alternative B, there would be greater potential for physical destruction and damage to cultural resources located along the Project route because more area would be disturbed along access routes and within structure work areas. However, structures near all of the cultural resources identified to date would be tubular steel monopoles under either alternative.

Under either action alternative, monopole structures would be less intrusive as a visual element on the landscape and may reduce the potential of visual effects to properties that gain their significance from their location, setting, feeling, and/or association. Because monopole structures are used exclusively for Alternative B, the visual intrusion would be less for the entire route; however, the important cultural resources identified to date are all located in segments where monopole structures would be used, so the visual impact would be the same under Alternative A and Alternative B.

## 3.10.4 Avoidance, Minimization, and Mitigation Measures

Avoidance of adverse effects to historic properties is the preferred treatment by the Service. Impacts would be avoided by not allowing permanent or temporary disturbance from construction activities on or directly adjacent to significant cultural resources and by avoiding visual impacts to sites that gain their significance from their setting. However, if avoidance is not possible, the Service would consult with the Nebraska SHPO, NPPD, and other consulting parties to identify treatment that is reasonable and in the public interest.

To resolve adverse effects on historic properties within the APE, the Service would continue the consultation process to develop and evaluate alternatives or modifications to the undertaking that may avoid, minimize, or mitigate adverse effects on historic properties. Some measures to avoid or minimize potential effects to significant cultural resources were implemented as part of the routing/siting process including identification of known resources. In particular, NPPD:

- Avoided placement of structures within boundaries of I-80 Rest Area (NRHP-registered site of the Oregon Trail remnants).
- Avoided placement of structures on or immediately adjacent to Oregon Trail and Mormon Trail remnants.

- Included setback distance of structures from trail remnants as allowed by engineering constraints.
- Minimized effects to the Mormon Trail by routing parallel to an existing county road, as opposed to placement directly over the trails.
- Shifted the route slightly to the east of the Sutherland State Aid Bridge to accommodate county plans for a new bridge. This shift provides greater separation from the existing bridge location and, when built, the new bridge may provide some visual screening between the old bridge and the transmission line.

Other measures that NPPD would implement to further avoid, minimize, or mitigate effects include:

- Use existing roads and two-tracks for access during construction based on availability and landowner approval.
- Avoid placement of structures and other ground-disturbing activities within the boundaries of significant cultural resource sites, as identified in coordination with the Service.
- Avoid placement of construction staging areas and tensioning and pulling sites on or immediately adjacent to significant cultural resources, as identified in coordination with the Service.
- Use ground matting or low-ground-pressure equipment to avoid or minimize ground disturbance on or immediately adjacent to significant cultural resources, as identified in coordination with the Service.
- If an unanticipated discovery of archaeological or paleontological resources occurs during construction, assess the significance of the resources in consultation with a professional archaeologist. If any unanticipated archaeological or paleontological resources are determined to be significant, coordinate with the Service to determine the appropriate treatment.
- Comply with the Nebraska Unmarked Human Burial Sites and Skeletal Remains Protection Act and the Native American Graves Protection and Repatriation Act as appropriate if human skeletal remains or burial goods associated with an unmarked burial are inadvertently discovered during construction.
- Restrict all construction vehicle movement outside the R-Project transmission line ROW to designated access routes and established roads other than for emergency situations.

### 3.10.5 Effects Summary

The principal types of effects that could occur are evaluated based on context and intensity. Categories in Table 3.1-2 of no intensity, low-to-moderate intensity, and moderate-to-high intensity correspond to Section 106 determinations of "no effect," "no adverse effect," and "adverse effect" to historic properties.

To date, six historic properties have been identified that may be directly or indirectly affected by NPPD's final route (Table 3.10-6). Additional areas may be found once surveys have been completed, and once the Service makes an assessment of potential resources identified by members of the public. Identification of architectural resources is pending determination of the viewshed and visual effects APE. Determinations of eligibility and effect are ongoing, and measures to avoid, minimize, and/or mitigate potential adverse effects would be developed in consultation with the Nebraska SHPO and other consulting parties.

**Table 3.10-6. Important Cultural Resources Identified to Date**

| Resource | NRHP-Status | Within Direct APE? | Within Indirect APE? | Potential Effects | Context and Intensity |
|---|---|---|---|---|---|
| Old Highway 83/ U.S. Route 183 Segment | Contributing to potentially eligible highway alignment, Criterion A | Yes, portions | Yes, portions | No adverse direct effect from construction access;<br>No adverse indirect (visual) effect from transmission line | Long term, low to moderate intensity |
| Historic Ranch (LO00-001) | Potentially Eligible (Criterion A and C) | No | Yes | Adverse indirect (visual) effect | Long term, high intensity |
| O'Fallon's Bluff Site, Oregon-California Trails | Listed in the NRHP, Criteria undefined (potential for all criteria) | No | No | Adverse indirect effect (visual, auditory, atmospheric) | Long term, high intensity |
| Sandill Ruts Site, Mormon Pioneer Trail | Eligible, under Criterion A (potential for other criteria) | No | No | Adverse indirect effect (visual, auditory, atmospheric) | Long term, high intensity |
| Sutherland State Aid Bridge | Listed in the NRHP under Criterion C | No | No | Potential adverse indirect effect (visual) | Long term, potential for moderate to high intensity |
| Archaeological Site | Potentially Eligible under Criterion D | No | No | To be determined; efforts would be made to avoid any direct effects | To be determined; efforts would be made to avoid direct effects |

Based on the important cultural resources identified to date, and pending consultation, NPPD's final route would not be able to avoid long-term, high-intensity visual impacts on the O'Fallon's Bluff site/Oregon-California Trails, the Sandhill Ruts/Mormon Pioneer Trail, and the historic ranch (LO00-001) and the moderate- to high-intensity impacts to the Sutherland State Aid Bridge. Therefore, NPPD's final route has the potential of resulting in high-intensity and long-term indirect impacts on these historic properties. Based on this level of intensity and long-term duration of indirect effects, the Service has determined that significant, long-term, high-intensity impacts would occur to cultural resources from construction, operation, and maintenance of the R-Project.

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## 3.11 Transportation

Issuance of a permit and subsequent implementation of the R-Project could affect the transportation system in the study area, including roadways, railroads, and airports, during construction, operation, and maintenance, including emergency repairs. This section, which assesses the potential effects of the alternatives on the transportation system, is divided into two parts: the first (Section 3.11.1) describes the affected environment and identifies potentially affected transportation facilities in the study area, and the second (Section 3.11.2) describes and quantifies, to the degree possible, potential direct and indirect effects of the alternatives on transportation and qualitatively measures impact intensity based on the criteria provided in Table 3.1-2.

### 3.11.1 Affected Environment

This section identifies the roads, railways, and airports in areas potentially affected by Project construction and summarizes highway traffic volume data. The locations of major transportation facilities are depicted in Figure 3.8-1 in Section 3.8, *Land Use*. Information is also provided about the responsibilities of state and local agencies with jurisdictional authority for roadways, as well as pertinent FAA regulations for structures near airports.

#### 3.11.1.1 Roadways

A network of Federal and state highways and local roads provides for surface transportation in the study area. Roadways in the study area carry passenger vehicles and commercial traffic. Public highways, roads, and streets in Nebraska are divided into two broad categories, each of which is subdivided into multiple functional classifications. The two broad categories are Rural Highways and Municipal Streets. State statute (Neb. Rev. Stat. § 39-2102) defines Rural Highways as “all public highways and roads outside the limits of any incorporated municipality,” and Municipal Streets as “all public streets within the limits of any incorporated municipality.” Functional classifications are used to define typical traffic patterns and jurisdictional responsibility.

NDOR has jurisdictional responsibility for all roads classified as interstates, expressways, or major arterials under the Rural Highways classification, and all roads classified as interstate under the Municipal Streets system. Incorporated municipalities have the responsibility for the design, construction, reconstruction, maintenance, and operation of all streets classified as expressway that are of a purely local nature.

Primary roadways in the study area include I-80 and U.S. Highways 20, 30, 83, 183, 275, and 281. The primary thoroughfare in the region is I-80, which passes east-to-west through the southwestern portion of the study area. Nebraska Highways 2 and 92 provide additional east-to-west connectivity through the study area. U.S. Highways 83 and 281 are major north-south thoroughfares.

I-80 is the primary thoroughfare in the region

Summary descriptions of the U.S. Highways in the study area are provided below:

- U.S. Highway 30, which is designated as a Nebraska scenic byway (the Lincoln Highway Scenic and Historic Byway), parallels I-80 and passes through the communities of Hershey and Sutherland.
- U.S. Highway 83 runs generally north-south through the study area, passing near the communities of Thedford and Stapleton.
- U.S. Highways 183 and 281 both run north-south through the eastern portion of the study area.
- Small segments of U.S. Highway 275 and U.S. Highway 20 pass through the northeastern corner of the study area.

State highways in the study area include Nebraska Highways 2, 7, 11, 70, 91, 92, 95, and 97. These routes are briefly described below as they cross the study area:

- Nebraska Highway 2 traverses the northwestern portion of the study area in an east-west direction, running through the communities of Thedford and Mullen. This route is designated as a Nebraska scenic byway (the Sandhills Journey Scenic Byway).
- Nebraska Highway 7 traverses the northern portion of the study area in a north-south direction. It terminates at the community of Brewster.
- Nebraska Highway 11 traverses the eastern portion of the study area in a north-south direction.
- Nebraska Highway 70 extends eastward from U.S. Highway 281 near the eastern edge of the study area.
- Nebraska Highway 91 follows a generally east-west route through the northern portion of the study area. This route is designated as a Nebraska scenic byway (the Loup Rivers Scenic Byway).
- Nebraska Highway 92 passes east-to-west through the western portion of the study area, running through the communities of Stapleton and Tryon.
- Nebraska Highway 95 is a small segment of highway in the northeastern portion of the study area, connecting U.S. Highway 281 and Nebraska Highway 11 and passing through the community of Chambers.
- Nebraska Highway 97 traverses the western portion of the study area in a north-south direction. It runs through the communities of Mullen and Tryon.

In addition to these highways, numerous paved county roads and lesser-used paved and unpaved roadways are present in the study area. Section-line roads generally form the basic layout of the existing secondary roadway system. Spaced approximately 1 mile apart, these roads create the grid pattern found in the southwest and northeast portions of the study area and near the town of Stapleton. The grid pattern has also been accentuated in communities through the use of arterial streets at the half-section or half-mile line.

The highest traffic volumes in the study area occur on I-80, which had an annual average daily traffic volume of approximately 15,000 vehicles per day in 2014 (NDOR 2015). Volumes on other highways in the study area are substantially lower, ranging from roughly 300 to 400 vehicles per day on Nebraska Highways 7, 11, 92, and 97 and U.S. Highway 183, to roughly 1,200 to 1,300 vehicles per day on Nebraska Highway 2, U.S. Highway 83 (south of Stapleton) and U.S. Highway 281, to roughly 2,700 to 2,900 vehicles per day on U.S. Highway 30 and U.S. Highway 83 (north of Stapleton) (NDOR 2015).

#### 3.11.1.2 Railroads

The railroad systems in the study area include the Union Pacific Railroad and Burlington Northern Santa Fe Railway. The Union Pacific Railroad main line follows an east-west course through the southern portion of the study area, south of U.S. Highway 30. The North Platte Branch splits off from the main line in the study area, approximately 2 miles east of Sutherland. Approximately 72 trains travel the main line (west of Sutherland) and 36 trains travel the North Platte Branch each day (Federal Railroad Administration 2016). An NPPD-owned spur from the Union Pacific line west of Sutherland carries coal from Wyoming’s Powder River Basin directly to the GGS Substation. A Burlington Northern Santa Fe Railway line traverses the northwestern portion of the study area, generally running parallel to Nebraska Highway 2. The line carries approximately 60 trains per day (Federal Railroad Administration 2016).

#### 3.11.1.3 Airports

The only public-use airport in the study area is the Thomas County Airport near Thedford. In addition to this public airport, several private airfields operate in the study area. FAA manages commercial and general aviation activities, while the military manages military aviation activities with FAA oversight. All public airports, as well as FAA-registered private airports and heliports that have FAA-approved instrument procedures and navigable airspace, are under the jurisdiction of FAA. None of the private airports in the study area has FAA-approved instrument procedures; therefore, only the Thomas County Airport is under FAA jurisdiction.

Federal regulations (14 CFR § 77.9) require a filing of notice with FAA before the construction or alteration of structures that may obstruct navigable airspace or cause electromagnetic interference with ground-based navigational aids. Notice is required for the following types of activities:

- Construction or alteration exceeding 200 feet above ground level
- Construction or alteration that penetrates any of the following imaginary surfaces extending outward and upward from the nearest airport runway or heliport:
  - A surface extending 20,000 feet at a slope ratio of 100:1 (horizontal:vertical) from runways more than 3,200 feet long
  - A surface extending 10,000 feet at a slope ratio of 50:1 (horizontal:vertical) from runways no more than 3,200 feet long
  - A surface extending 5,000 feet at a slope ratio of 25:1 (horizontal:vertical) from the nearest point of the nearest heliport takeoff and landing area

- Any construction or alteration on the following types of facilities:
  - Public use airports
  - Airports operated by a Federal agency or the Department of Defense
  - Military or public-use airports under construction
  - Airport or heliports with at least one FAA-approved instrument approach procedure

Additionally, a permit is required from the Nebraska Department of Aeronautics before erecting or building any structure exceeding a height of 150 feet above ground surface at the point of installation.

### 3.11.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term effects of the proposed alternatives, including the No-action Alternative, on traffic and transportation facilities in the project area as defined in Table 3.1-1. Definitions for duration and intensity developed for this Project are described in Table 3.1-2.

Assessments of the effects of the alternatives are based on the following considerations:

- The potential for road closures and traffic delays, as indicated by the number of primary roadways and railroads crossed by NPPD's final route
- The potential for interference with operations at airports and airfields, as indicated by the number of public and private airports and landing strips near NPPD's final route

Section 3.11.3 presents the avoidance, minimization, and mitigation measures that NPPD would employ under either action alternative to avoid or reduce adverse effects on transportation and transportation facilities.

#### 3.11.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect transportation resources. Roads and rail traffic would not be disrupted, and operations at airports and airfields would not experience interference resulting from transmission facility construction.

#### 3.11.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent implementation of the R-Project transmission line along NPPD's final route under Alternative A would result in direct effects on transportation in the short term and long term. Specific effects on transportation as a result of the various activities associated with implementation of Alternative A are described below.

### Direct Effects

This section identifies the potential direct effects of Alternative A construction and operation on the transportation system and transportation facilities in the Project area. Roadways and railways are addressed first, followed by airports and airspace. Each discussion identifies potentially affected facilities and then describes potential short-term (i.e., construction-related) and long-term (i.e., operational) effects on those facilities. The effects analyses below are based on the expectation that the avoidance, minimization, and mitigation measures, described at the end of this section, would be implemented as appropriate during Project construction, operation, and maintenance.

#### *Roadways and Railroads*

NPPD's final route would cross the following primary roadways:

- I-80, east of Sutherland
- U.S. Highway 30, east of Sutherland
- U.S. Highway 83, between North Platte and Thedford (specific number of crossings while paralleling the highway will depend upon final design and results of landowner negotiations)
- U.S. Highway 183, between Taylor and the Rock/Loup county line
- U.S. Highway 281, between Bartlett and Nebraska Highway 95
- Nebraska Highway 2, east of Thedford
- Nebraska Highway 7, between Brewster and the Blaine/Brown county line
- Nebraska Highway 11, between Burwell and the Holt/Garfield county line
- Nebraska Highway 92, between Stapleton and Arnold (specific number of crossings while paralleling the highway will depend upon final design and results of landowner negotiations)
- Nebraska Highway 97, between Tryon and North Platte

NPPD's final route would parallel U.S. Highway 83 for approximately 35 miles and Nebraska Highway 7 for approximately 5 miles, staying within 500 feet of each highway for most of those distances.

NPPD's final route would cross two active Union Pacific railroad lines near Sutherland and one active Burlington Northern Santa Fe line near Thedford. The route would also cross the NPPD-owned spur that carries coal to the Gerald Gentleman Station Generating Facility.

Construction of transmission facilities and substations could affect transportation facilities in a number of ways. Vehicles carrying heavy equipment and materials, such as transmission tower components, may contribute to increased wear or damage to road surfaces. Before county-maintained roads are used for hauling heavy equipment or materials, NPPD would evaluate the ability of bridges to handle construction traffic and review the findings with the appropriate county road departments. NPPD does not anticipate the need to upgrade any county roads at this stage of preliminary design.

In areas where no roads are present, temporary access routes would be built for access to structure locations and work areas. At some locations, construction of temporary access routes may require improvements such as blading and, where required, placement of fill material. Following construction, temporary access routes would be removed and the affected areas would be restored. Construction of temporary access routes is not expected to have any short-term or long-term effects on traffic or transportation facilities in the project area.

Construction activities may necessitate temporary closures of roadways while construction is underway at crossings, potentially interfering with regular traffic flow and local emergency response activities. Road closures and detours may also be necessary when stringing transmission lines across roads, relocating existing wells or distribution lines, or installing bird flight diverters on transmission line segments over roadways. Deliveries of large equipment and materials may also require temporary closures. I-80 would not be closed for any construction activities, although temporary closures of one lane, possibly in both directions, or “rolling barricades” to slow traffic, may occur during portions of the wire stringing process.

NPPD would work with NDOR and the Nebraska State Patrol to determine and implement the appropriate procedures for lane and road closures, including plans for the timing of such closures. Road closures are expected to take the form of temporary lane restrictions, speed reductions, or traffic stoppages. Closures would generally last for a few minutes (3–5 minutes) at a time and would occur only during a period of a few days to a few weeks when construction activities are underway at a given location, resulting mostly in low-intensity effects on road traffic. Some closures or delays may exceed 15 minutes and would be considered moderate-intensity effects. The likelihood of construction-related stoppages or rerouting of rail traffic would be low because construction would occur at only one location at any given time and would be timed to avoid train movements. No substantial disruptions of traffic flow on roads or railways are expected.

In addition, construction-related traffic, such as vehicles carrying materials, equipment, and workers to and from work sites, would contribute to short-term, temporary increases in traffic volumes on highways and other roadways near work sites. The movement of heavy material haul trucks may also cause temporary traffic delays. Most roads in the study area have low traffic volumes with infrequent or episodic use. Temporary effects from increased traffic on these relatively small, uncongested roads are not expected have a noticeable effect on traffic patterns, aside from temporary delays. The only roadway in the study area with substantial traffic volumes is I-80. The potential for noticeable effects on I-80 traffic would be negligible because construction-related traffic is not expected to exceed a few dozen vehicles per day, likely less than one-half of one percent of the average daily traffic volume on that roadway.

Temporary guard structures, consisting of H-frame wood poles, would be erected at road crossings to prevent ground wires, conductors, or equipment from falling on underlying facilities and disrupting road traffic. Depending on site-specific topography and access restrictions, some guard structures may need to be placed in road ROWs during construction activities.

Potential construction-related effects on road and rail traffic would be minimized through implementation of the avoidance and minimization measures identified in Section 3.11.3.

Over the long term, inspection and maintenance of transmission facilities would entail the use of light-duty vehicles (e.g., pickup trucks) on local roadways and highways. Scheduled ground-based inspection patrols would occur over the course of a single week every other calendar year. NPPD would use light ATVs to conduct ground-based inspection and maintenance activities in the Project ROW, so traffic patterns would not be affected. Maintenance vehicles would need to access locations where repairs or other activities are necessary; however, the movement of these vehicles would not occur on a regular basis and is not expected to adversely affect traffic patterns over the long term. Traffic patterns along primary roadways are not expected to noticeably change.

Emergency repairs would be conducted as necessary to repair the line. The exact location, timing, or frequency cannot be predicted at this time. However, emergency repairs could necessitate road or rail closures lasting a few minutes to a few hours, depending on the extent and nature of the repairs. The likelihood or location of any such closures cannot be reliably predicted.

Inspection and maintenance activities associated with transmission facilities are not expected to affect railroad traffic.

#### *Airports and Airspace*

NPPD's final route would come within approximately 1.7 miles (9,000 feet) of the Thomas County Airport near Thedford and also pass within a few miles of five private landing strips (see Figure 3.8-1).

During Project construction, helicopters would be used to carry equipment and materials to work areas, to haul assembled sections of steel lattice towers, and to pull shield wire and conductor sock lines. NPPD would also use helicopters for Project inspection and maintenance. It is anticipated that three to four helicopters would be in use at any given time, depending on the construction activities scheduled at that time. Plans for helicopter use would be developed by the selected construction contractor before initiation of construction activities.

Helicopters would use temporary work areas such as fly yards and staging areas for landing and refueling. Helicopters would likely be kept at fly yards, staging areas, or local airports when not in use. Project-related helicopter use could interfere with other uses of airspace in the study area, such as aerial spraying and agricultural inspections. Construction activities at any given location would occur during a limited period and local landowners would be given advance notice; therefore, helicopter use is not expected to result in any substantial adverse effects on the use of airspace in the study area.

Over the long term, inspection and maintenance of transmission facilities would entail the use of aerial patrols in addition to the ground-based patrols discussed above. Scheduled aerial inspection patrols would occur once per calendar year and a second inspection once every other calendar year. Unscheduled aerial patrols may be required during emergency or storm conditions. Aerial patrols may include the use of helicopters to survey the line. NPPD would coordinate with helicopter operators to ensure flight plans are filed with the Nebraska Department of Aeronautics, as applicable. As described in Chapter 2, NPPD incorporated modifications intended to enable private airstrips to operate in a safe manner during the development of NPPD's final route. Based on the infrequent occurrence of anticipated trips, in combination with proposed notifications and coordination measures identified below, aerial patrols are not expected to adversely affect airspace use in the study area.

The runway of the Thomas County Airport is 4,400 feet long, triggering a notification requirement for construction of any structures that extend above a surface extending 20,000 feet at a slope ratio of 100:1 (horizontal:vertical) from the runway (i.e., approximately 90 feet tall at a distance at 9,000 feet, assuming minimal differences in ground elevation). NPPD routed the line across grassland areas given the location of the Thomas County Airport (Figure 3.11-1). As noted above, NPPD's final route would also pass within a few miles of five private airports or landing strips. For the reasons discussed in the preceding paragraphs, obstructions or interference with operations at airports in the study area are not anticipated.

Per Federal regulations, NPPD would file notice with the FAA before initiating construction or alteration of any structures that may obstruct navigable airspace or cause electromagnetic interference with ground-based navigational aids to obtain a "Determination of No Hazard to Air Navigation."

Per Nebraska State Statute, NPPD would file notice with the Nebraska Department of Aeronautics before initiating construction or alteration of any structure the height of which exceeds 150 feet above the surface of the ground at the point of installation to obtain a "Permit to Build."

In addition, NPPD would coordinate with the operators of active private airports near NPPD's final route to ensure that construction activities would not obstruct navigable airspace and operators' aerial spraying operations, if applicable. Coordination would be initiated as Project design progresses.

#### Indirect Effects

Construction of the transmission line is not expected to substantially increase the electrical supply in counties of the study area; however, the R-Project may drive the construction of wind energy projects, which would increase the generation of electrical power. Alternative A is expected to increase local traffic volumes over time by fostering economic growth related to the development of wind energy projects. If any temporary access routes are left in place following Project construction, they would not likely be accessible to the public. For these reasons, some indirect effects on transportation related to increased traffic volumes are anticipated under Alternative A.

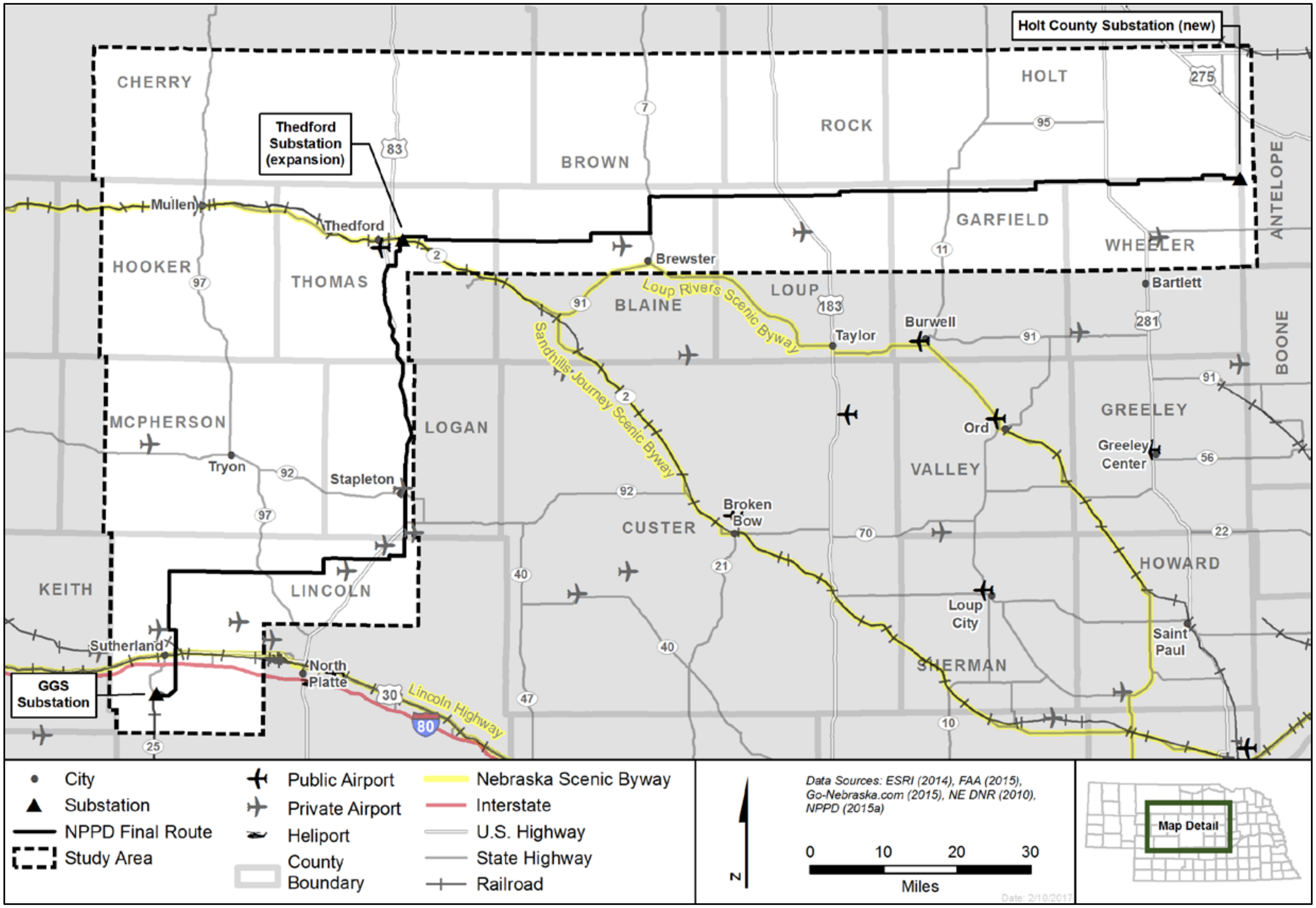


**Figure 3.11-1. Airports and Private Airstrips in Proximity to NPPD's Final Route**

By providing transmission access for future wind energy Projects, the R-Project could lead to the development of more wind power generation in the region. However, the exact number and location of such projects cannot be predicted at this time. Additional information about the potential effects of future wind energy projects is presented in Chapter 4, *Cumulative Impacts*.

#### 3.11.2.3 Alternative B: Tubular Steel Monopole Structures Only

Under Alternative B, NPPD would construct the R-Project using steel monopole structures only. Steel monopoles would be erected with ground-based equipment instead of helicopters. As a result, construction of Alternative B would entail more use of ground-based equipment (e.g., concrete trucks, cranes) than would be needed under Alternative A.

The R-Project would follow the same route under Alternative B as Alternative A. Other than the use of monopoles instead of lattice towers, all other aspects of the Project, including the Service' issuance of a permit and NPPD's performance of operation and maintenance activities, would be the same as Alternative A. Thus, the differences identified above would occur only in areas where lattice towers would be installed under Alternative A.

#### Roadways and Railroads

Alternative B would cross the same roadways and railways as Alternative A and would have the same types of direct and indirect effects on transportation facilities and traffic. Because more heavy equipment would be needed for construction of Alternative B than under Alternative A, the potential for increased wear or damage to road surfaces would be higher. Alternative B could also result in more temporary road closures or traffic delays during deliveries of large equipment and materials. The following roadways are in areas where monopoles would be installed instead of lattice towers. As such, these roadways could receive greater volumes of heavy-equipment traffic under Alternative B, compared to Alternative A:

- U.S. Highway 83, south of Stapleton
- U.S. Highway 183, between Taylor and the Rock County/Loup County line
- Nebraska Highway 2, east of Thedford
- Nebraska Highway 7, between Brewster and the Blaine/Brown County line
- Nebraska Highway 11, between Burwell and the Holt/Garfield County line
- Nebraska Highway 97, between Tryon and North Platte

Potential construction-related effects on roads and bridges would be minimized through implementation of the BMPs identified in Section 3.11.3. As under Alternative A, NPPD would work with NDOR and the Nebraska State Patrol to determine and implement appropriate procedures for lane and road closures, including plans for the timing of such closures. Also similar to Alternative A, closures would generally last for a few minutes (3–5 minutes) and would occur only during a period of a few days to a few weeks when construction activities are underway at a given location, resulting in low- to moderate-intensity effects on road traffic. Based on the above, no substantial disruptions of traffic flow on roads or railways are expected during construction. Although construction-related traffic delays may be longer in some areas under Alternative B, the overall intensity of effects on road traffic would be the same as Alternative A.

The use of roads and vehicles for inspecting and maintaining transmission facilities under Alternative B would not differ from Alternative A; consequently, Alternative B is not expected to result in any noticeable long-term modifications to traffic patterns along primary roadways or railways.

#### Airports and Airspace

Similar to Alternative A, Alternative B is not expected to result in any substantial, direct or indirect, adverse effects on the use of airspace in the study area in the short term or the long term, and Alternative B would not obstruct or interfere with operations at any airports. Because helicopters would not be used for monopole installation, construction activities under Alternative B would involve less helicopter use than Alternative A. As under Alternative A, however, helicopters would be used for other construction activities (e.g., carrying equipment and materials, pulling shield wire, inspecting construction progress). Over the long term, the use of aircraft for inspection and maintenance of transmission facilities would be the same as Alternative A, and the effects would be equivalent.

### 3.11.3 Avoidance, Minimization, and Mitigation Measures

NPPD would employ the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate adverse effects on transportation and transportation facilities:

- Contact NDOR and county and municipal road/highway/public works departments before beginning construction to coordinate routing of construction traffic with those agencies.
- Before county-maintained roads are used for hauling heavy equipment or materials, evaluate the ability of bridges to handle construction traffic and review the findings with the appropriate county road departments.
- Comply with applicable state and county requirements regarding oversized or overweight vehicles, as permitted or required by NDOR and local authorities, potentially requiring oversized loads to avoid travel on holidays, during weekends, and during times of darkness.
- Locate construction staging areas and tensioning and pulling sites adjacent to existing roads where practical based on availability and landowner approval.
- Use existing roads and two-tracks for access during construction based on availability and landowner approval.
- Restrict all construction vehicle movement outside the R-Project transmission line ROW to designated access routes and established roads other than for emergency situations.

- Coordinate in advance with emergency service providers to avoid restricting movements of emergency vehicles and notify counties and cities of the proposed locations, nature, timing, and duration of any construction activities and advise of any access restrictions, so that local authorities could notify potentially affected police, fire, ambulance, and paramedic services.
- Schedule wire stringing and tensioning activities to coincide to the extent practical with periods of least road traffic to minimize traffic disruptions.
- Comply with the stipulations of crossing permits and regulatory agency requirements when using the road ROWs (e.g., for placement of guard structures).
- To reduce potential effects on safety, Place transmission line structures at highway crossings at the maximum feasible distance from the crossing within design and engineering limits.
- After or during construction, if necessary to maintain safe driving conditions, repair roadway damage caused by R-Project construction vehicles in coordination with NDOR or local authorities.
- Schedule construction activities to avoid train movements, precluding the need for construction-related stoppages or rerouting of rail traffic.
- During Project design and construction, comply with applicable regulations associated with railroads and railways in the Project area; obtain and comply with the terms of authorizations and permits for entering railroad ROWs; and include in the Project design adequate structure heights at railroad crossings to minimize potential effects on railroad maintenance activities.
- Establish an escrow account for the R-Project and finalize an escrow agreement with the Service that would be used if provisions of the Restoration Management Plan regarding beetle habitat restoration are not met and NPPD is not taking appropriate steps, including adaptive management, to achieve successful restoration.

### 3.11.4 Effects Summary

Under either action alternative, the R-Project would result in low- to moderate-intensity effects on transportation in the short term and low-intensity effects in the long term. The majority of adverse effects would occur during construction and would consist of temporary closures of roadways, and possible traffic delays or detours. Some closures or delays may exceed 15 minutes and would be considered moderate-intensity effects. The potential for damage to road surfaces would be reduced through implementation of the avoidance, minimization, and mitigation measures described above. If necessary to maintain safe driving conditions, NPPD would coordinate with NDOR or local authorities to repair roadway damage caused by construction vehicles. Construction-related increases in traffic on roadways are not expected to have a noticeable effect on traffic patterns, aside from temporary delays. Over the long term, inspection and maintenance of transmission facilities are not expected to result in noticeable changes in traffic patterns within the study area. The primary difference between the effects of the two action alternatives is a greater potential for construction-related road damage and traffic delays under Alternative B in areas where monopole structures, rather than lattice towers, would be installed.

The likelihood of construction-related stoppages or rerouting of rail traffic under either action alternative would be low because construction would occur at only one location at any given time and would be timed to avoid train movements. No effects on airports or airspace are anticipated. The implementation of avoidance, minimization, and mitigation measures described in Section 3.11.3 would reduce the magnitude of potential effects on transportation. Consequently, the R-Project does not pose a significant impact to transportation.

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## 3.12 Visual Resources and Aesthetics

Because visual quality contributes to quality of life and enjoyment of the environment, NEPA requires consideration of effects on visual and aesthetic resources. This section evaluates the potential effects of the alternatives on visual resources in the analysis area. The study methodology and existing conditions of visual resources in the study area are identified in Section 3.12.1, *Affected Environment*, and the effects of the alternatives (including the No-action alternative) on visual resources are evaluated and compared in Section 3.12.2, *Direct and Indirect Effects*. The intensity of prospective environmental effects on the visual resources in the analysis area was evaluated using the criteria outlined in Table 3.1-2.

### 3.12.1 Affected Environment

This section describes the landscape character in the approximately 7,039-square-mile R-Project study area to provide regional context for the analysis of potential effects. The practical limits of the affected environment are the *viewshed* for the proposed Project. The viewshed is defined as the area within which the Project—including transmission lines and towers, substations, tree removal, and other elements—would be visible, with an emphasis on locations within 3 miles of the route (i.e., the analysis area). Locations in the study area that are screened from viewing the Project, for example by topography or by distance, are not considered to be in the viewshed and would not be affected by Project features. Distance zones used in the analysis of potential effects are described below.

The discussion of the affected environment includes an overview of the regulatory context and methodology for evaluating impacts, the visual character and quality of the study area, and the viewers who could be affected by the Project.

#### 3.12.1.1 Regulatory Context and Study Methodology

Visual resources are recognized as valuable public resources and are a required element of the environment to be considered in NEPA review. Assessment of visual quality includes an evaluation of the visual setting for the R-Project, as well as the perceived aesthetic compatibility between the Project and its setting. Assessment of visual quality also considers the anticipated perceptions of the viewers of the R-Project. While perceptions of aesthetic quality between different viewers may vary, there are also patterns of viewer response that have broad similarity and can generally predict the anticipated public response to changes in visual resources. These typical patterns serve as the basis for accepted methods of documenting visual quality.

No unique methodology for evaluating effects on visual resources related to power transmission projects is available. Several agencies, including USFS, the U.S. Bureau of Land Management, FHWA, NPS, and others, have adopted methodologies for evaluating visual impacts in general, although the Service has not adopted a particular visual-resource-assessment methodology. Typically, one of these methodologies is selected either based on the NEPA lead agency or based on the fit between the methodology and the character of the R-Project. For this evaluation, the FHWA (1981) *Visual Impact Assessment for Highway Projects Manual* was selected as an appropriate methodology for the R-Project because of its linear nature and rural setting. The FHWA methodology was developed to evaluate the effects of constructing linear infrastructure projects through a relatively undeveloped landscape. Minor modifications to the methodology have been used to make it more easily applicable to the large study area for the R-Project. As described below, Visual Landscape Units (VLUs) have been analyzed as landscape types, rather than contiguous subunits of the study area. Mapping VLUs for the entire study area would have been impractical and would not have improved the quality of the analysis. Similarly, viewers have been categorized as typical users from potential viewing areas in the viewshed. This change to the methodology allows for a more targeted evaluation of potential impacts by segments of NPPD's final route.

For this EIS, the analysis is based on three complementary aspects of the visual environment that can be used to describe potential effects—visual character, visual quality, and viewer sensitivity.

The visual character of the landscape setting for a project is based on its physical characteristics without consideration of aesthetic value or viewer perception. Visual character includes colors, shapes, typical patterning, and other types of compositional elements that are characteristic of the natural and built landscape in a project's landscape setting. Elements that might be considered as part of the visual character of the landscape include typical landforms and vegetation patterns, strong linear edges between visual elements (for example, horizon lines or the line between land and water), or typical colors in the landscape.

Visual quality is an assessment of how the public would likely value the visual character of a project setting. The FHWA methodology evaluates visual quality based on vividness, intactness, and unity:

- **Vividness** describes how memorable and distinctive the visual character of the landscape is. A landscape has high vividness when a combination of topography, vegetation, and possibly water is harmoniously composed in a view.
- **Intactness** describes whether the visual character of the landscape has been interrupted by elements that contrast with its general visual character or has been modified in a way that reduces its visual quality. Typically, intactness is lowered by development, such as buildings, roads, or vegetation clearing that conflicts with the character of the landscape. Development does not always reduce the visual quality of a landscape; well-placed agricultural buildings or residential communities, for example, can improve the vividness and unity of a view.
- **Unity** evaluates how well composed and harmonious the visual characteristics of the landscape are. Typically, a view's unity is reduced when a feature in the landscape looks out of place or out of character.

Potential effects were evaluated by determining whether the R-Project would detract from the vividness, intactness, and unity of the landscape setting as expressed by visual quality; evaluating the visibility of the Project by different viewers; and considering the likely sensitivity of viewers to changes in visual quality.

### Visual Character, Visual Landscape Units, and Key Observation Points

As part of the methodology, the analysis area is organized into typical landscape types that have similar visual character and that are expected to experience similar effects under the R-Project. For example, an analysis area that included hilly, forested areas, and flatter open areas might be divided into subareas of these similar landscape types for evaluation. For evaluation of the R-Project, the analysis area has been delineated into seven types of subareas, called VLUs, which have relatively homogeneous visual character.

For each of these VLUs, Key Observation Points (KOPs) were identified as a location for photography that communicates the character of the VLU and as a basis to determine visual impacts. KOPs were used as VLU assessment locations for the visual resource inventory and for the development of visual simulations. VLUs and KOPs in the analysis area are described and summarized in Section 3.12.1.2, *Existing Conditions*.

### Visual Quality Ratings

Each VLU is scored for visual quality, based on an evaluation of its vividness, intactness, and unity. The KOPs for each VLU are typically the locations used for scoring, enabling an accurate comparison between the existing condition and the anticipated condition under each alternative.

Visual quality ratings are expressed on a scale from very low to very high for vividness, intactness, and unity. The vividness, intactness, and unity ratings are combined to generate an overall Visual Quality Rating for each VLU.

### Visibility Thresholds

The perception of form, texture, color, and other visual elements in the landscape is a function of changing distance from a viewing location. Visibility thresholds (also referred to as distance zones) are based on perception thresholds, the scale and nature of the objects being viewed, and the viewing environment. In general, landscape elements tend to become less obvious and detailed at greater distances. Elements of form and line become more dominant than color or texture at longer viewing distances.

Visibility thresholds for the R-Project were established based on previous experience conducting visual studies in similar geographical, topographical, and environmental settings (NPPD 2015a). Visibility depends on the height and structure types of the typical Project features with respect to the surrounding landscape. For the typical 120- to 185-foot-high monopole structures or 90- to 155-foot-high lattice towers, distance zones identified for the R-Project are as follows:

- Immediate foreground, viewpoint location to 1,500 feet—This “very high visibility” distance zone is where Project features would be dominant and where high- and moderate-sensitivity viewers would likely be significantly affected.
- Foreground, 1,500 feet to 0.5 mile—This “high visibility” distance zone is where Project features could potentially be dominant, depending on the viewing conditions, and where high- and moderate-sensitivity viewers could be substantially affected.

- Middleground, 0.5 mile to 1.5 miles—This is the distance zone where the potential effects on high-sensitivity viewers begin to diminish and Project features would become co-dominant or sub-dominant in the landscape, depending on the viewing conditions and setting.
- Background, 1.5 miles to 3.0 miles—This is the distance zone where Project features would not likely be perceived by the moderate-sensitivity casual viewer, and where high-sensitivity viewers would be affected only where the strongest contrasts would occur, such as in skylining conditions where no transmission lines currently exist.
- Seldom Seen, beyond 3.0 miles—In this distance zone, typical Project elements would not be seen by viewers even where strong contrasts occur because of intervening vegetation, topography, atmospheric conditions, or other factors. This is the limit of the visual resource analysis area.

#### Typical Viewers and Viewer Sensitivity

Although the proposed R-Project would have physical effects on the environment, visual resource quality is perceived by the viewer. Evaluation of potential effects for visual quality includes consideration of the number of viewers who might be affected by a change to the visual environment, and the anticipated sensitivity of those viewers to visual quality.

In general, viewers are expected to have higher sensitivity to visual quality if they are engaged in an activity that is enhanced by high visual quality (for example, sightseeing or looking out a window for aesthetic benefit), if they have more frequent or extended viewing of the resource. To evaluate the overall effects on visual resources, viewer sensitivity is considered as a factor together with the prominence of changes to visual resources that would be part of the proposed Project. Viewers in this analysis are grouped by viewing location, and the expectation of the typical viewer's sensitivity expected for users of that resource (see the Viewer Groups and Potential Viewing Locations section below).

### 3.12.1.2 Existing Conditions

#### Regional Landscape Character

The landscape setting for the R-Project is eastward-sloping plateau containing sand dunes, flat sandy plains, and rolling, dissected plains. Expansive areas of sand sheets and undulating fields of grass-stabilized sand dunes cover the landscape, and the area is referred to as the Sandhills. Local relief in the Sandhills is up to 400 feet. Cattle grazing, the most common land use in this landscape type, is prominent in defining the visual character of the study area.

The typical visual character of the landscape is rolling and open with little to no tree cover. Numerous wetlands and lakes dot the region and are sometimes associated with trees and taller vegetation. The North and South Platte River Valleys, a prominent feature in the region, is characteristically wide and flat with interlacing streams in the floodplain. The river and its braiding tributaries are bordered by riparian vegetation, including deciduous trees. The area is very sparsely populated; however, cattle ranching is a tradition, and large ranches are found throughout the region.

The North and South Platte Valley and Terraces Level IV ecoregion is characterized by extensive irrigated agricultural land; to the east, the North and South Platte Valley and Terraces area contains a greater abundance of hardwood trees. In the Lakes Region, few large streams and rivers occur; however, many small streams have their headwaters in this region. Potential natural vegetation is a combination of Sandhills prairie and wetland communities (USEPA 2011b).

A relatively small portion of the landscape in the study area is developed with urbanized areas or irrigated (typically using center-pivot systems) agriculture. Some areas are largely undeveloped, but are visually influenced by highway or road corridors, railroad corridors, and transmission line corridors in otherwise naturally dominated landscapes. Water features created as a result of dams often appear as natural features.

### Visual Landscape Units

The analysis area for the Project has been defined as the effective Project viewshed, which extends for three miles from proposed Project elements. Seven VLUs have been identified in the analysis area: Sandhills, Agricultural, Village, Industrial, Riparian, High Plains Valley, and the Platte River. Of these VLUs, the Sandhills landscape type is the most extensive and characteristic. The remaining VLUs are more limited in extent and contribution to the visual character of the study area. These VLUs and their general character are summarized below:

- The Sandhills VLU is a widespread and defining feature of the analysis area. The Sandhills landscape is somewhat diverse but is typically irregular in landscape form and line. Unvegetated, unstable slope areas of exposed sand provide smooth, uniform patches on otherwise uniformly vegetated and undulating hillsides. Seasonal changes provided by wildflowers contribute to the visual quality of these landscapes. The Sandhills VLU is the most characteristic landscape type in the study area and in the analysis area.
- The Agricultural VLU is characterized by irrigated fields that create a strong geometry on the landscape. This VLU, located near the North and South Platte rivers and other riparian floodplains, is primarily concentrated in the southwestern and the northeastern portions of the analysis area. Landform in the unit is generally flat with uniform and moderate- to low-growing vegetation cover. Human-made development features include utility service and distribution lines, residences, center-pivot irrigation, and storage structures and silos.
- The Village VLU includes developed areas of Sutherland, Stapleton, Thedford, and other communities around the analysis area. The unit is visually dominated by high-density, single- or multiple-story (three to five stories, typically) commercial and residential development of various architectural styles. Streets are often fairly wide, especially the “main” streets that provide the visual gateways to the village centers of activities. Street trees, landscape trees, and other planted, tall vegetation contrasts with the horizontally oriented vegetation of the surrounding agriculture and grassland. The Village VLU makes up a small portion of the analysis area.

- The Industrial VLU is located along Union Pacific railroad and transmission-line utility corridors and around facilities such as the GGS Substation, agricultural processing plants, and oil/gas storage facilities. Areas classified as the Industrial VLU often exhibit visual complexity with low unity. Such areas are not harmonious in the visual elements of form, line, color, and texture. The Industrial VLU is found in a very small portion of the analysis area.
- The Riparian VLU is typical of the minor perennial drainages and stream areas that are visually different from the surrounding landscapes because of flowing water features and trees along the banks that provide distinct corridors of diverse vegetation form, line, color, and texture. These landscapes occur primarily along the North Loup, Middle Loup, Dismal, and Calamus rivers.
- The High Plains Valley VLU is located in gently rolling to flat landscapes in upland areas not occupied by the Sandhills. Such landscapes occur in the analysis area primarily south of the North and South Platte River corridors in Sandhills transitional landscapes and in the northeastern portion of the analysis area in Gracie Flats, German Valley, and large portions of Wheeler and Holt counties. They may support grazing activities that do not substantially visually alter the natural appearance of the landscape. The lines of landforms are gentle and flowing; the ground texture and color are smooth.
- The Platte River VLU is located along the North and South Platte River corridors where broad floodplains are occupied by wide, multiple ribbons of flat, flowing water with riparian overstory and lower-growing vegetation that contrasts with the adjacent agricultural areas. These corridors are typically about 1,300 to 3,500 feet wide. The Platte River VLU makes up a very small portion of the analysis area.

#### Viewer Groups and Potential Viewing Locations

As a method for identifying locations where there might be higher sensitivity to change in the visual environment, viewers are discussed from the perspective of potential viewing locations, or viewpoints, in the study area. The anticipated sensitivity of viewers is based on typical activities and expectations that might be anticipated for viewers in these locations.

- Residential areas**—**The study area is very sparsely populated. Aside from the concentrated developed areas of Sutherland, Stapleton, and Thedford, residences are highly dispersed and typically associated with agricultural areas. Residential viewers have stationary views and, therefore, long-viewing durations for a low number of viewers. Residences have a high visual sensitivity.
- Recreation and preservation areas**—**The study area contains numerous visually sensitive areas owned, managed, or identified by various agencies for parks, recreation, and/or preservation purposes. Examples include NWRs, National Forests, SRAs, WMAs, scenic byways, and trails. Hunting, fishing, camping, and golfing occur on private land, and hunting and fishing are especially popular along the North and South Platte rivers and tributaries, as well as in and around the many farm ponds and small lakes. Portions of the

Calamus River, Dismal River, and Middle Loup River are on the NRI and are considered to be visually sensitive corridors because of their recognized ORVs and state recognition as recreational features.

- Travel and designated scenic corridors—Transportation in the study area is provided by a network of Federal and state highways and local roads (Section 3.11, *Transportation*). The Lincoln Highway Scenic and Historic Byway (U.S. Highway 30) and the Sandhills Journey Scenic Byway (Nebraska Highway 2) are designated Nebraska Scenic Byways in the study area. In addition to these roadways, a number of paved county roads and less-used paved and unpaved roadways in the study area also serve as part of the statewide bicycle network. Visual sensitivity depends primarily on typical travel speed, primary road users (user attitudes toward change in the landscape), number of viewers, and scenic roadway status. Gaston Road is used for access to the Nebraska National Forest in the study area and is considered a Recreation Destination Route. The road is located east of Thedford and connects to the Nebraska National Forest south from Nebraska Highway 2.

Sensitivity levels are summarized in Table 3.12-1. Sensitivity levels are based on viewer exposure, which is a function of view duration, use volumes, viewer attitudes toward change in the landscape, and designated scenic or historic status. Sensitivity levels are categorized as low, moderate low, moderate, moderate high, or high.

**Table 3.12-1. R-Project Viewer Exposure and Sensitivity**

| Sensitive Viewpoint or Corridor | View Duration | Use Volume | Attitudes Toward Change | Scenic/ Historic | Visual Sensitivity |
|---|---|---|---|---|---|
| Residences/village corporate limits | Long | Low to high | High | -- | High |
| **Parks, Recreation and Preservation Areas** | | | | | |
| National Historic Trails (Oregon, Pony Express, Mormon Pioneer, California) | Long | Moderate low | High | Historic | High |
| Calamus, Dismal, and Middle Loup rivers | Long | Moderate | Moderate high | -- | High |
| Sutherland Reservoir SRA | Long | Moderate high | Moderate | -- | High |
| Goose Lake WMA | Moderate long | Moderate low | Moderate | -- | Moderate high |
| Oregon Trail and Augusta Winds Golf Courses | Long | Moderate | Moderate high | - | High |
| Sutherland Flat Rock Riders OHV Park | Moderate | Moderate | Moderate low | -- | Moderate |
| American Discovery Trail | Long | Moderate low | High | -- | High |

| Sensitive Viewpoint or Corridor | View Duration | Use Volume | Attitudes Toward Change | Scenic/ Historic | Visual Sensitivity |
|---|---|---|---|---|---|
| **Transportation Corridors** | | | | | |
| I–80 | Short | High | Moderate low | -- | Moderate |
| U.S. Highway 30 (Lincoln Highway Scenic and Historic Byway) | Short | Moderate | Moderate | Scenic | High |
| U.S. Highway 83 | Short | Moderate | Moderate | -- | Moderate |
| U.S. Highway 83 Dismal Creek Rest Area/Overlook | Long | Moderate | Moderate high | Scenic | High |
| U.S. Highway 183 | Short | Moderate | Moderate | -- | Moderate |
| U.S. Highway 281 | Short | Moderate | Moderate | -- | Moderate |
| Nebraska Highway 97 | Moderate short | Moderate low | Moderate low | -- | Moderate low |
| Nebraska Highway 92 | Moderate short | Moderate low | Moderate low | -- | Moderate low |
| Nebraska Highway 91 | Moderate short | Moderate low | Moderate low | -- | Moderate low |
| Nebraska Highway 2 (Sandhills Journey Scenic Byway) | Moderate short | Moderate | Moderate | Scenic | High |
| Nebraska Highway 7 | Moderate short | Moderate low | Moderate low | – | Moderate low |
| Nebraska Highway 11 | Moderate short | Moderate low | Moderate low | – | Moderate low |
| Gaston Road USFS recreation destination route | Moderate long | Moderate low | Moderate high | – | Moderate high |

Source: NPPD (2015a)

### Key Observation Points

Eleven KOPs have been identified in the analysis area. The KOPs are shown on Figure 3.12-1 and are described below, including visual sensitivity and visual quality landscape ratings discussed above.

- KOP 1, Sutherland Reservoir SRA—This KOP, which is a representative viewpoint from the reservoir, is located at the boat launch on its east side. It has a high visual sensitivity and is located in a moderate visual quality landscape.
- KOP 2, I-80 Eastbound Crossing—This KOP, which is a representative viewpoint from the I-80 corridor, is located just east of the rest area. It has a moderate visual sensitivity and is located in a moderate to moderate-high visual quality landscape.
- KOP 3, Sutherland—This KOP, which is a representative viewpoint from the eastern side of Sutherland, is located in a high sensitivity residential area of moderate visual quality.

- KOP 4, North Platte River Crossing-Mormon Trail Interpretive Marker—This KOP, which is a representative viewpoint of the Platte River crossing, is located north of the North Platte River at the Mormon Pioneer Trail interpretive marker located on N. Prairie Trace Road. It has a high visual sensitivity and is located in a moderate-high visual quality landscape.
- KOP 5, U.S. Highway 83—This KOP, which is a representative viewpoint from the highway as the Project parallels it, is located at the Augusta Winds Golf Course. It has a moderate visual sensitivity and is located in a moderate visual quality landscape.
- KOP 6, Dismal River Overlook—This KOP, which is a representative viewpoint from the highway designated overlook, is located on the north side of the Dismal River adjacent to U.S. Highway 83. It has a high visual sensitivity and is located in a high visual quality landscape.
- KOP 7, Sandhills Journey Scenic Byway—This KOP, which is a representative viewpoint from the byway, is located about 2 miles east of Thedford. It has a moderate-high sensitivity and is located in a moderate visual quality landscape.
- KOP 8, Sandhills Landscape—This KOP is a representative viewpoint from the Sandhills landscape. It has a high visual sensitivity and is located in a high visual quality landscape.
- KOP 9, U.S. Highway 183—This KOP, which is a representative viewpoint from the highway, is located about 10.6 miles north of the Nebraska Highway 96 intersection. It has a moderate visual sensitivity and is located in a moderate visual quality landscape.
- KOP 10, U.S. Highway 281—This KOP, which is a representative viewpoint from the highway, is located 0.5 mile south of the 846th Road intersection. It has a moderate visual sensitivity and is located in a moderate visual quality landscape.

  KOP 11, Goose Lake WMA Entrance—This KOP, which is a representative viewpoint from the WMA access road (496th Avenue), is located at the 846th Road intersection. It has a moderate high visual sensitivity and is located in a moderate visual quality landscape.

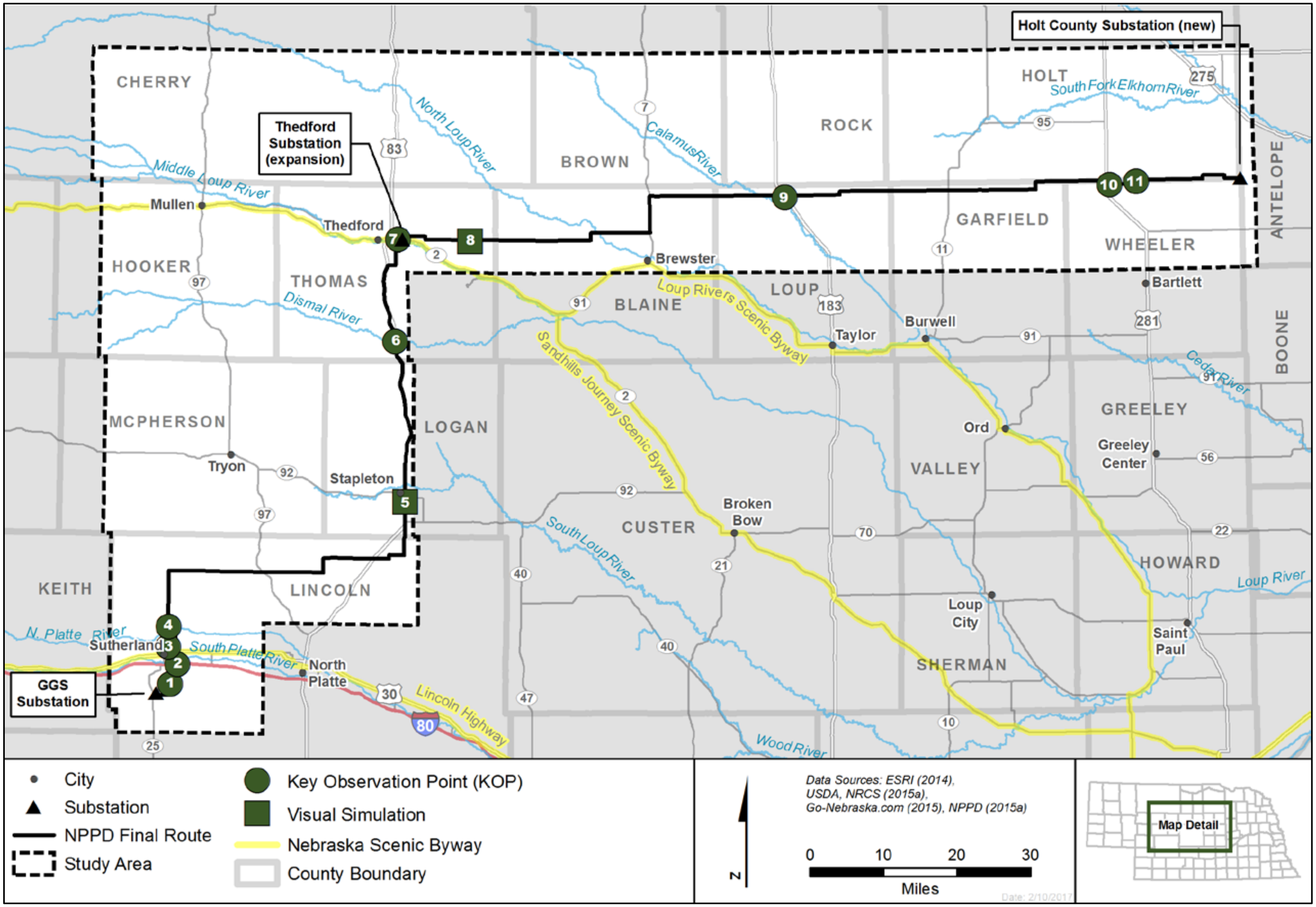



**Figure 3.12-1. Key Observation Points in the R-Project Analysis Area**

### 3.12.2 Direct and Indirect Effects

Potential direct and indirect effects were analyzed for both the No-action Alternative and the two action alternatives. As described in Section 3.12.1.1, potential effects of the action alternatives are evaluated by combining the existing visual quality of the landscape setting, the magnitude of the anticipated change to visual character, the number of viewers likely to be affected, and the anticipated sensitivity of those viewers to visual quality. The No-action Alternative is not expected to affect the visual quality of the landscape setting and is discussed briefly in Section 3.12.2.1. Alternative A and Alternative B are expected to have direct, adverse effects on visual quality in the landscape setting for the Project; those potential effects are described in this section. No indirect effects are anticipated.

The analysis of effects focuses on locations where the inventory of existing conditions suggests that there may be both viewers sensitive to change and proposed Project elements that could be visually prominent. For many locations in the analysis area, evaluation of potential impacts suggests that while the Project may be visible, only minor effects that would not change the visual quality rating would occur. For locations where the Project is anticipated to have a more substantial effect on visual quality, each contributing factor to visual quality—existing quality, potential change to the landscape, number of viewers, and viewer sensitivity—was evaluated as either low, medium, or high. Combining these evaluations, the overall effect was identified as being of low, moderate, or high intensity (Table 3.1-2). The types of effects anticipated under the action alternatives and the considerations that support characterizing the intensity of the anticipated effects are described in more detail in Section 3.12.2.2.

#### 3.12.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect the visual character and quality of the analysis area.

#### 3.12.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

**Direct and Indirect, Long-term Effects**

Power transmission facilities are typically visually prominent features that contrast with the surrounding landscape. Even when located in already developed areas, the scale and character of power transmission towers and lines may contrast with their surroundings. Representative visual simulations of the effects of steel monopole and lattice tower structures on existing landscapes in the analysis area are illustrated and discussed later in this section. In general, viewers consider electric transmission facilities as detracting from, rather than contributing to, aesthetic and visual quality. The construction of new transmission facilities in undeveloped landscapes typically has substantial effects on visual resources, and the technical requirements of transmission facilities limit the options available for mitigation.

Under Alternative A, several types of impacts would reduce visual quality. Long-term effects could include:

- Cleared corridors through forest and shrub landscape types
- Color, form, and scale contrast between structures (e.g., transmission towers, wires, bird flight diverters) and the surrounding landscape
- Light and glare impacts from steel towers and power lines
- Color, form, and scale contrasts between substation structures and their context
- Color and form contrasts between new access roads and their surroundings, especially in locations where there are few existing roads

The intensity of the effects depends on the visual quality of the surrounding landscape, the visibility of the transmission facilities, the visual contrasts created by the Project, and the estimated sensitivity of potential viewers. Where a facility would be visible to many viewers in a landscape with high visual quality, the effect would be more substantial than where the quality of the landscape was lower, or fewer people might view it.

Alternative A includes a mixture of lattice and monopole support structures. The locations of the different types of structures proposed under each alternative is shown in Figure 2-11. Recent research indicates that, compared to monopoles, lattice structures are noticeable to casual observers at greater distances and also attract visual attention at greater distances (Sullivan et al. 2014). Because monopoles are substantially less bulky and complex than lattice towers, it is also likely that the visual impacts of monopoles would be less than those of lattice towers at shorter viewing distances.

Construction of Alternative A would also entail the relocation of approximately 28 miles of existing overhead distribution power lines. The lines would not be moved far from their current locations. For example, lines along public roads would be moved to the opposite side of the road. The visual impacts of the relocated distribution lines are therefore expected to be similar to those of the existing lines, although effects related to poles and overhead wires would be eliminated along the 6-mile-long segment of the route where existing distribution lines would be relocated underground.

Bird flight diverters would be installed on approximately 123 miles of the R-Project and on an equivalent length of existing transmission lines. Spiral flight diverters would be placed on the majority of these 123 miles. The diverters would be yellow in color and would be placed at 50-foot intervals alternating on opposite shield wires. Each diverter would be approximately 12 inches long and have a maximum diameter of about 3 inches. Across certain waterbodies, NPPD would use a “V” shaped, reflective diverter that is 6 inches by 4 inches. Most of the segments of the R-Project where diverters would be installed are in the northeastern portion of the analysis area, and near crossings of the South Platte, South Loup, and North Loup rivers. Diverters would also be installed along approximately 64 miles of existing line in the central Platte River Valley southeast of the R-Project, and on several segments of existing line north of the R-Project.

The bird flight diverters placed on new and existing transmission lines may be visible to viewers at relatively short distances (i.e., up to a few hundred yards). The visual impact would be reduced for a majority of the marked line through the use of spiral diverters, which are less bulky than other types of marking devices (e.g., spheres, swinging plates, and flappers), and by the distance between viewers and the wires, which would be at least 100 feet above the ground at most locations. It is assumed for this analysis that the presence of these diverters would not substantially modify the visual impact of new or existing transmission lines. For this reason, the visual impacts of bird diverters are not addressed further.

The determination of potential effects for Alternative A is based on the analysis of effects at several locations along NPPD's final route. These viewing locations include representative examples of landscapes in the area analyzed for effects as described in Table 3.1-1, and can be used to evaluate the range of likely effects that Alternative A could have at the landscape level. Overall, several of the viewing locations include high-quality views or locations where sensitive viewers would likely be present. This is a conservative approach to analysis of the potential effects in that it evaluates impacts where they are likely to be more intense than in more typical locations in the analysis area.

The Project would be most prominently visible to the largest number of viewers in segments located near communities and alongside highways. Where the proposed alignment would be distant from highways and communities, the effects on visual quality would be less intensive. Where rolling topography or forestland is located between likely viewers and the proposed facility, visibility and associated impacts may be reduced.

Project elements typical of Alternative A would affect the visual characteristics of vividness, intactness, and unity at different intensities, based on the characteristics of the existing landscape and the number, location, and sensitivity of potential viewers:

- Vividness is a characteristic of the underlying landscape. Typically, a project has a substantial effect on vividness only if it becomes a dominant element of the view.
- Intactness is a measure of the negative change that could occur in a landscape based on development or other human activities. Typically, elements of a proposed project, including power transmission structures, substations, and other associated changes to the landscape, adversely affect intactness. The potential effects on intactness depend on the prominence of a proposed project in the landscape, the distance from viewers, and the number of potential viewers.
- Unity is a measure of the fit between different elements in the landscape, including both natural and manmade features. Transmission towers, power lines, and substations generally contrast with their landscape setting, and are be perceived as decreasing the unity of the visual environment. A project could have substantial impacts on unity if the landscape setting is generally more uniform, where the contrast between a proposed project elements and the landscape setting is high, and where there would be more, rather than fewer, sensitive viewers.

Anticipated changes for each of these measures of visual quality are used to develop a measure of combined change in visual quality. Taken together with viewer sensitivity and visibility, the anticipated impact is identified as either low intensity, moderate intensity, or high intensity. Definitions for duration and intensity developed for this Project are described in Table 3.1-2.

As described in Section 3.12.1.1, potential effects of Alternative A are evaluated by combining the existing visual quality of the landscape setting, the magnitude of the anticipated change to visual character, the number of viewers likely to be affected, and the anticipated sensitivity of those viewers to visual quality. The analysis of effects focuses on locations where the inventory of existing conditions suggests that there may be both viewers sensitive to change and proposed Project elements that could be visually prominent. For many locations in the analysis area, evaluation of potential impacts suggested that the effects on visual quality would be minor or would not occur. For locations where the Project is anticipated to have a more substantial effect on visual quality, each contributing factor to visual quality—existing quality, potential change to the landscape, number of viewers, and viewer sensitivity—was evaluated as either low, medium, or high. Combining these evaluations, the overall effect was identified as either low, moderate, or high intensity.

Effects under Alternative A were assessed from representative viewing locations and landscape units with high to medium levels of viewer sensitivity located in the analysis area. The potential effects are described below and summarized in Table 3.12-2.

**Table 3.12-2. Summary of Potential Visual Effects of Alternative A on Representative Viewing Locations and Landscape Units**

| Landscape Units/Viewing Locations | Existing Visual Quality | Anticipated Change | | | Combined Change to Visual Character | Visibility/Number of Viewers | Viewer Sensitivity | Overall Effect on Visual Quality |
|---|---|---|---|---|---|---|---|---|
| | | Vividness | Intactness | Unity | | | | |
| **Communities and Residences** | | | | | | | | |
| Residences near Sutherland and Thedford | Medium/low | Minor | Moderate/minor | Moderate/ minor | Medium | Medium | High | Moderate intensity |
| Sutherland | Medium | Minor | Minor | Minor | Low | Medium | High | Low intensity |
| Stapleton | Medium | Minor | Moderate | Moderate | Medium | Medium | High | Moderate intensity |
| **Recreation and Historic Sites** | | | | | | | | |
| Sutherland Reservoir | Medium | Minor | Minor | Minor | Low | Low | High | Low intensity |
| Augusta Winds Golf Course | Medium | Minor | Moderate | Moderate | Medium | High | High | Moderate intensity |
| Mormon Trail interpretive marker | High | Moderate | Substantial | Substantial | High | Medium | High | High intensity |
| Oregon Trail interpretive marker | Medium | Substantial | Substantial | Substantial | High | High | High | High intensity |
| Goose Lake WMA | Medium | Moderate | Substantial | Substantial | High | Low | High | Moderate Intensity |
| American Discovery Trail and National Historic Trails | Medium | Minor | Moderate | Moderate | Medium | Low | High | Moderate Intensity |
| **River Crossings** | | | | | | | | |
| North and South Platte rivers | High | Minor | Moderate | Minor | Low | Medium | High | Moderate intensity |

| Landscape Units/Viewing Locations | Existing Visual Quality | Anticipated Change | | | Combined Change to Visual Character | Visibility/Number of Viewers | Viewer Sensitivity | Overall Effect on Visual Quality |
|---|---|---|---|---|---|---|---|---|
| | | Vividness | Intactness | Unity | | | | |
| Middle Loup River | Medium | Minor | Moderate | Minor | Low | High | High | Moderate intensity |
| Dismal River overcrossing | High | Minor | Minor | Substantial | Medium | High | High | High intensity |
| North Loup River | Medium | Minor | Moderate | Moderate | Medium | High | High | Moderate intensity |
| Calamus River | Medium | Minor | Moderate | Moderate | Medium | High | High | Moderate intensity |
| **Highways and Scenic Byways** | | | | | | | | |
| U.S. Highway 83/ Nebraska Highway 92 | Medium | Minor | Major | Moderate | High | High | Medium | Moderate intensity |
| Dismal River Overlook | High | Minor | Major | Major | High | High | High | High intensity |
| U.S. Highway 30 | Medium | Minor | Moderate | Minor | Low | High | High | Moderate intensity |
| Interstate 80 | Medium | Minor | Moderate | Moderate | Medium | High | Medium | Moderate intensity |
| Gaston Road | Medium | Minor | Minor | Minor | Low | Medium | High | Low intensity |
| Nebraska Highway 2 | Medium | Minor | Minor | Minor | Low | Medium | High | Low intensity |
| Nebraska Highway 7 | Medium | Minor | Moderate | Moderate | Medium | High | Medium | Moderate intensity |
| U.S. Highway 183 | Medium | Minor | Moderate | Moderate | Medium | Medium | Medium | Moderate intensity |
| Nebraska Highway 11 | Medium | Minor | Moderate | Moderate | Medium | Medium | Medium | Moderate intensity |
| U.S. Highway 281 | Medium | Minor | Moderate | Moderate | Medium | Medium | Medium | Moderate intensity |

### *Sensitive Viewpoints or Corridors in the Visual Analysis Area Not Likely to be Affected*

Several of the sensitive viewpoints located in the visual analysis area would not likely be affected by Alternative A (Table 3.12-3). Although these viewpoints are located in the study area, they are outside the 6-mile-wide analysis area and the proposed transmission facilities would either not be visible or would be at a very great distance from viewers. Consequently, these viewpoints are not addressed further.

**Table 3.12-3. Sensitive Viewpoints or Corridors Not Likely to be Affected**

| | Viewer Exposure | | | | |
|---|---|---|---|---|---|
| **Sensitive Viewpoint or Corridor** | **View Duration** | **Use Volume** | **Attitudes Toward Change** | **Scenic/ Historic** | **Visual Sensitivity** |
| **Parks, Recreation and Preservation Areas** | | | | | |
| Oregon Trail Golf Course | Long | Moderate | Moderate High | -- | High |
| Sutherland Flat Rock Riders OHV Park | Moderate | Moderate | Moderate Low | -- | Moderate |
| **Transportation Corridors** | | | | | |
| Nebraska Highway 91 | Moderate Short | Moderate Low | Moderate Low | -- | Moderate Low |

### *Communities and Residences*

Alternative A would be located near several small communities, including Gandy, Hershey, Stapleton, and Thedford. Several isolated residences are also located very near the route. Impacts on communities are generally based on views experienced by residents who can see the facilities from their homes, although the entire community would often experience visual impacts in day-to-day travels. Hershey, Gandy, and Thedford are relatively distant from the proposed alignment and would be considered to have either no or low impacts. Potential effects on isolated residences and the other affected communities are described below.

***Isolated Residences***—Large sections of the landscape affected by Alternative A are very sparsely populated; however, installing power facilities near an existing home can have a substantial impact on the residents.

Isolated residences near Sutherland located on W. Power Road, S. Bubble Road, W. Antelope Road, W. Platte Valley Road, Suburban Road, and in the Birdwood Creek area would have foreground or immediate foreground views of the Project. Other areas where residences would have foreground or immediate foreground views of Alternative A include the following (in sequence from southwest to northeast):

- Near the southernmost crossing of U.S. Highway 83, approximately 10 miles southwest of Stapleton (lattice towers)
- Along U.S. Highway 83 between Stapleton and Thedford (steel monopoles)

- Along Nebraska Highway 2 east of Thedford and near the Middle Loup River (lattice towers)
- Near Rosehill Road in eastern Thomas County (lattice towers)
- Near the North Loup River (lattice towers)
- Along Nebraska Highway 7 north of Brewster (steel monopoles)
- Near the Calamus River (lattice towers)
- Near Nebraska Highway 11(lattice towers)
- Near U.S. Highway 281(steel monopoles)
- Along the Holt/Wheeler county line west of the Western Substation (steel monopoles)

Typically, the existing visual quality near these residences is low to medium, and residential viewers are assumed to have high sensitivity to visual quality. Because of the proximity of proposed Project elements to viewers from these homes, effects on vividness, intactness, and unity would occur. Impacts on some individual residents in the areas described above would be of high intensity; however, in the context of the overall Project, relatively small number of viewers would be affected. The most prominent structures visible from most of the locations identified above would be lattice towers. Steel monopoles would be visible near Sutherland, along U.S. Highway 83 between Stapleton and Thedford, along Nebraska Highway 7, near U.S. Highway 281, and along the Holt/Wheeler County line.

***Sutherland***—The existing visual quality of the landscape surrounding Sutherland is medium and includes a mixture of irrigated fields, grazing land, and remnant native landscapes. Scattered trees provide some vertical elements in the view, along with power lines that provide local service. Topography is generally flat looking to the east, while there are low rolling hills to the north. Vividness of the existing landscape is low, intactness is medium, and unity is medium.

Visibility to Alternative A from Sutherland would be medium. The most prominent structures would be steel monopoles. The poles would be prominent and would not be screened by topography or vegetation, but they would be between 1 to 3 miles distant. Impacts would be most visible to residents on the east and north edges of the community, where residential neighborhoods give way to farmland and views are the least obstructed by buildings. Near the center of town, homes and trees associated with residential landscapes would screen most views to the Project. Alternative A would have a low-intensity impact on visual resources near Sutherland, and the overall visual quality of this landscape unit would remain medium.

***Stapleton***—Stapleton is a small agricultural community near U.S. Highway 83. Residences are typically located within 0.25 mile to 0.5 mile from the proposed transmission line. The landscape between the community and proposed transmission line is flat and generally open with some scattered trees. Existing visual quality is medium, and residential viewers are assumed to be sensitive to changes in visual quality. The proposed Project would reduce intactness and unity for viewers looking eastward from the community. The most prominent structures would be steel monopoles. Overall, the impact would be of moderate intensity.

### *Recreation and Historic Sites*

***Sutherland Reservoir SRA***—The proposed transmission line would be located to the south and east of the Sutherland Reservoir SRA, curving around the reservoir from the GGS Substation. The existing landscape setting for the power line is generally irrigated agriculture, although the reservoir itself is bordered by a fringe of trees and gently rising topography that screen views.

Power lines would range from 0.5 to 1 mile distant from the south and east edges of the reservoir. Vegetation in those areas would screen views of the Project, however. The most direct views to the Project would be from farther away, either from the water or from the opposite shore of the reservoir. The most prominent structures would be steel monopoles, but their prominence would be reduced by distance, topography, and existing vegetation. Vividness in this landscape setting is high primarily because of the combination of water, topography, and forest vegetation. Prominent modifications to the landscape and structures associated with the reservoir, including multiple existing transmission and distribution lines in the vicinity of Sutherland Reservoir, would reduce existing intactness and unity in this area to medium. Anticipated changes to vividness, intactness, and unity would be minor, resulting in a low change in the overall visual quality of the landscape setting. The overall effect on visual resources would be of low intensity.

***Augusta Winds Golf Course***—The Augusta Winds Golf Course is located along U.S. Highway 83 just south of Stapleton. The golf course is set in open, gently rolling terrain and has open views to the surrounding landscape. Recreationists using the golf course would be considered sensitive viewers. Existing power poles along U.S. Highway 83 are low and are not prominently visible from the course. The proposed transmission line would be visible and prominent from the majority of the course and would be located between 200 feet and 0.5 mile from playing areas. The most prominent structures would be steel monopoles. Most fairways would align parallel to the transmission line and would not be directly in the field of view for most golf shots. Two fairways aligned perpendicular to the proposed transmission line play from east to west, so golfers would have the power lines to their backs.

Existing vividness, intactness, and unity are medium at this location. The landscape surrounding the course, and the course itself, are relatively featureless and do not include distinctive topographic or vegetative character. The golf course itself is a minor detraction from the landscape character, reducing intactness and unity. Because of the proximity of the power transmission corridor and the lack of any screening vegetation or topography, the power lines would be very prominent. Vividness would remain medium; however, intactness and unity would be reduced to low. Overall, impacts to visual resources at this location would be of moderate intensity.

***Mormon Trail Interpretive Marker***—The North Platte River is an important historic resource, being the site of Native American trails, the Mormon Trail, and the first transcontinental railroad. Alternative A would be located directly in the viewshed of a significant Mormon Trail interpretive site, including an interpretive sign, located at a historic crossing location of the river. The two transmission line structures closest to the site would be one steel monopole approximately 250 feet to the south and one steel monopole approximately 950 feet to the north.

The transmission line conductors between these two structures would pass overhead at the site. Changes associated with the proposed Project, including tree removal and installation of the transmission line, would be dominant in the viewshed, reducing vividness, intactness, and unity. Impacts to visual resources at this location would be of high intensity.

***Oregon Trail Interpretive Marker***—Located at a rest area along I-80 just southeast of Sutherland, this site provides views to an extensive set of wheel ruts from wagons traveling the Oregon Trail. The rest area is elevated above the four-lane interstate highway and provides extensive views to the south over the Oregon Trail route and irrigated cropland beyond, as well as to the South Platte River Valley and the Sutherland ethanol plant. A paved pathway leads from the rest area to interpretive sites where visitors can view wheel ruts. Views from the interpretive site are open and have very little topographic or vegetative diversity.

The proposed Project alignment is very close to the viewpoint, and the Project would be visually dominant in views to the north where the setting is otherwise open and undeveloped. The most prominent structures would be steel monopoles. Currently, the site has moderate vividness and intactness and high unity. Expectations for visual quality at the site are high because access has been developed intentionally to showcase a unique and significant historic feature associated with the Oregon Trail. Impacts on visual resources at this location would be of high intensity.

***Goose Lake Wildlife Management Area***—Located in the northeastern part of the Project area, the Goose Lake WMA is set in open landscape with minor topographic relief. NPPD's final route would pass approximately 1 mile south of the site. The most prominent structures would be steel monopoles. Existing shelterbelts and wooded areas would provide visual screening. Existing visual quality is medium because of the contribution the lake makes to the landscape setting. The Project would have low impacts on intactness and unity of the landscape setting.

***American Discovery Trail and National Historic Trails***—The American Discovery Trail is a non-motorized recreational trail connecting the Atlantic to the Pacific. Within the Project area, the trail generally is located parallel to and south of I-80. The California, Mormon Pioneer, Oregon, and Pony Express Trails follow U.S. Highway 30. The Project would likely be visible to American Discovery Trail users near Sutherland Reservoir; the trail connects to Sutherland Reservoir at the north end of the SRA and passes under NPPD's final route. The Project would be visible to trail users near where NPPD's final route crosses U.S. Highway 30.

Alternative A would be prominent in views at all trail crossings; however, the presence of existing development of similar character would reduce the impact of new transmission lines. Impacts to American Discovery Trail users would be similar to those described for the Sutherland Reservoir, above, although higher-intensity effects would occur at and near the location where the trail approaches and passes under the proposed transmission lines. NPPD met with the landowner at the Oregon-California Trail crossing location to determine how to maximize the distance of structures from the trail, considering engineering constraints. As depicted in the current Project design, towers would be located approximately 350 to 700 feet from the trails. The existing landscape setting of the National Historical Trails is fairly flat with scattered agricultural structures, a railroad line, and existing power lines, as well as the Sutherland Ethanol Plant. The most prominent structures would be steel monopoles. Impacts on trail users are anticipated to be of high intensity. See the effects analysis in Section 3.10, *Cultural Resources*, for further discussion of the effects of transmission towers and overhead lines on the integrity of setting, feeling, and association of the National Historic Trails.

### *River Crossings*

NPPD's final route would cross several rivers. Each of the rivers has some recreational use with rivers closer to communities typically having higher use levels. Recreationists are considered sensitive to visual quality. At each river crossing, the primary visual impact would be at or near the crossing location because the alignment typically does not run parallel to river corridors. The effective visual impact of the crossings on river users would largely depend on the presence or absence of riparian trees. Rivers that have a developed fringe of riparian vegetation are visually enclosed, and river users would have limited views to the transmission facilities. Rivers that have a generally open bank would allow much more extensive views to the transmission corridor, and impacts would be greater.

Each river crossing would include an impact at the crossing location. Wires and nearby support structures would be prominent in the view, and generally create a strong visual contrast with the existing landscape. For rivers that have a fringe of riparian forest, the crossing location would also include a cleared area in the transmission corridor, which would increase the amount of visual change associated with the Project. Consistent with recommendations provided by NPS, NPPD would locate towers as far as possible from the edge of any NRI-listed river segments.

***North and South Platte Rivers***—NPPD's final route would include crossings at each of these rivers, where they would be visible to recreational users. The most prominent structures would be steel monopoles. The North and South Platte rivers are both lined by low riparian forest, which would limit views to the transmission corridor. The rivers themselves are heavily braided and complex visual environments. Frequent bends in the river would limit longer distance views to the crossing locations. Although there are occasional modifications to the viewshed surrounding the rivers, primarily road crossings and dams, the majority of the river environment is visually intact. Vividness, intactness, and unity for each of these rivers is high.

Tree clearing and structures associated with the transmission lines would reduce the intactness and unity of the river environment causing localized high-intensity impacts, but the impacts would be limited to a short stretch of the river. As depicted in the current Project design, towers would be located approximately 100 to 200 feet from the banks of the South Platte River and 300 to 600 feet from the banks of the North Platte River. The overall visual impact to these landscape units would be of moderate intensity.

***Dismal River***—The Dismal River is a meandering river with a well-defined channel, bordered by scattered riparian forest and relatively high hills defining the river valley. One of these hills is the location of the Dismal River Overlook, described below. The visual setting for the river is natural looking, having very few intrusions. The proposed transmission line would cross the river at one of the few locations where an existing man-made structure is visually prominent, the Highway 83 bridge crossing. Although the bridge is visually intrusive, it is a low-level, primarily horizontal structure, and would not be as prominent as the transmission structures.

Vividness and unity for the Dismal River are both high in this location with intactness being medium because of the presence of the existing highway bridge. As noted above, the Dismal River is on the NRI and is considered to be visually sensitive. The scattered riparian forest would screen some views to the transmission corridor, but in general it would be prominently visible from ridgeline to ridgeline, and steel monopoles located at or near the ridgelines would be especially prominent. As depicted in the current Project design, towers would be located approximately 250 to 1,550 feet from the banks of the Dismal River.

Vividness would remain high, intactness would be reduced to low, and unity would be reduced to medium in this location. The visual impact on this landscape unit would be of high intensity.

***Middle Loup River***—The Middle Loup River crossing location is near the community of Thedford. The river is paralleled by Highway 2, the Sandhills Journey Scenic Byway. The river is complex, with numerous bends and oxbows, but the channel is more defined than the North and South Platte rivers, which include more active braiding. The landscape surrounding the Middle Loup River is generally agricultural, treeless, and with limited patches of taller riparian shrubs. Scattered rural homes are frequently visible from the river, along with local power lines adjacent to the railroad line and highway paralleling the river.

Vividness, intactness, and unity for this stretch of the Middle Loup River are all medium. The crossing location for the corridor would be located near an existing road crossing. As noted above, however, the Middle Loup River is on the NRI and is considered to be visually sensitive. The proposed transmission line would be prominently visible, but located in the context of a modified landscape and an existing roadway bridge. The most prominent structures would be lattice towers, which would be approximately 150 to 400 feet from the banks of the river. Vividness would remain medium, intactness would be reduced to low, and unity would remain medium. The visual impact on this landscape unit would be of moderate intensity.

***North Loup River***—The North Loup River flows in a relatively small channel bordered by riparian shrubs. Compared to large rivers along the transmission route, the North Loup River is relatively straight without the meanders and oxbows that characterize rivers with higher flows. The river flows in a generally northwest to southeast direction, while the proposed transmission corridor is primarily oriented east and west near the location where the corridor crosses the river.

Vividness and unity are medium for the river, while intactness is high. The transmission line would be prominent in views from the river and would be visible for a relatively long stretch of the river because of the near parallel alignment of the transmission line and lack of tall riparian vegetation. The most prominent structures would be lattice towers.

Vividness would remain medium, intactness would be reduced to low, and unity would be reduced to low where the transmission line is near the river. The visual impact on this landscape unit would be of moderate intensity.

***Calamus River***—The Calamus River is a meandering river with a well-defined channel. The surrounding landscape is primarily open grazing land, with few trees and limited patches of riparian shrubs. Scattered rural homes and outbuildings are visible at several locations. The proposed crossing location would be approximately 3 miles west of the crossing of U.S. Highway 183. Similar to the North Loup River, the Calamus River flows generally northwest-to-southeast, while the proposed transmission corridor near the location of the river crossing would be oriented east-and-west.

Vividness and unity at the Calamus River crossing are medium, and intactness is high. As noted above, the Calamus River is on the NRI and is considered to be visually sensitive. The transmission line would be prominent in views from the river and would be visible for a relatively long stretch of the river because of the near parallel alignment of the transmission line and lack of tall riparian vegetation. The most prominent structures would be lattice towers, which would be approximately 200 to 1,000 feet from the banks of the river. Vividness would remain medium, intactness would be reduced to low, and unity would be reduced to low where the transmission line is near the river. The visual impact on this landscape unit would be of moderate intensity.

#### *Visual Resources Associated with Highways and Scenic Byways*

Highway travelers vary in their presumed sensitivity to visual quality, and typically would be considered to have a medium sensitivity to aesthetics. Scenic byways have been officially recognized as desirable routes for recreational travelers. Byway travelers are typically considered to have high sensitivity to visual quality. Transmission lines have a greater effect on highway travelers when they run parallel to roadways, rather than intersecting them at a single point. However, in areas with little topographic relief a power transmission alignment perpendicular to the highway can be visually prominent.

NPPD’s final route would run parallel to U.S. Highway 83 for approximately 40 miles (Nebraska Highway 92 is co-located with U.S. Highway 83 for 4 miles of that stretch, south of Stapleton) and Nebraska Highway 7 for approximately 5 miles, staying within 500 feet of the road for most of those distances. NPPD’s final route would cross over seven other highways (I-80, U.S. Highway 30, Nebraska Highway 97, Nebraska Highway 2, U.S. Highway 183, Nebraska Highway 11, and U.S. Highway 281). U.S. Highway 30 and Nebraska Highway 2 are designated state scenic byways—the Lincoln Highway Scenic and Historic Byway and the Sandhills Journey Scenic Byway, respectively.

***U.S. Highway 83/Nebraska Highway 92***—Under Alternative A, the Project would be prominent to travelers for approximately 40 miles of U.S. Highway 83, including about 4 miles of Nebraska Highway 92. Steel monopoles would be used along most of this length (lattice towers would be used at the northern end, where NPPD's final route would leave the highway corridor and turn east). Figure 3.12-2 is a visual simulation of the current setting for this highway and the setting with the proposed Project. The visual character of the viewshed from the highway varies, but in general the Project would reduce the intactness and unity of the highway's landscape setting. The existing visual quality of the highway's landscape setting is medium. The Project is expected to have a moderate-intensity impact on views from the highway.


Source: NPPD (2015a)

**Figure 3.12-2. Visual Simulation of Steel Monopoles along Highway 83 (Alternatives A and B)**

The Dismal River Overlook is a scenic viewpoint associated with U.S. Highway 83 and is located at a high point overlooking its namesake river. The existing view is of a high-quality landscape. The proposed transmission corridor would be prominent in the view and would extend above the horizon line (“skyline”) for parts of its alignment. The most prominent structures would be steel monopoles. Viewer sensitivity would be high for this location because it is a dedicated viewpoint. Both intactness and unity would be reduced by the proposed Project. The Project is expected to have a high-intensity impact on visual quality at the viewpoint.

***U.S. Highway 30, the Lincoln Highway Scenic and Historic Byway***—NPPD’s final route would cross U.S. 30, the Lincoln Highway Scenic and Historic Byway, just east of the community of Sutherland. The existing landscape setting here is fairly flat with scattered agricultural structures, a railroad line, and existing power lines north of the highway, as well as the Sutherland Ethanol Plant. The proposed Project would be prominent in the view; however, the presence of existing development of similar character would reduce the impact of new transmission lines. The most prominent structures would be steel monopoles. The overall impact of the proposed Project for travelers along U.S. Highway 30 would be of moderate intensity.

***Interstate 80***—The proposed crossing location for I-80 is located just south of the crossing of U.S. Highway 30. The highway has eastbound and westbound rest areas that are prominent visual features near the Project location. The Project elements would be prominent in views 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. The proposed Project would have a moderate intensity impact on visual quality.

***Nebraska Highway 2, the Sandhills Journey Scenic Byway***—NPPD’s final route would cross Nebraska Highway 2, the Sandhills Journey Scenic Byway, just east of the community of Thedford. After crossing the Middle Loup River, the route would cross Highway 2 and then make a 90-degree turn to the east. The route would then parallel Highway 2, proceeding east for approximately 0.5 mile, where it would connect into NPPD’s existing Thedford Substation. The most prominent structures would be lattice towers. The landscape to the north of the byway is rolling and would provide some visual buffering between travelers, so the views of the transmission line would be brief. Several rows of existing transmission lines are also located to the north of the byway, which would lessen the impacts of the new line by reducing the contrast between the new facility and the byway’s existing landscape setting.

The existing visual quality of the landscape near the byway is medium, and while viewer sensitivity would be considered high, the new line would not result in major changes to vividness, intactness, or unity. Overall, the impact to the byway would be of low intensity.

***Nebraska Highway 7***—NPPD’s final route would parallel Nebraska Highway 7 for approximately 5 miles north of the community of Brewster. The landscape setting is open pastureland, with gently rolling topography and occasional copses of trees. An existing line of power poles is located to the west of the highway, and occasional fence lines associated with agricultural activity occur along the terrain. New transmission facilities would reduce intactness and unity for the section of highway to which they are adjacent. Under Alternative A, the most prominent structures would be steel monopoles. The impact to visual resources would be of moderate intensity.

***Nebraska Highway 97, U.S. Highway 183, Nebraska Highway 11, and U.S. Highway 281***—NPPD's final route would cross Nebraska Highway 97, U.S. Highway 183, Nebraska Highway 11, and U.S. Highway 281 in locations with very similar landscape settings. Each is bordered by open grazing land with minor rolling topography and stands of trees. There is also existing development near the crossing locations. The Project transmission line would reduce the intactness and unity of the landscape setting at all four crossing locations. For Alternative A, the most prominent structures at Nebraska Highway 97, U.S. Highway 183, and Nebraska Highway 11 would be lattice towers, while the most prominent structures at the U.S. Highway 281 crossing would be steel monopoles. Alternative A would be a prominent feature visible to travelers for a short duration at each of the crossings. Overall, the impacts at each of the crossings would be of low intensity.

***Gaston Road USFS Recreation Destination Route***—NPPD's final route would not cross Gaston Road but would be approximately 0.5 to 1.0 mile from the northernmost 2 miles of the road. Project transmission structures would likely be visible to recreational users using Gaston Road for access to the Nebraska National Forest. The most prominent structures would be lattice towers. The landscape between Gaston Road and the proposed transmission line corridor is rolling and would provide some visual buffering between travelers and the transmission line, and views would be brief. An existing transmission line is located to the east of Gaston Road, which would lessen the effects of the new line by reducing the contrast between the new facility and the road's existing landscape setting. The existing visual quality of the landscape near Gaston Road is medium. While viewer sensitivity would be considered high, the new line would not result in major changes to vividness, intactness, or unity. Overall, the impact to recreational users of Gaston Road would be of low intensity.

#### *Stations and Substations*

***GGS Substation***—The GGS Substation would be expanded within its existing footprint and would include installation of a 345 kV breaker, 345 kV reactor, and 345 kV dead-end structure in addition to the infrastructure currently installed. Weak visual contrasts and minimal impacts would occur from the existing industrial setting, low visibility from sensitive viewpoints, low visual quality of the area, and presence of existing substation, transmission line, and generation plant infrastructure. Visual quality would remain low, and visual changes would not affect landscape vividness or intactness; therefore, impacts would be of low intensity.

***Thedford Substation***—The approximate 13-acre Thedford Substation expansion would be located west of the existing Thedford 115 kV Substation and north of Nebraska Highway 2 (Sandhills Journey Scenic Byway) in pasture/rangeland. The new substation would be located in the immediate foreground of byway travelers (see Figure 3.12-3), residences located directly south of the highway, and recreationists using the Middle Loup River. Visual quality in the area is moderate, and the existing substation and 115 kV transmission and railroad corridor reduce visual intactness. Nebraska Highway 2 travelers would have brief views of the substation.

Overall, visual contrast as seen from this corridor would be moderately strong because of the addition of the 345 kV structure and substation that is substantially larger than the existing substation, and landform and structure contrasts created by substation equipment and necessary grading. The impact would be moderate.


Source: NPPD (2015a)

**Figure 3.12-3. Visual Simulation of Lattice Towers East of Thedford (Alternative A)**

***Holt County Substation***—The approximate 12-acre Holt County Substation would be located on the northwest corner of the intersection of 846th Road and 510th Avenue in an area dominated by irrigated cropland. The new substation would be located at least 0.5 mile from the nearest sensitive viewers (residences).

Travelers using 846th Road, a local road serving surrounding residential and agricultural land uses, would experience the highest visibility of the substation. This road has a low sensitivity because of use levels, so impacts on viewers from this corridor would be of low intensity. For the highly sensitive residential viewers, structure contrasts would cause the greatest impacts on the surrounding moderate visual quality, but would be seen in the context of the existing 345 kV transmission line and at a distance that would cause low-intensity visual impacts.

#### *Construction Period Effects*

Short-term construction effects would include tree clearing and grading, the temporary presence of large equipment in the landscape, and temporary impacts related to construction of substations. Visual impacts would include short-term impacts associated with the construction of the R-Project and presence of vehicles, equipment, and potential fugitive dust associated with construction activities. Impacts related to the staging and laydown areas would be short term and are not anticipated to result in substantial effects on visual quality. Staging areas would be located in previously disturbed areas and would be restored to landowner specifications. Therefore, the primary visual impacts associated with those sites would be related to the short-term presence of construction materials and would result in short-term, low-intensity impacts.

### 3.12.2.3 Alternative B: Tubular Steel Monopole Structures Only

Under Alternative B, NPPD would construct the R-Project using steel monopole structures only. The R-Project would follow the same route under Alternative B as under Alternative A. Constructed related visual impacts would be different under Alternative B as helicopters would not be used for structure erection, more access route improvements would be required, larger structure work areas would also be required. Thus, there would be some short-term differences in visual impact, but these differences between the two alternatives would occur only in areas where lattice towers would be installed under Alternative A.

At relatively short viewing distances (foreground and immediate foreground—i.e., closer than 0.5 mile), the visual impacts of monopole structures may be less than those of lattice towers because monopoles are substantially less bulky and complex than lattice towers. These differences diminish with distance.

Based on this difference, the visual impacts of Alternative B on foreground and immediate foreground views would likely be less intense than those of Alternative A for viewers in the following areas but not sufficient to change the intensity of impact:

- Residents in the Birdwood Creek area
- Residents near the southernmost crossing of U.S. Highway 83
- Residents along Nebraska Highway 2 east of Thedford and near the Middle Loup River
- Residents near Rosehill Road in eastern Thomas County
- Residents near the North Loup River
- Residents near the Calamus River
- Residents near Nebraska Highway 11
- Residents along the Holt/Wheeler county line west of the Western Substation

- Recreational users of the Middle Loup, North Loup, and Calamus rivers
- Travelers on Nebraska Highway 2, the Sandhills Journey Scenic Byway
- Travelers on Nebraska Highway 97, Gaston Road, U.S. Highway 183, and Nebraska Highway 11.

Outside these areas, the short-term and long-term, direct and indirect effects of Alternative B on visual resources would be the same as Alternative A.

Compared to Alternative A, Alternative B would result in lower-intensity visual impacts for some viewers, and would be considered to have less impact on visual resources. However, the relative reduction in impact would not be substantial enough to change the effect determinations at any of the representative viewing locations or landscape units in Table 3.12-2, primarily because the locations where lattice towers would be replaced by monopoles are remote and would not be visible to large numbers of viewers. Thus, while the overall visual impact of Alternative B would be less than that of Alternative A, the intensity of location-specific effects on visual quality would be the same as Alternative A.

### 3.12.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on visual resources and aesthetics:

- Site structures in the Sandhills segments of the Project area to avoid obvious visual intrusion, such as hill tops or narrow drainages, where practicable.
- Predetermine the area limits of construction activities and restrict and confine activity within those limits; do not apply permanent paint or discoloring agents to vegetation or rocks to indicate survey or construction activity limits.
- If needed, use existing borrow areas, if available, and site any borrow pits created for the Project in previously disturbed areas.
- Use increased setbacks for locating structures that may be near trails and river crossings to minimize visual intrusion.
- Locate construction access parallel to landform contours, to minimize ground disturbance and/or reduce scarring.
- Locate staging areas in previously disturbed areas where available.
- Avoid the use of permanent lighting of transmission support structures, unless required by FAA regulations; use down-shield sodium vapor lighting at substations to reduce night glare and light pollution.
- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.

### 3.12.4 Effects Summary

Under either action alternative, the R-Project would result in short- and long-term, low- to high-intensity effects on visual resources and aesthetics. Most locations in the analysis area would experience long-term, moderate-intensity effects from the presence of the transmission lines structures. These effects would be intensified in some areas by the clearing of trees and tall brush in the ROW. The presence of the R-Project would cause high-intensity impacts on visual quality in the areas of the Oregon Trail and Mormon Trail interpretative markers, the Dismal River crossing, and the Dismal River Overlook. The Project would have moderate-intensity impacts on visual quality in most other areas, although the effects at Sutherland Reservoir and along Nebraska Highway 2 would be of low intensity. Implementation of avoidance, minimization, and mitigation measures described above would reduce the magnitude of some potential effects (primarily those related to Project construction) from high intensity to moderate. The only difference between the effects of the two action alternatives is that the visual impacts of Alternative B on foreground and immediate foreground views would likely be less intense than those of Alternative A in areas where monopoles would be installed rather than lattice towers. Under either action alternative, monopoles would be used at all locations where high-intensity impacts are anticipated.

Based on anticipated high-intensity impacts on visual quality in the areas of the Oregon Trail and Mormon Trail interpretive markers, the Dismal River crossing, and the Dismal River Overlook, implementation of the R-Project under either action alternative is expected to have significant effects on visual resources, even with the implementation of the avoidance, minimization, and mitigation measures listed above.

## 3.13 Air Quality and Greenhouse Gas Emissions

Issuance of a permit and subsequent implementation of the R-Project would affect air quality and GHG emissions relative to ambient conditions in the Project area during construction, operation, and maintenance, including emergency repairs. This section is divided into two parts: the first (Section 3.13.1) describes the affected environment for air quality, GHG emissions, fossil-fueled equipment, and disturbance to vegetation in the study area and the second (Section 3.13.2) describes and quantifies, to the degree possible, the direct and indirect effects of the Project and includes a qualitative assessment of impact intensity based on the criteria provided earlier in Table 3.1-2. At the conclusion of the discussion in Section 3.13.3, measures that NPPD would implement to avoid and minimize effects on air quality and GHG emissions are presented.

### 3.13.1 Affected Environment

#### 3.13.1.1 National Ambient Air Quality Standards/Attainment

USEPA defines ambient air in 40 CFR § 50.1I as: "that portion of the atmosphere, external to buildings, to which the general public has access." In compliance with the Clean Air Act, USEPA has promulgated the National Ambient Air Quality Standards (NAAQS). The NAAQS were enacted for the protection of public health and welfare, allowing for an adequate margin of safety. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as children, the elderly, and those suffering from asthma. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. To date, USEPA has issued the NAAQS for six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide ($NO_2$), ozone ($O_3$), particulate matter with a diameter less than or equal to a nominal 10 micrometers or 2.5 micrometers ($PM_{10}$ and $PM_{2.5}$, respectively), sulfur dioxide ($SO_2$), and lead. A description of each criteria air pollutant is below (USEPA 2016a). Table 3.13-1, presented after the following list, shows the Federal standards for criteria air pollutants.

- CO is a colorless, odorless gas emitted from combustion processes, including engine exhaust. Elevated CO concentrations can cause adverse health impacts by reducing oxygen delivery to vital organs. Very high concentrations can cause death. For the proposed Project, CO is primarily a consideration in the vicinity of the construction equipment exhaust.
- $NO_2$ is one of a group of reactive gases called oxides of nitrogen or nitrogen oxides (NOx). NOx react with ammonia, moisture, and other compounds to form small particles that penetrate deep in the lungs, and can cause or worsen existing respiratory system problems such as asthma, emphysema, or bronchitis. $NO_2$ emission sources associated with the proposed Project include vehicles and construction equipment. NOx are also a precursor that can lead to the chemical reactions forming ground-level $O_3$.

- Ground-level $O_3$ is an important component of smog and is formed through reactions of NOx and volatile organic compounds (VOCs) in the presence of sunlight. Sources of NOx and VOC emissions include both mobile and stationary sources. Health effects of $O_3$ exposure include respiratory irritation, reduced lung function, and worsening of diseases such as asthma. People with lung disease, children, older adults, and people who are active outdoors may be particularly sensitive to $O_3$. Elevated $O_3$ can also affect sensitive vegetation. $O_3$ formation is a regional air quality concern; therefore, the potential impacts in terms of $O_3$ formation are addressed by quantifying the contribution of the proposed Project to precursor emissions rather than predicting actual equipment-specific $O_3$ concentrations.
- PM is a broad class of air pollutants that exist as liquid droplets or solids with a wide range of size and chemical composition. $PM_{10}$ and $PM_{2.5}$ are of particular health concern because they can get deep into the lungs and affect respiratory and heart function. Particulates can also affect visibility; damage soil, plants, and water quality; and stain stone materials. Fugitive dust is a primary source of respirable airborne particulate matter. Fugitive dust results from land clearing, grading, excavation, concrete work, blasting, dynamiting, vehicle traffic, and low-flying air traffic. The amount of fugitive dust generated is related to the type and duration of mechanical activities, silt and moisture content of the soil, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Particulate matter arising from fugitive dust is regulated by Federal, state and local agencies.
- $SO_2$ is part of a group of reactive gases called sulfur oxides. Health effects of $SO_2$ exposure include adverse respiratory effects, such as increased asthma symptoms. The largest sources of $SO_2$ emissions nationally are from fossil fuel combustion at power plants/industrial facilities, electrical utilities, and residential/commercial boilers. Mobile sources are not a significant source of $SO_2$ emissions.
- Lead is a toxic heavy metal that can have numerous adverse health impacts, including neurological damage to children and cardiovascular effects in adults. Lead emissions can contribute to exposure directly through the air or indirectly by causing soil/water contamination. Before leaded gasoline was phased out, automobiles were a source of lead emissions. According to USEPA, the major sources of lead emissions today are ore and metal processing and piston-engine aircraft operating on leaded aviation gasoline. The proposed Project would not likely involve lead emissions; therefore, lead is not discussed further in the air quality analysis.

**Table 3.13-1. Federal Standards for Criteria Air Pollutants**

| Pollutant | | Primary/ Secondary | Averaging Time | Level | Form |
|---|---|---|---|---|---|
| CO | | Primary | 8 hours | 9 ppm | Not to be exceeded more than once per year |
| | | | 1 hour | 35 ppm | |
| Lead | | Primary and secondary | Rolling 3 month period | 0.15 $\mu g/m^3$[a] | Not to be exceeded |
| $NO_2$ | | Primary | 1 hour | 100 ppb | 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | | Primary and secondary | 1 year | 53 ppb[b] | Annual mean |
| $O_3$ | | Primary and secondary | 8 hours | 0.07 ppm[c] | Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years |
| PM | $PM_{2.5}$ | Primary | 1 year | 12.0 $\mu g/m^3$ | Annual mean, averaged over 3 years |
| | | Secondary | 1 year | 15.0 $\mu g/m^3$ | Annual mean, averaged over 3 years |
| | | Primary and secondary | 24 hours | 35 $\mu g/m^3$ | 98th percentile, averaged over 3 years |
| | $PM_{10}$ | Primary and secondary | 24 hours | 150 $\mu g/m^3$ | Not to be exceeded more than once per year on average over 3 years |
| $SO_2$ | | Primary | 1 hour | 75 ppb[d] | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | | Secondary | 3 hours | 0.5 ppm | Not to be exceeded more than once per year |

Source: USEPA (2016b)

Notes: CO – carbon monoxide, µg/m3 – microgram per cubic meter, $NO_2$ – nitrogen dioxide, $O_3$ – ozone, $PM_{2.5}$ – particulate matter with a diameter less than or equal to nominal 2.5 micrometers, $PM_{10}$ – particulate matter with a diameter less than or equal to nominal 10 micrometers, ppm – parts per million, $SO_2$ – sulfur dioxide; ppb – parts per billion.

[a] In areas designated nonattainment for the lead standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 $\mu g/m^3$ as a calendar quarter average) also remain in effect.

[b] The level of the annual $NO_2$ standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[c] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) $O_3$ standards additionally remain in effect in some areas. Revocation of the previous (2008) $O_3$ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

[d] The previous $SO_2$ standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: 1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and 2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous $SO_2$ standards or is not meeting the requirements of a State Implementation Plan call under the previous $SO_2$ standards (40 CFR § 50.4(3)). A State Implementation Plan call is a USEPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Counties in the United States that do not meet the NAAQS are called non-attainment areas. While $O_3$ is monitored for ambient air quality levels, regulations limit $NO_x$ and VOC emissions, which are $O_3$ precursors. To regulate the emission levels resulting from a project, Federal actions located in non-attainment areas are required to demonstrate compliance with the general conformity guidelines established in *Determining Conformity of Federal Actions to State or Federal Implementation Plans* (40 CFR § 93). Section 93.153 of this rule sets the applicability requirements for projects subject to it through the establishment of de minimis levels for annual criteria air pollutant emissions. These de minimis levels can vary based on criteria air pollutant non-attainment area designations (e.g., moderate, serious, severe, extreme). Projects with emissions below the de minimis levels, and projects in counties that are in non-attainment areas, are not subject to the rule. Those projects in non-attainment areas with emissions at or above the levels are required to perform a conformity analysis as established in the rule. The de minimis levels apply to direct and indirect sources of emissions that can occur during the construction and operational phases of an action.

Ambient air quality is monitored throughout Nebraska by stations meeting USEPA’s design criteria for *State and Local Air Monitoring Stations and National Air Monitoring Stations.* No monitoring stations are located in the proposed Project area. One monitor for regional scale tracking of particulate data exists in the Nebraska National Forest, southeast of Thedford. This monitor identifies and quantifies airborne contaminants to determine impacts on Federally classified Class I areas. Class I areas are special air quality protections under Section 162(a) of the Clean Air Act (42 U.S.C. § 7472) for Federal lands such as national parks, wilderness areas, and national monuments. All monitoring sites in the state have recorded air quality data that were within Federal and Nebraska State standards. Furthermore, Nebraska has never had a declared non-attainment determination (NDEQ 2015). Nebraska does not have any designated non-attainment areas, therefore the general conformity guidelines described above are not applicable to the R-Project.

The north-central portion of Nebraska encompassed by the study area is mostly rural in character and sparsely populated. The study area is dominated by agricultural land uses, primarily rangeland and a small amount of cropland. Agriculture is a key economic driver in the area. Existing air emissions in the proposed Project area, therefore, primarily stem from agricultural sources related to livestock, fertilizer, fugitive dust, and vehicle emissions. Agricultural emissions include ammonia and particulate matter due to ranching and farming activities. However, residential, commercial, industrial, and commuting vehicles that travel in and through the Project area, as well as railroad locomotives using rail lines, contribute to fugitive dust and emissions, including CO, NOx, VOCs, particulate matter, and $SO_2$.

#### 3.13.1.2 Greenhouse Gases

GHGs are chemical compounds found in Earth's atmosphere that absorb and trap infrared radiation as heat. As incoming solar radiation is absorbed and emitted back from the Earth's surface as infrared energy, GHGs in the atmosphere prevent some of this heat from escaping into space, instead reflecting the energy back to further warm the surface (Center for Sustainable Systems 2015). Global atmospheric GHG concentrations are a product of continuous release and storage of GHGs over time. In the natural environment, the release and storage of GHGs are recurring. Deforestation, soil disturbance, and the burning of fossil fuels disrupt the natural carbon cycle discussed below by increasing the GHG emission rate over the storage rate, resulting in a net increase of GHGs into the atmosphere. The accumulation of increased GHG levels in the atmosphere increases temperatures and warms the planet through a greenhouse effect (U.S. EIA 2009).

The GHGs emitted into the atmosphere through human activities are $CO_2$, methane, nitrous oxide ($N_2O$), and fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride ($SF_6$) (USEPA 2016c). $N_2O$ is emitted during agricultural and industrial activities and during the combustion of fossil fuels and solid waste. Fluorinated gases, particularly $SF_6$, are often used in substation equipment. $SF_6$ is used as an electrical insulator in high-voltage substation equipment such as circuit breakers, transformers, and ground switches. Although fluorinated gases are emitted in small quantities, fluorinated gases have the ability to trap more heat than $CO_2$ and are considered gases with a high global warming potential (USEPA 2016c).

Total anthropogenic GHG emissions were the highest in human history from 2000 to 2010, and reached 49 gigatons of carbon dioxide equivalent ($CO_2e$) per year in 2010 (Intergovernmental Panel on Climate Change 2014). $CO_2e$ is a metric used to compare the emissions from various GHGs based upon their global warming potential. Annual GHG emissions grew on average by 1.0 gigaton of $CO_2e$ (2.2 percent) per year from 2000 to 2010, compared to 0.4 gigaton of $CO_2e$ (1.3 percent) increase per year from 1970 to 2000. Increasing levels of these GHG emissions could increase the Earth's temperature by between 2.0°F and 11.5°F by 2100 (USEPA 2013). This increase in Earth's temperature may result in accelerated melting of Artic sea ice and glaciers, decreased periods of ice cover on lakes and rivers, changes in hydrology associated with early melting and decreased snow packs, changes in growing seasons and plant hardiness zones, changes in surface water characteristics, and more frequent and severe extreme weather events. All of these changes could have a ripple effect on agricultural production, human health, public infrastructure, water supplies, hydropower generation, and terrestrial, aquatic, and marine ecosystems.

GHG emissions from the R-Project would primarily come from construction activities that generate emissions through fossil-fueled equipment and also as a result of vehicles used during construction workers daily commutes to and from the work site.

#### 3.13.1.3 Fossil-Fueled Equipment

Generators, large earth-moving equipment, pick-up trucks, equipment-mounted augers, helicopters, concrete trucks, and other mobile sources fueled by diesel or gasoline are sources of combustion emissions, including the pollutants CO, $NO_x$, VOCs, $PM_{2.5}$, $SO_2$, and small amounts of hazardous air pollutants such as benzene. These mobile sources would likely be used in the Project area. Diesel and gasoline engines must comply with USEPA mobile source regulations in 40 CFR Part 86 for on-road engines and 40 CFR Parts 89 and 90 for non-road engines. USEPA has regulations in 40 CFR Part 80 that require significant reductions in the sulfur content of diesel fuel used in on-road and non-road engines. As of June 1, 2006, 80 percent of diesel fuel from large refiners and importers for non-road use was required to have sulfur content no greater than 15 parts per million (ppm). As of June 1, 2007, diesel fuel from large refiners and importers for non-road engines was required to have sulfur content no greater than 500 ppm. As of December June 1, 2010, USEPA required that all on- and off-road (non-road) diesel fuel from large refiners and importers would not exceed 15 ppm sulfur (i.e., ultra-low sulfur fuel) (USEPA 2016d).

#### 3.13.1.4 Vegetation Disturbance

Vegetation provides an important ecosystem service in the form of carbon sequestration—the uptake and storage of carbon in grasses, shrubs, forests, and other plant life. Plants remove carbon from the atmosphere and store it in vegetative tissue such as stems, roots, bark, and leaves. Through photosynthesis, all green vegetation removes $CO_2$ and releases oxygen to the atmosphere. The remaining carbon is used to create plant tissues and store energy. USFS measures carbon stored in forests across the nation by estimating aboveground live tree, below-ground live tree, understory, standing dead trees, down dead wood, forest floor, and soil organic carbon in each administrative unit within each state each year. Table 3.13-2 shows the amount of carbon stored in live, aboveground trees and saplings in the counties for which the transmission line may pass:

**Table 3.13-2. Carbon in Live Trees and Saplings above Ground on Forested Land by County**

| County | Acres (land) | Total Carbon (metric tons) |
|---|---|---|
| Blaine | 455,040 | 15,525 |
| Garfield | 364,800 | 33,073 |
| Holt | 1,543,680 | 1,260,035 |
| Lincoln | 1,640,960 | 700,983 |
| Logan | 365,440 | No data available |
| Loup | 363,520 | 1,616 |
| Thomas | 456,320 | 144,984 |
| Wheeler | 368,000 | 116,517 |
| **TOTAL** | **5,557,760** | **2,272,732** |

During plant respiration, carbon-containing compounds are broken down to produce energy, releasing $CO_2$ in the process. Other GHGs, such as $N_2O$ and methane, are also exchanged by vegetation. Wildfires and timber harvests release GHGs, in varying quantities, through combustion and the production of wood products (Hoover et al. 2014). Carbon sequestration is particularly valuable as a mode of mitigating GHG emissions. Degradation, destruction, or removal of plants can diminish or eliminate their potential to mitigate emissions.

### 3.13.2 Direct and Indirect Effects

This section describes direct and indirect impacts on air quality and the potential for GHG emissions in the proposed Project area. Direct effects are those that are caused by an action and occur at the same time and place as the action. Indirect effects are those that occur at a later time, but are a result of an action, and may extend beyond the proposed Project area boundaries.

Each alternative was analyzed based on the likelihood of effects on air quality and the potential for GHG emissions previously described in the Affected Environment section. Quantitative estimates of criteria pollutant emissions from the potential equipment used during the project are based on the California Air Resources Board's Off-Road Emissions Inventory Database and the FAA's 2005 Aircraft Emission Database. The annual total vehicle miles travelled under Alternative A and Alternative B were converted to key criteria air pollutants and $CO_2e$ based on the USEPA emissions model Motor Vehicle Emission Simulator or MOVES2014a. To ensure a conservative emission factor, the MOVES emissions modeling was conducted for a January morning hour (7:00 a.m.) because emissions are generally higher at lower temperatures. The analysis was based on passenger vehicles traveling at an average speed of 60 miles per hour on rural unrestricted access type roadways (i.e., arterials, connectors, and local streets). The MOVES modeling was conducted for a 2017 analysis year. Appendix F provides a detailed overview of the MOVES input assumptions.

Data for calculations of vegetation disturbance were retrieved from the USFS Forest Inventory Data Online program. This program gives users access to the National Forest Inventory and Analysis databases and the ability to generate tables and maps of forest statistics. Data were retrieved from counties for which the transmission line would primarily pass through. These counties include Blaine, Garfield, Holt, Lincoln, Logan, Loup, Thomas, and Wheeler. Both the amount of carbon stored (in metric tons) in live trees and saplings above-ground on forested land by species group and diameter class and the acreage of the county were used for analysis.

Potential effects are described in terms of duration and intensity. Short-term effects are those that may affect air quality for the duration of construction. Effects on air quality under both action alternatives would persist over the 50-year lifespan of the transmission line are considered long-term effects. The intensity of effects under Alternative A is categorized as low, moderate, or high according to the threshold criteria established in Table 3.1-2. Mitigation practices that would decrease the severity of impacts from construction activities are discussed in Section 3.13.3, *Avoidance, Minimization, and Mitigation Measures*.

#### 3.13.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Therefore, implementation of the No-action Alternative would not affect air quality or GHG emissions.

#### 3.13.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent implementation of the R-Project along NPPD's final route under Alternative A would result in direct and indirect effects on air quality in the proposed Project area in the short and long term. Effects on air quality from construction, operation, and maintenance of the Project may include the creation of fugitive dust and emissions from fossil-fueled or transmission line equipment. Specific effects on air quality from various construction, operation, and maintenance activities associated with implementation of the R-Project under Alternative A are described below.

**Direct Effects**

Direct effects under Alternative A consist of those that may lead to the creation of fugitive dust, emissions from fossil-fueled or transmission line equipment, and disturbance to vegetation from construction, operation, and maintenance activities associated with the proposed Project.

**Construction Impacts**

***Fugitive Dust***

Various phases of construction would occur at different locations throughout the process and would require several crews operating at the same time in different locations. Construction is expected to last 21 to 24 months. The majority of potential fugitive dust generated in a given location would occur during this period because the Project would be located primarily on open ranges and undeveloped or agricultural land with transportation occurring primarily on arterials, connectors, dirt roads, and gravel roads. Increases in traffic on these roads from construction workers, equipment, earthmoving activities, and wind action on disturbed areas would lead to increases in the production of fugitive dust.

Site-preparation for the proposed transmission line and associated substations would require earthmoving and grading activities, exposing soils and increasing the potential for wind erosion. Grading activities, the transportation of soil, and other construction debris in uncovered trucks could also contribute to fugitive dust. Most fugitive dust would occur during the warmer, drier months when soils are not frozen and are more prone to dust generation, where helicopters would be used to bring lattice towers into place, and from fly yards and assembly areas. Impacts on air quality from fugitive dust are expected to be short term and of low intensity. The quantitative estimates of fugitive dust emissions from construction activities shown in Table 3.13-3 are based on the Midwest Research Institute's Level 1 PM emission factor. The Midwest Research Institute's PM emission factor is based on a work schedule of 168 hours per month, and was scaled up to account for the R-Project's anticipated schedule of 260 hours per month. It is also assumed that only 33 percent of the construction areas (access routes, tower pads, other general construction areas) would be under construction at any one time.

The quantitative estimates of fugitive dust emissions from the use of access routes during construction of the project shown in Table 3.13-3 are based on the procedures outline in U.S. EPA's AP-42, Section 13.2.2. The total acres of temporary disturbance from access routes was used in this calculation, although only a portion of the total includes ground disturbance from temporary improvements.

**Table 3.13-3. Fugitive Dust Emission Estimates from Construction Activities**

| Pollutant | Alternative A | |
|---|---|---|
| | Total Estimated Emissions (tons) | Estimated Emissions (tons/year) |
| $PM_{10}$ | 407.4 | 203.7 |
| $PM_{2.5}$ | 51.1 | 25.6 |

***Fossil-Fueled Equipment***

Table 3.13-4 was derived from equipment information provided by NPPD at the request of the Service. A full and complete equipment list has not been developed at this time. Such a list would be developed by the selected contractor prior to initiation of construction activities. The following table lists equipment typically used for construction of a transmission line and substations and should not be considered final.

**Table 3.13-4. Estimated Equipment for Construction, Operation, Maintenance**

| Construction Activities | | | | |
|---|---|---|---|---|
| Access | Type of Equipment | Quantity | Alternative A Duration (weeks) | Alternative B Duration (weeks) |
| Access Scenario 2 and Scenario 3 (see Chapter 2 for a description of the access scenarios) | Bulldozer (D-8 Cat or equivalent) | 1 | 16 | 32 |
| | Front-end loader | 1 | 16 | 32 |
| | Dump truck | 1 | 16 | 32 |
| | Grader | 1 | 16 | 32 |
| | Roller compactor | 1 | 16 | 32 |
| | Water truck | 1 | 16 | 32 |
| | Diesel tractor with lowboy | 1 | 16 | 32 |
| | Light vehicles | 2 | 16 | 32 |

| ROW Preparation | Type of Equipment | Quantity | Alternative A Duration (weeks) | Alternative B Duration (weeks) |
|---|---|---|---|---|
| ROW clearing | ATV | 2 | 29 | 29 |
| | Brush mower/shredder | 1 | 29 | 29 |
| | Light vehicles | 2 | 29 | 29 |
| | Mechanized feller-buncher | 1 | 29 | 29 |
| | Grapple skidder | 1 | 29 | 29 |
| **Temporary Work Areas** | **Type of Equipment** | **Quantity** | **Alternative A Duration (weeks)** | **Alternative B Duration (weeks)** |
| Assemble lattice towers in fly yards/assembly areas | Crane, all-terrain (35 ton) | 2 | 40 | 0 |
| | Diesel tractor/trailer | 2 | 40 | 0 |
| | Tool trailer | 1 | 40 | 0 |
| | Air compressor | 2 | 40 | 0 |
| | Mechanics truck | 1 | 40 | 0 |
| | Light vehicles | 4 | 40 | 0 |
| Handle material in construction yards/staging areas | Crane, all-terrain (35 ton) | 4 | 65 | 65 |
| | Heavy forklift | 4 | 65 | 65 |
| | Light vehicles/ATV | 6 | 65 | 65 |
| | Mechanic truck | 2 | 65 | 65 |
| | Job site trailers | 6 | 65 | 65 |
| **Structures** | **Type of Equipment** | **Quantity** | **Alternative A Duration (weeks)** | **Alternative B Duration (weeks)** |
| Structure staking | ATV | 1 | 19 | 19 |
| | Light vehicle | 1 | 19 | 19 |
| **Helical Pier Foundation for Lattice Tower** | **Type of Equipment** | **Quantity** | **Alternative A Duration (weeks)** | **Alternative B Duration (weeks)** |
| Helical pier foundation installation | Tracked excavator | 1 | 48 | 0 |
| | Bobcat-type front-end loader | 1 | 48 | 0 |
| | Tracked material carrier | 1 | 48 | 0 |
| | Light vehicle/ATV | 1 | 48 | 0 |
| | Mechanics truck | 1 | 48 | 0 |

| | | | | |
|---|---|---|---|---|
| | Welding truck | 1 | 48 | 0 |
| | Water truck | 1 | 48 | 0 |
| Lattice structure hauling/erection | Crane, all-terrain (35 ton) | 2 | 27 | 0 |
| | Tracked material carrier | 2 | 27 | 0 |
| | Helicopter, heavy-lift | 1 | 16 | 0 |
| | Tool trailer | 2 | 27 | 0 |
| | Air compressor | 4 | 27 | 0 |
| | Mechanics truck | 2 | 27 | 0 |
| | Light vehicle/ATV | 4 | 27 | 0 |
| **Standard Foundation for Steel Monopole** | **Type of Equipment** | **Quantity** | **Alternative A Duration (weeks)** | **Alternative B Duration (weeks)** |
| Foundation excavation/installation | Auger rig | 2 | 22 | 55 |
| | Dump truck | 2 | 22 | 55 |
| | Front end loader | 2 | 22 | 55 |
| | Backhoe | 2 | 22 | 55 |
| | Concrete truck | 8 | 22 | 55 |
| | Diesel tractor/trailer | 2 | 22 | 55 |
| | Crane, all-terrain (35 ton) | 4 | 22 | 55 |
| | Tool trailer | 2 | 22 | 55 |
| | Mechanics truck | 1 | 22 | 55 |
| | Light vehicle | 4 | 22 | 55 |
| | Water truck | 2 | 22 | 55 |
| Structure assembly/erection | Heavy crane, 120–150 ton | 1 | 26 | 65 |
| | Bucket truck | 1 | 26 | 65 |
| | Tool trailer | 1 | 26 | 65 |
| | Truck (2 ton) | 1 | 26 | 65 |
| | Mechanics truck | 1 | 26 | 65 |
| | Light vehicle | 4 | 26 | 65 |
| | Fork lift, all-terrain | 1 | 26 | 65 |
| | Crane, all-terrain (35 ton) | 1 | 26 | 65 |
| | Diesel tractor/trailer | 2 | 26 | 65 |

| Wire Installation | Type of Equipment | Quantity | Alternative A Duration (weeks) | Alternative B Duration (weeks) |
|---|---|---|---|---|
| Stringing, pulling, and tensioning | Conductor reel trailers | 6 | 75 | 75 |
| | Shield wire reel trailers | 2 | 75 | 75 |
| | 3-drum pullers | 2 | 75 | 75 |
| | Single drum pullers | 2 | 75 | 75 |
| | Double bull-wheel tensioner | 1 | 75 | 75 |
| | Diesel tractor/trailer | 4 | 75 | 75 |
| | Crane, all-terrain (35 ton) | 2 | 75 | 75 |
| | Sagging equipment (D-8 Cat) | 2 | 75 | 75 |
| | Bucket truck | 1 | 75 | 75 |
| | Mechanics truck | 1 | 75 | 75 |
| | Tool trailer | 1 | 75 | 75 |
| | Helicopter, medium lift | 1 | 75 | 75 |
| | Light vehicles | 4 | 75 | 75 |
| **Substations** | **Type of Equipment** | **Quantity** | **Alternative A Duration (hours)** | **Alternative B Duration (hours)** |
| GGS Substation Construction | Light duty pickup | -- | 500 | 500 |
| | Truck, 12–20K | -- | 350 | 350 |
| | Medium duty pickup | -- | 250 | 250 |
| | Heavy duty pickup | -- | 300 | 300 |
| | Heavy duty crane | -- | 100 | 100 |
| | Bobcat loader | -- | 400 | 400 |
| | Digger derrick < 25K | -- | 10 | 10 |
| | Digger derrick > 25K | -- | 10 | 10 |
| | Bucket truck > 43 foot | -- | 20 | 20 |
| | Tracked digger derrick | -- | 100 | 100 |
| Thedford Grading | Scraper | -- | 210 | 210 |
| | Bulldozer | -- | 210 | 210 |
| | Tractor | -- | 210 | 210 |
| | Grader | -- | 210 | 210 |
| | Light duty pickup | -- | 2,000 | 2,000 |

| | | | | |
|---|---|---|---|---|
| Thedford 345kV/115kV Construction, including new transformer | Truck, 12–20K | -- | 1,450 | 1,450 |
| | Medium duty pickup | -- | 950 | 950 |
| | Heavy duty pickup | -- | 900 | 900 |
| | Heavy duty crane | -- | 550 | 550 |
| | Bobcat loader | -- | 2,300 | 2,300 |
| | Digger derrick < 25K | -- | 30 | 30 |
| | Digger derrick > 25K | -- | 30 | 30 |
| | Bucket truck > 43 foot | -- | 40 | 40 |
| | Tracked digger derrick | -- | 600 | 600 |
| Holt Co. Grading | Scraper | -- | 150 | 150 |
| | Bulldozer | -- | 150 | 150 |
| | Tractor | -- | 150 | 150 |
| | Grader | -- | 150 | 150 |
| **Substations** | **Type of Equipment** | **Quantity** | **Alternative A Duration (hours)** | **Alternative B Duration (hours)** |
| Holt Co. Construction | Light duty pickup | -- | 1,000 | 1,000 |
| | Truck, 12–20K | -- | 750 | 750 |
| | Medium duty pickup | -- | 450 | 450 |
| | Heavy duty pickup | -- | 400 | 400 |
| | Heavy duty crane | -- | 400 | 400 |
| | Bobcat loader | -- | 1,500 | 1,500 |
| | Digger derrick < 25K | -- | 10 | 10 |
| | Digger derrick > 25K | -- | 10 | 10 |
| | Bucket truck > 43 foot | -- | 40 | 40 |
| | Tracked digger derrick | -- | 400 | 400 |
| **Operation and Maintenance** | | | | |
| **Task** | **Type of Equipment** | **Quantity** | **Alternative A Annual Duration (hours)** | **Alternative B Annual Duration (hours)** |
| Routine inspection | ATV | 2 | 25 | 25 |
| | Light vehicle | 1 | 25 | 25 |
| | Helicopter, light duty | 1 | 37 | 37 |
| Routine maintenance and repairs | Light vehicle | 2 | 40[a] | 40[a] |
| | Crane, all-terrain (35 ton) | 1 | 40[a] | 40[a] |

[a] Would begin approximately 30 years after initial construction.

Since Nebraska has never received a non-attainment determination, the proposed Project is not subject to the applicability requirements for annual criteria air pollutant emissions under 40 CFR § 93. However, the quantitative estimates of criteria pollutant emissions from the potential equipment listed above and shown in Table 3.13-5 are based on the California Air Resources Board's (CARB) Off-Road Emissions Inventory Database (in conjunction with the U.S. Energy Information Administration's suggested value of 161.3 pounds of $CO_2$ emissions per million British thermal unit of diesel fuel), as well as the FAA's 2005 Aircraft Emission Database for helicopter emissions (in conjunction with the Conklin and De Decker Associates Aircraft $CO_2$ Calculator for $CO_2$ emissions).

**Table 3.13-5. Criteria Pollutant Emission Estimates Based for Potential Construction Equipment**

| Pollutant | Alternative A | |
|---|---|---|
| | Total Estimated Emissions (tons) | Estimated Emissions (tons/year) |
| $NO_X$ | 100.3 | 50.2 |
| VOCs | 5.0 | 2.5 |
| $SO_2$ | 2.6 | 1.3 |
| CO | 8.1 | 4.1 |
| $PM_{2.5}$ | 8.5 | 4.3 |
| $CO_2e$ | 16,781 | 8,391 |

Assumptions were made regarding estimated emissions for construction personnel commuting to and from the construction site. Projects similar in size and scope to the R-Project have required up to 200 construction personnel for construction purposes (USDA, Rural Utilities Service 2014). These construction personnel would likely be located in towns neighboring the transmission line, such as Bartlett, Burwell, Taylor, Brewster, Dunning, Thedford, Stapleton, North Platte, and Sutherland. Construction personnel would work on the Project daily during peak (e.g., access and structure installation) and non-peak construction (e.g., site preparation and restoration work).

The emission estimates for criteria air pollutants estimated in Table 3.13-6 are based on the approximate number of passenger vehicles that would be used during Project construction and the approximate distance those vehicles would travel. The number of round trips was conservatively estimated using the following assumptions:

- All construction personnel would travel in separate vehicles to and from the proposed Project area each day.
- A maximum number of construction personnel (200) would be required to construct the Project.

- The round trip distance between the construction site and nearby towns is approximately 36 miles, depending on the exact location of construction personnel in the proposed Project area.
- Construction personnel would travel at an average speed of 60 miles per hour on rural unrestricted access type roadways.
- To ensure a conservative emission factor, a morning hour (7:00 a.m.) was used because emissions are generally higher at lower temperatures.

Since construction is expected to last between 21 and 24 months, the latter time frame was used to estimate total emissions.

**Table 3.13-6. Emission Estimates Based on Construction Personnel Commutes (for both Alternatives A and B)**

| Pollutant | Total Estimated Emissions (tons) | Estimated Emissions (tons/year) |
|---|---|---|
| $NO_X$ | 1.66 | 0.83 |
| VOCs | 0.29 | 0.14 |
| $SO_2$ | 0.01 | 0.00 |
| CO | 14.10 | 7.05 |
| $PM_{2.5}$ | 0.08 | 0.04 |
| $CO_2e$ | 1,317.46 | 658.73 |

An estimated total of 659 metric tons of $CO_2e$ would be emitted each year of construction from personnel commutes; therefore, adverse impacts from this source of GHG production would be low.

Emissions resulting from both construction equipment and passenger vehicles would be localized in the Project area and would be similar to or less than those created as a result of agricultural activities taking place in a majority of the study area. These emissions would, however, incrementally increase the total GHGs emitted over time. Emissions stemming from construction would be localized and short term, would not impair air quality in the proposed Project area, and would not be expected to affect the current attainment status of Nebraska.

Implementation of Alternative A would require an estimated 1,458.4 acres of temporary disturbance and an estimated 52 acres of permanent disturbance. Vegetation would be restored on all temporarily disturbed areas that were not previously disturbed prior to construction. Permanent loss to vegetation would result in a very small reduction in the level of carbon sequestration in the Project area.

Forests are particularly important when considering emissions. Tree growth and future carbon sequestration and storage rates are highly variable and depend on several factors, including the species and age of the tree, climate, forest density, and soil conditions. Approximately 49 acres of trees would be permanently removed during ROW clearing. Based on the table above, 49 acres would equate to approximately 12 metric tons of carbon removed, far below the total carbon stored in all eight counties. Impacts on air quality from the disturbance to vegetation are expected to be localized, short term, and of low intensity.

### Operation and Maintenance Impacts

Onsite operational activities that would result in direct or indirect air emissions would be limited. Operational emissions would occur from vehicle usage to and from the ROW, regular maintenance inspections, and emergency repairs. Operational activities would be considerably less on an annual basis than the construction activities discussed above. Ionization of air molecules surrounding conductors (known as the “corona effect”) may produce a small amount of $O_3$ and NOx. These potential operational emissions would result in limited impacts on air quality and would not affect the attainment status in the affected counties. Therefore, impacts are expected to be localized, long term, and low intensity.

The quantification of emissions during operation and maintenance of the R-Project shown in Table 3.13-7 are based on methods previously cited for travel on access routes, maintenance equipment, and helicopter use.

**Table 3.13-7. Emission Estimates for Operation and Maintenance Activities**

| Pollutant | Annual Estimated Emissions (tons/year) |
|---|---|
| $NO_X$ | 0.3 |
| VOCs | 0.005 |
| $SO_2$ | 0.02 |
| CO | 0.07 |
| $PM_{2.5}$ | 0.06 |
| $CO_2e$ | 11.6 |

### Indirect Effects

As mentioned previously, emissions produced during the life of the Project would incrementally increase the total global GHGs emitted over time. Furthermore, wind currents and circulation patterns are capable of carrying fugitive dust beyond the Project area. No other indirect effects are expected from the construction and operation of the proposed transmission line.

#### 3.13.2.3 Alternative B: Tubular Steel Monopole Structures Only

Issuance of a permit and subsequent implementation of the R-Project along NPPD's final route under Alternative B would result in direct and indirect effects on air quality in the proposed Project area in the short and long term. Effects on air quality from construction, operation, and maintenance of the Project may include the creation of fugitive dust and emissions from fossil-fueled or transmission line equipment. Specific effects on air quality from various construction, operation, and maintenance activities associated with implementation of the R-Project under Alternative B are described below.

**Direct Effects**

Similar to Alternative A, direct effects under Alternative B consist of those that may lead to the creation of fugitive dust, emissions from fossil-fueled or transmission line equipment, and disturbance to vegetation from construction, operation, and maintenance activities associated with the proposed Project.

**Construction Impacts**

***Fugitive Dust***

Similar to Alternative A, the majority of potential fugitive dust generated in a given location under Alternative B would occur during construction of the monopole structures because the Project would be located primarily on open ranges and undeveloped or agricultural land with transportation occurring primarily on arterials, connectors, dirt roads, and gravel roads. Increases in traffic on these roads from construction workers, equipment, earthmoving activities, and wind action on disturbed areas would lead to increases in the production of fugitive dust. Most fugitive dust under Alternative B would occur during the warmer, drier months when soils are not frozen and are more prone to dust generation. In general, impacts from fugitive dust are expected to be reduced in the short term and of low intensity because no helicopters would be used to support tower structure construction under Alternative B. However, access routes under Alternative B would experience greater usage and would generate greater quantities of fugitive dust than Alternative A.

The quantitative estimates of fugitive dust emissions from construction activities are presented in Table 3.13-8 and are based on the same factors as Alternative A. The total acres of temporary disturbance from access routes was used in this calculation although only a portion of the total will include ground disturbance from temporary improvements.

**Table 3.13-8. Fugitive Dust Emission Estimates from Construction Activities**

| Pollutant | Total Estimated Emissions (tons) | Estimated Emissions (tons/year) |
|---|---|---|
| $PM_{10}$ | 525.9 | 263.0 |
| $PM_{2.5}$ | 65.9 | 32.9 |

***Fossil-Fueled Equipment***

The quantitative estimates of criteria pollutant emissions from the potential equipment are listed above and shown in Table 3.13-9 and are based on the same factors as Alternative A.

**Table 3.13-9. Criteria Pollutant Emission Estimates Based for Potential Construction Equipment**

| Pollutant | Total Estimated Emissions (tons) | Estimated Emissions (tons/year) |
|---|---|---|
| $NO_X$ | 94.9 | 47.4 |
| VOCs | 5.1 | 2.5 |
| $SO_2$ | 2.2 | 1.1 |
| CO | 6.7 | 3.4 |
| $PM_{2.5}$ | 7.6 | 3.8 |
| $CO_2e$ | 15,238 | 7,619 |

Under Alternative B, construction personnel would likely be located in the same towns noted under Alternative A. Implementation of Alternative B would generate emissions roughly the same as those generated under Alternative A (see Table 3.13-5). Therefore, adverse impacts from GHG production as a result of personnel commutes would be low.

Emissions resulting from construction equipment would slightly increase under Alternative B because of the increased equipment usage of access routes and roads. These impacts would be localized in the Project area and would be similar to or less than those created as a result of agricultural activities taking place in a majority of the Project area. Though these emissions would incrementally increase the total GHGs emitted over time, emissions stemming from construction would be localized and short term and would not impair air quality in the proposed Project area; and would not be expected to affect the current attainment status of Nebraska.

Implementation of the Alternative B would require more ground disturbance than Alternative A. An estimated 1,871.4 acres would be temporarily disturbed and an estimated 77 acres would be permanently disturbed. However, permanent removal of trees in the ROW would result in the same reduction of carbon sequestration as Alternative A. Therefore, impacts from the disturbance to vegetation are expected to be localized, short term, and of low intensity.

### Operation and Maintenance Impacts

Onsite operational activities that would result in direct or indirect air emissions would be similar to those under Alternative A. Operational air emissions would occur as a result of worker commutes to the transmission line ROW to conduct regular maintenance and inspection activities and during emergency repairs. Operational activities would be considerably less on an annual basis than the construction activities discussed above. Therefore, impacts are expected to be localized, long term, and of low intensity.

The quantification of emissions during operation and maintenance of the R-Project shown in Table 3.13-10 are based on methods previously mentioned for travel on access routes, maintenance equipment, and helicopter use.

**Table 3.13-10. Emission Estimates for Operation and Maintenance Activities**

| Pollutant | Annual Estimated Emissions (tons/year) |
|---|---|
| $NO_X$ | 0.3 |
| VOCs | 0.006 |
| $SO_2$ | 0.02 |
| CO | 0.09 |
| $PM_{2.5}$ | 0.08 |
| $CO_2e$ | 12.2 |

### Indirect Effects

Similar to Alternative A, under Alternative B, emissions produced during the life of the Project would incrementally increase the total global GHGs emitted over time. Furthermore, wind currents and circulation patterns are capable of carrying fugitive dust beyond the Project area. No other indirect effects are expected from the construction and operation of the proposed transmission line.

## 3.13.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on air quality and effects from GHGs during construction and emergency repairs:

- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Require fugitive dust control plans identifying possible avoidance and minimization measures as part of contract specifications, for example:
  - Establish stabilized truck exit areas for washing the wheels of all trucks that exit work areas such as construction yards and substations.
  - Establish tracking pads at construction exits to public roadways to prevent dirt from being tracked onto roadways.
  - Water truck routes within the sites as needed, or in cases where such routes would remain in the same place for an extended duration, stabilize, or cover with gravel to avoid the re-suspension of dust.

  - During dry weather, water exposed soil areas (e.g., construction yards and staging areas) as needed to control fugitive dust.
  - Prior to leaving the construction sites, securely cover the loads of all trucks hauling loose material.
  - Limit the travel speed of onsite vehicles to minimize fugitive dust emissions.
  - After construction, revegetate areas cleared of trees with native grasses.
- Minimize equipment idling times either by shutting off equipment when not in use or reducing the maximum idling time.

#### 3.13.4 Effects Summary

The R-Project is not anticipated to adversely affect air quality and GHG emissions in the Project area. Air emissions attributed to the R-Project would not change the attainment/non-attainment status. Over the long term, adverse effects under both action alternatives are anticipated to be of low intensity. The greatest potential for adverse effects would occur during construction and would be short term. Adverse effects would include increases in fugitive dust and emissions caused by construction activity, vehicles, and equipment. The implementation of avoidance and minimization measures described above would reduce the magnitude of potential effects. Consequently, the R-Project does not pose a significant impact to air quality.

## 3.14 Noise

Issuance of a permit and subsequent implementation of the R-Project would increase noise levels over ambient conditions in portions of the study area during construction, operation, and maintenance, including emergency repairs, of the R-Project. This section is divided into three parts: the first (Section 3.14.1) discusses general sound principles, the second (Section 3.14.2) describes the affected environment for noise levels in portions of the study area, and the third (Section 3.14.3) describes the direct and indirect effects of implementing either the No-action Alternative, Alternative A, or Alternative B. A qualitative assessment of impact intensity based on the criteria provided earlier in Table 3.1-2 has been performed for the two action alternatives. Although the effects analysis is largely a qualitative assessment, noise levels as documented in available literature have been introduced to further describe potential impacts from the action alternatives.

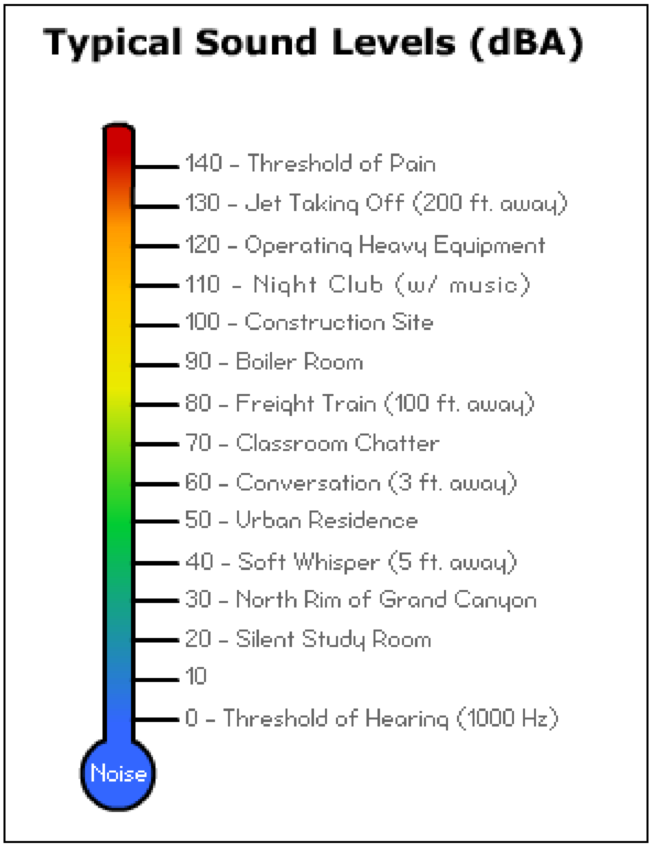
### 3.14.1 Acoustics Principles

According to the Occupational Safety and Health Administration (OSHA), noise is defined as unwanted sound. Sound is all around us; it becomes noise when it interferes with normal activities, such as speech, concentration, or sleep. Noise may be classified as continuous (constant), impulsive (sudden burst), intermittent (increases or decreases rapidly), or low frequency (low background humming).

The standard measurement unit of sound is the dB, which represents the acoustical energy present. Sound levels are measured in A-weighted decibels (dBA), a logarithmic scale that approaches the sensitivity of the human ear across the frequency spectrum. The human ear responds to sound in audible frequencies in a similar way in most individuals. A 3- to 5-dBA increase is equivalent to doubling the sound pressure level but is barely perceptible to the human ear. A 6-dBA increase is a readily perceptible change and a 10-dBA increase is doubling of the apparent loudness.

Sound in the environment is constantly changing and fluctuates based on both natural and human-made sources. To characterize and quantify these fluctuations, metrics have been established, including the exceedance sound level ($L_x$). The $L_x$ is the sound level exceeded by a certain percent (x) of the sampling period and is referred to as a statistical sound level. The most commonly used $L_x$ values are $L_{eq}$ and $L_{dn}$. The $L_{eq}$ is the equivalent level of a constant sound over a specific period that has the same sound energy as the actual sound over the same period; this is also sometimes known as the average sound level. $L_{dn}$, the day-night sound level, is the A-weighted average equivalent sound for a 24-hour period with 10 dBA added to the $L_{eq}$ from 10 p.m. to 7 a.m. to account for the expectation that nighttime is a quiet period.

The dB scale compresses sound pressures important to human hearing into a manageable scale. By definition, 0 dBA is the standardized threshold of hearing and is defined as 20 micropascals (0.0002 microbars) at 1,000 hertz. At the upper end of human hearing, noise causes pain, which occurs at sound pressures of about 10 million times that of the threshold of hearing. On the dB scale, the threshold of pain occurs at 140 dBA. This range of 0 dBA to 140 dBA is not the entire range of sound; it is the range relevant to human hearing (Figure 3.14-1).




Source: OSHA (2013)

**Figure 3.14-1. Typical Noise Levels for Various Types of Human Activity**

### 3.14.2 Affected Environment

Noise associated with transmission lines and substations is a factor during construction and operation and maintenance of the transmission infrastructure. Human exposure to high levels of noise may cause hearing loss, create physical and psychological stress, reduce productivity, interfere with communication, and contribute to accidents and injuries by making it difficult to hear warning signals. In addition to humans, excessive noise levels can also adversely affect wildlife. Wildlife relies on meaningful sounds to communicate, navigate, avoid danger, and find food against a background of noise. The level of disturbance may be qualified as damage (harming health, reproduction, survivorship, habitat use, distribution, abundance or genetic distribution) or disturbance (causing a detectable change in behavior). Additional information about noise effects on wildlife is provided in Section 3.6.

Ambient sound levels in portions of the study area can range from static to highly variable and are based on sound sources and disturbances in the immediate area. For much of the study area, which is predominantly pasture/range land, agricultural, and residential areas, sound levels are expected to fall in the range of 40 to 60 dBA. These levels are generally characterized as quiet, and as documented by OSHA (2013), they are common to urban residences and conversation (Figure 3.14-1).

Communities located in the study area generally have higher ambient sound levels resulting from human activities. Areas adjacent to roadways, such as I-80, U.S. Highways 83 and 183, several Nebraska highways, and county and local roads in the study area, have higher ambient noise levels from vehicle traffic and human activity. Using the OSHA (2013) scale, these noise levels would range from 50 to 70 dBA. Areas adjacent to railroads periodically have much higher noise levels, potentially approaching 80 dBA, as trains pass through. In addition, an existing and variable level of natural ambient noise emanates from the wind, streams and rivers, wildlife, and other sources.

Noise associated with the operation of a transmission line includes corona noise and Aeolian noise, described below:

- Corona noise is the most common noise associated with transmission lines and is heard as a crackling or hissing sound. Corona noise varies with weather conditions and the voltage of the line, and most frequently occurs during periods of rain, fog, or high humidity. Specifically, the noise comes from a breakdown of air into charged particles caused by the electrical field at the surface of conductors. Corona noise typically results in continuous noise levels of 40 to 50 dBA in proximity to the transmission line, and during wet or high-humidity conditions, it can range from 50 to 60 dBA (Aspen Environmental Group 2016). Corona noise levels are not consistent from location to location because conductor surface defects, damage, dust, and other inconsistencies can influence the noise levels.
- Aeolian noise is caused by wind blowing through the conductors, is usually infrequent, and depends on wind velocity and vibration. Aeolian noise typically occurs when wind is steady and perpendicular to the lines, which sets up an Aeolian vibration that can produce resonance if the frequency of the vibration matches the natural frequency of the line.

Wind blowing across power lines and power poles can generate noise when airflow is non-laminar or turbulent. Noise associated with a substation would include operation of transformer banks and circuit breakers that also produce corona noise and operation of a diesel-fired emergency backup generator at the Holt County Substation for safety-related equipment.

A noise sensitive site is any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit. Using satellite imagery provided by POWER Engineering and published on October 25, 2014, a summary of potentially affected receptors within specified distances of NPPD’s final route centerline or within buffer distances of the substation extents have been compiled. Table 3.14-1 summarizes the data with respect to NPPD’s final route and Table 3.14-2 contains a similar summary for the substations.

**Table 3.14-1. Potential Sensitive Noise Receptors for Selected Route**

| Receptor Types and Distances | GGS Substation to Thedford Substation | Thedford Substation to Holt County Substation | Total |
|---|---|---|---|
| **Within 500 feet** | **38** | **26** | **64** |
| Commercial Building | 3 | 0 | **3** |
| Church | 0 | 1 | **1** |
| House | 5 | 6 | **11** |
| Outbuilding | 30 | 19 | **49** |
| **Within 0.25 mile** | **121** | **75** | **196** |
| Commercial Building | 4 | 0 | **4** |
| Church | 0 | 1 | **1** |
| House | 20 | 13 | **33** |
| Outbuilding | 97 | 61 | **158** |
| **Within 0.5 mile** | **282** | **213** | **495** |
| Commercial Building | 12 | 0 | **12** |
| Cemetery | 1 | 0 | **1** |
| Church | 0 | 2 | **2** |
| House | 107 | 39 | **146** |
| Outbuilding | 162 | 172 | **334** |

**Table 3.14-2. Potential Sensitive Noise Receptors for Substations**

| Receptor Types and Distances | GGS Substation | Thedford Substation | Holt County Substation | Total |
|---|---|---|---|---|
| **Within 500 feet** | **0** | **2** | **1** | **3** |
| House | 0 | 1 | 0 | **1** |
| Outbuilding | 0 | 1 | 1 | **2** |
| **Within 0.25 mile** | **1** | **8** | **4** | **13** |
| Commercial Building | 1 | 0 | 0 | **1** |
| House | 0 | 2 | 0 | **2** |
| Outbuilding | 0 | 6 | 4 | **10** |
| **Within 0.5 mile** | **2** | **11** | **5** | **18** |
| Commercial Building | 2 | 0 | 0 | **2** |
| House | 0 | 3 | 0 | **3** |
| Outbuilding | 0 | 8 | 5 | **13** |

A substantial number of agricultural acres would occur in the Project ROW; this acreage ranges from just under 175 acres for irrigated cropland, to more than 525 acres for dryland crops, and to almost 3,800 acres for pasture and rangeland. Within this type of land use, sensitive noise receptors can include inhabitants of houses and outbuildings. Although livestock do not meet the definition of a sensitive noise receptor, consideration has been given to how noise associated with the two action alternatives can affect livestock.

### 3.14.3 Direct and Indirect Effects

Noise impacts have been determined considering short-term effects from the use of construction equipment, including helicopters, and long-term effects from operation of the transmission line and substations. Short-term effects resulting from maintenance activities at various locations throughout the life of the line have also been considered. Impacts have been determined qualitatively; however, readily available quantitative information has been used to validate the qualitative conclusions.

The impact analysis has been considered for the No-action Alternative, Alternative A, and Alternative B. Under Alternatives A and B, the impact intensity on sensitive receptors from short-term, long-term, and cumulative impacts has been qualified; however, cumulative impacts are addressed separately in Chapter 4. Definitions of low, moderate, and high intensity impacts, described in Table 3.1-2, have been applied to this analysis. Recommended avoidance, mitigation, and minimization measures are also discussed.

#### 3.14.3.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. As a result, implementation of the No-action Alternative would not generate any noise, and sensitive noise receptors would not be affected.

#### 3.14.3.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Effects on potential sensitive receptors associated with Alternative A have been determined and are summarized in the following sections. As described earlier, these effects have been categorized as either short term or long term.

##### Short-term Effects

During construction of the transmission line and substations, noise would originate from a number of sources at the construction sites, including construction crews and vehicles, construction machinery, helicopter operations, and assembly operations. This noise would have the potential to affect nearby residences, businesses, agricultural interests (i.e., farming and ranching), recreational users, wildlife, and other sensitive receptors, such as churches.

Short-term increased noise levels are anticipated to occur when construction activities are ongoing. Specifically, potential sources of noise from construction activities can include the following: ROW tree clearing, access route preparation (blading and placement of fill material), development of equipment assembly and laydown areas, site preparation and construction of foundations at each transmission structure location, erection of structures at individual tower sites, helicopter use during transmission structure erection and stringing of conductors, use of heavy material haul trucks, staff vehicle transportation, site restoration, and site inspections.

Other R-Project construction activities potentially facilitated by helicopters may include delivery of personnel, equipment, and materials to structure work areas, hardware installation, and pulling shield wire and conductor sock lines. Using helicopters for pulling shield wire and conductor sock lines is the normal, and expected, construction technique for wire stringing on both lattice tower and tubular steel monopole sections of a transmission line. Helicopters used for pulling shield wire and conductor sock lines are typically much smaller than the heavy-lift helicopters used to set lattice structures. NPPD would also use helicopters to deliver fly-in portable water tanks (large collapsible bladders) to each lattice tower during periods of active construction to assist with fire prevention.

In addition to transmission line and substation construction, NPPD would relocate the existing overhead distribution lines for 22 miles using a digger-derrick truck. NPPD would also relocate four existing wells that supply water for livestock watering tanks and irrigation pivots along the R-Project centerline. A well drilling truck would be required for the installation of the relocated wells.

The activities having the potential for greatest impact have been grouped into three categories: pole installation, transmission line stringing, and substation construction. Direct and indirect effects for these categories are discussed further in the following subsections.

#### *Tubular Steel Monopoles*

As noted in Chapter 2, NPPD would use two types of structures for the R-Project transmission line: tubular steel monopoles and steel lattice towers. In the case of tubular steel monopoles, site preparation and structure installation would be completed using conventional and, in some cases, large, construction equipment. The monopoles would be placed at approximately 1,350-foot intervals along the transmission line route where existing access exists, including U.S. Highway 83.

Table 3.14-3 lists equipment likely to be used at assembly areas, for foundation installation and for constructing/erecting the tubular steel monopoles and summarizes typical noise levels produced by this equipment. Noise levels are given as $L_{eq}$ to depict the average sound level for environmental noise and account for fluctuating sound levels.

At a distance of 50 feet, the overall combined noise estimate generated by conventional equipment that would likely be used during construction of the tubular steel monopoles is 89 dBA. Noise produced by construction activities would decrease with distance at a rate of 6 dBA per doubling distance from the site (FHWA 2011). Because this calculation does not include the effects, if any, of local shielding or atmospheric attenuation that can be attributed to other structures, forested areas, terrain, or larger vegetative cover, actual values would likely be lower. Table 3.14-4 shows estimated construction noise levels at various distances from construction activities based on this rate of decrease.

**Table 3-14-3. Typical Construction Equipment Noise Levels**

| Type of Equipment | Maximum Level (dBA) at 50 Feet |
|---|---|
| Road grader | 85 |
| Bulldozer | 85 |
| Heavy truck | 88 |
| Backhoe | 80 |
| Pneumatic tools | 85 |
| Crane | 85 |
| Combined equipment | 89 |

Source: Thalheimer (2000)

**Table 3.14-4. Construction Noise in the Vicinity of a Representative Construction Site**

| Distance from Construction Site (feet) | Hourly $L_{eq}$ (dBA) |
|---|---|
| 50 | 89 |
| 100 | 83 |
| 200 | 77 |
| 400 | 71 |
| 800 | 65 |
| 1,600 | 59 |

Notes: The following assumptions were used: 1) one grader, bulldozer, heavy truck, backhoe, pneumatic tools, concrete pump, and crane would be used; and 2) the reference noise level would be 89 dBA and the distance for the reference noise level would be 50 feet.

Based on information from NPPD, foundation excavation and installation are expected to take 22 weeks to complete, and structure assembly and erection would continue for 26 weeks. This is the total duration of the construction activities for steel pole installation for the entire Project. It is expected that these activities would take a day or less at any individual structure location. During this time, sensitive receptors identified in Table 3.14-1 within 500 feet of construction activities can expect intermittent noise levels ranging from 65 to 71 dBA.

At approximately 0.25 mile from the construction site, sensitive receptors would experience noise levels less than approximately 59 dBA, comparable to what is currently expected from an urban residence or conversation at a distance of 3 feet.

### *Steel Lattice Towers*

Steel lattice towers would be used in the Sandhills ecoregion where existing access is limited or does not exist. NPPD would use steel lattice towers in this sensitive area because they can be constructed with less overall impact on the surrounding area by using smaller equipment and employing helicopters (capable of lifting 15,000 to 20,000 pounds) for structure hauling and erection. Smaller helicopters would also be used to assist with stringing the transmission line.

Towers would be preassembled at one or more central assembly areas using smaller equipment and then transferred by helicopter to tower sites. The helicopter would hover at the assembly area on average from a few to several minutes per tower as it picks up each tower section and would then hover at each tower site from a few to several minutes, while the tower is placed on the foundation. Span lengths between lattice towers would be the same as monopoles (approximately 1,350 feet). Although the smaller assembly equipment generally produces less noise, the use of helicopters in these more remote areas would substantially increase intermittent noise levels during construction activities.

According to the FAA's (1977) *Helicopter Noise Measurements Data Report*, a loaded cargo helicopter (in this case, a Sikorsky S-64 Skycrane) flying 150 meters (or approximately 500 feet) away produces about 89 dBA of peak noise. Using the 6-dBA doubling calculation suggests a similar fully loaded cargo helicopter would produce approximately 95 dBA at 250 feet and approximately 83 dBA at 1,000 feet.

NPPD expects to use helicopters for approximately 16 weeks to complete structure erection for the entire Project (NPPD 2015a). It is expected that lattice tower installation will take less than a day at any individual structure location. Because this is a linear Project, as progress is being made on tower erection, it is anticipated that a progressive shift in increased noise levels would be heard when a helicopter is hovering at the tower sites as construction activities move across the transmission line route. NPPD would coordinate with landowners to ensure that livestock are not in the immediate area during helicopter operations.

### *Stringing of Conductor and Shield Wire*

NPPD expects to use helicopters for approximately 75 weeks to string the transmission line for the entire Project (NPPD 2015a). As described in Chapter 2, splicing would be required at the end of conductor and shield wire stringing. NPPD plans to use implosive splicing technology to perform this phase of the transmission line installation. Implosive splicing uses a small amount of explosive that is designed to connect two lengths of conductor or shield wire together upon detonation. When the implosion splice is detonated, it creates a brief sound similar to a loud thunderclap (Tyburski and Moore 2008), which is approximately 120 dBA. Decibel levels reduce with increasing distance from the splicing location. In addition to the noise, the detonation creates a brief overpressure in the surrounding air. Although not reaching a threshold of pain in humans, this sudden impulse sound could be disruptive to normal activities and potentially affect livestock behavior within 500 feet of this construction activity. However, NPPD would coordinate with landowners to ensure that livestock are not in the immediate area during the use of implosive splicing technology.

#### *Substations*

Increases in noise levels would also result from the construction of new and expanded substations. Impacts from construction of these facilities would be similar to those presented for the transmission line (except helicopter noise) with noise coming from construction equipment, vehicles, and construction labor. Impacts from construction would be limited to the construction period and would be localized to the proposed substation areas and adjacent roadways. Roadways in the immediate vicinity of each substation would include State Highway 2 for the Thedford Substation, West Power Road for the GGS Substation, and the intersection of 846th Road and 510th Avenue for the Holt County Substation. Grading activities for the Thedford Substation expansion would occur for approximately 1 month, and construction would last for up to 40 weeks. NPPD expects grading activities for the new substation in Holt County to occur for approximately 1 month and for construction activities to occur for 40 weeks. Expansion of the GGS Substation is expected to last approximately 8 weeks. While, the construction period of the substations may be longer in the localized area in comparison to some of the transmission line work, it would still occur over a relatively short time with overall impacts from construction being short term and of low intensity.

#### *Construction Summary*

The construction of either monopole or lattice towers would generally have low-intensity, short-term impacts on sensitive noise receptors because of the limited number of sensitive receptors and their distance from the alignment. The majority of land use in the area is open range, undeveloped land, and agricultural areas. Sixty-seven sensitive noise receptors (commercial buildings, church, houses and outbuildings) would be located within 500 feet of NPPD's final route or substations (Table 3.14-1). Any increase in noise levels from conventional construction equipment, ranging from 65 to 71 dBA, could be a concern for these sensitive noise receptors that are closer to the proposed Project.

One of the higher-intensity impacts would stem from helicopter use for lattice tower erection when noise levels could range from 90 to 100 dBA for intermittent, short periods. However, helicopter use would be most frequent in the Sandhills areas where few sensitive noise receptors are located. Noise impacts attributed to helicopter use would be short term and occur only when lattice towers are being erected and during conductor stringing, regardless of structure type.

The highest-intensity noise level anticipated during the construction phase would originate from implosive splicing of transmission line wire. Noise levels approaching 120 dBA are expected in localized areas during short periods. Although impacts are anticipated to be of low intensity based on a lack of population, special consideration should be given to how loud, impulsive noise attributed to wire splicing can impact livestock behavior.

As described in the Affected Environment section, current ambient sound levels typically vary between 40 and 70 dBA. Based on these existing conditions, an increase in noise levels exceeding 70 dBA, in areas with sensitive noise receptors, would be considered to be of moderate intensity (i.e., noise would attract attention and would contribute to the soundscape; user activities would be unaffected) and all noises below 70 dBA would be considered to be of low intensity (i.e., noise attracts would attract attention but would not dominate soundscape; user activities would be unaffected).

### Long-term Effects

Once the Project has been constructed, noise levels could periodically increase during operation and maintenance, including emergency repairs. Noise attributed to maintenance would occur, when and if maintenance needs arise, from field vehicles accessing trouble spots and from the actual maintenance activity. These impacts would be of short duration and typically would not reach low intensity levels, especially considering the lack of population in the area.

The operation of the proposed transmission line would result primarily in corona-generated noise, occurring in the atmosphere near the conductor. Changes to local atmospheric pressure may result in a hissing or cracking sound that may be heard directly under the transmission line or within a few feet of the ROW, depending on weather, altitude, and system voltage, with the level of corona noise receding with distance.

Maximum noise levels associated with corona noise typically do not exceed 60 dBA as heard from the edge of the ROW during extreme weather events, and noise levels typically do not exceed 50 dBA during fair weather events. These levels are characterized as quiet and common in small communities and near rural roadways. None of the sensitive noise receptors are close enough to the transmission line to have their noise levels affected; therefore, there would be no appreciable impacts associated with corona noise.

As discussed previously, operation of the transmission line could also produce Aeolian noise. NPPD would use a T2 (twisted pair) conductor on the steel pole segments of the line to limit Aeolian vibration.

Under Alternative A, NPPD would expand two existing substations and construct one new substation. At these substation sites, noise from operations would occur from substation equipment with substation transformers being the primary source. Sounds commonly associated with a transformer are described as a hum. This hum is created by the expansion and contraction of the core when the transformer is energized and occurs approximately twice per alternating cycle. In addition, each transformer would have cooling fans that would create noise while in operation. Noise from these fans would come from either the motor’s mechanical noise or through the blades disrupting the air.

Within 100 feet of a large electrical transformer, noise levels of approximately 50 dBA are possible (Industrial Noise Control 2016). However, based on the distances from potential sensitive receptors to the expanded and new substations, operational noise-related impacts are expected to be low intensity. In addition to transformers, emergency generators would also produce noise. Under Alternative A, NPPD would intermittently use only one generator at the Holt County Substation.

#### 3.14.3.3 Alternative B: Tubular Steel Monopole Construction Only

As described in Chapter 2, Alternative B would be identical to Alternative A, except NPPD would construct the R-Project transmission line using steel monopoles throughout the entire 225-mile length of the line, rather than using a combination of steel monopoles and lattice towers. This change is expected to have several impacts on noise levels during construction activities:

- Existing access to structure locations where steel monopoles would be installed instead of lattice towers may require access improvements for overland travel with large or heavy vehicles and equipment. Improvements to existing access (including two-tracks) and new access routes may require blading and placing fill material on geo-fabric where required.
- An increase in heavy equipment use, including concrete trucks, dump trucks, and large cranes, would be needed to haul steel pole members, install foundations, and assemble and erect structures.
- The duration of site access improvements would increase from 16 to 32 weeks, the duration of foundation excavation and installation would increase from 22 to 55 weeks, and the duration of structure assembly and erection would increase from 26 to 55 weeks.
- Some construction activities related to helicopter use would be eliminated (Table 3.13-2)—lattice tower assembly in fly yards, helical pier foundation installation, and lattice structure hauling and erection. However, other helicopter noise would occur during conductor and wire stringing.

Although the amount and duration of heavy equipment use would increase under Alternative B, noise impacts during Project construction would be offset because of the reduced helicopter use, which would have a greater short-term effect on the overall noise environment. Similar to Alternative A, implosive splicing of transmission line wire (i.e., short-term noise levels would approach 120 dBA in localized areas) would cause the highest-intensity noise level anticipated during the construction phase under Alternative B.

Under Alternative B, no changes are anticipated in the type of construction equipment or their period of use for stringing of conductor and shield wire; substation construction; or routine inspection, maintenance and repair activities once the transmission line is in service. Therefore, short- and long-term effects on noise levels from these activities would be the same as presented for Alternative A.

### 3.14.4 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate adverse noise effects generated by construction activities:

- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Limit construction activities to daylight hours as practicable and conduct public outreach to neighboring communities, including local governments and residents, to describe when construction would occur and what would be expected to minimize the potential for public complaints or concern.
- Coordinate in advance with local ranchers when construction activity would occur to determine whether livestock may be affected and whether they can be relocated during key periods and be responsible for property damages.
- Establish blasting criteria for implosive splicing within a certain distance of sensitive receptors.
- Use well-maintained equipment and standard specifications for construction machinery, such as mufflers, and coordinate with landowners, as practicable, to minimize effects on them and their operations.

### 3.14.5 Effects Summary

The construction under Alternative A would generally have low-intensity, short-term impacts because of the limited number of sensitive receptors and their distance from the transmission line. The highest-intensity noise level anticipated during the construction phase of either action alternative would originate from implosive splicing of transmission line wire and helicopter operations. Although the amount and duration of heavy equipment use would increase under Alternative B, noise impacts during construction would be offset because of the reduced helicopter use, which would have a greater short-term effect on the overall noise environment. It should be noted that although helicopter noise occurring during lattice tower installation and implosive splicing would be characterized as high intensity, these noises would occur for very short periods in localized areas. Long-term operational noise levels under either action alternative would be of low intensity. Thus, the overall effects intensity when combined with the assembly and installation of all towers under either action alternative would be low. Noise receptors would not be significantly affected under either action alternative.

## 3.15 Hazardous Materials and Hazardous Wastes

The potential impacts that hazardous materials and hazardous wastes can have on human health and the environment largely depend on their types, quantities, toxicities, and associated management practices. This section evaluates the potential effects of the use of hazardous materials and the generation of hazardous wastes under Alternative A and alternatives. The areas in proximity to the two action alternatives that have the potential for existing contamination are identified in Section 3.15.1, *Affected Environment*, which also includes a brief summary of the Federal statutes and implementing regulations regarding hazardous materials and hazardous wastes applicable to the two action alternatives. The potential for proposed activities to be located where there is existing contamination as well as the effects from the use of hazardous materials and the generation of hazardous wastes associated with the alternatives are evaluated and compared in Section 3.15.2, *Direct and Indirect Effects*. The intensity of potential environmental effects from hazardous materials and hazardous wastes was evaluated using the criteria outlined in Table 3.1-2.

### 3.15.1 Affected Environment

#### 3.15.1.1 Federal Statutes and Implementing Regulations

##### Spill Prevention, Control, and Countermeasures Rule

The Spill, Prevention Control and Countermeasures Rule, promulgated under the CWA, as amended by the Oil Pollution Act, is intended to prevent discharge of oil into navigable waters of the United States or adjoining waterbodies. Facilities subject to the Rule must prepare and implement a plan to prevent any discharge of oil into or upon navigable waters or adjoining shorelines. The plan is called an SPCC Plan.

##### Resource Conservation and Recovery Act

Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of this waste, and on owners and operators of treatment, storage, and disposal facilities. Each treatment, storage, and disposal facility owner or operator is required to have a permit issued by USEPA or the state. Typical construction and maintenance activities associated with transmission lines have generated small amounts of these hazardous wastes: solvents, pesticides, paint products, motor and lubricating oils, and cleaners. Small amounts of hazardous wastes may be generated by the action alternatives. These materials would be disposed of according to state law and RCRA.

##### Toxic Substances Control Act

The Toxic Substances Control Act is intended to protect human health and the environment from toxic chemicals. Section 6 of the Act regulates the use, storage, and disposal of polychlorinated biphenyls (PCBs). NPPD would ensure that PCBs are not introduced into the environment. Equipment used for the Project would not contain PCBs, and any existing equipment removed from the R-Project area that may still contain PCBs would be handled according to the disposal provisions of this Act.

#### Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act registers and regulates pesticides. NPPD uses herbicides (a kind of pesticide) only in a limited fashion and under controlled circumstances. Herbicides are used on transmission line ROWs and in substation yards to control vegetation, including noxious weeds. When NPPD or its contractors use restricted-use herbicides, the date, dose, and chemical used are recorded and records are kept by NPPD. Herbicide containers are disposed of according to RCRA standards.

#### Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as CERCLA or Superfund) was enacted by Congress on December 11, 1980, to establish prohibitions and requirements concerning closed and abandoned contaminated sites, provide for liability of persons responsible for releases of contamination at these sites, and establish a trust fund to provide for cleanup when no responsible party could be identified.

### 3.15.1.2 State of Nebraska Statutes and Implementing Regulations

#### Nebraska Administrative Code (NAC) Title 119 – Rules and Regulations Pertaining to the Issuance of Permits under the National Pollutant Discharge Elimination System

The NPDES is the national system for the issuance, reissuance, modification, suspension, revocation, monitoring, and enforcement of permits pursuant to the Federal CWA, and includes any state program that has been approved by the administrator of the USEPA. Waste dischargers must treat their wastes to USEPA standards in order to receive a permit.

#### NAC Title 128 – Rules and Regulations Governing Hazardous Waste Management

The state's Environmental Protection Act authorizes the NDEQ to develop regulations for hazardous waste management that comply with the Federal RCRA (Neb. Rev. Stat. § 81-1505(13)). The regulations developed by the NDEQ have been issued at Title 128 NAC.

#### NAC Title 130 – Rules and Regulations Pertaining to Livestock Waste Control

Livestock waste control facilities are required if a livestock operation of any size threatens to violate surface water or ground water standards. NDEQ administers rules and regulations for livestock waste control under Title 130 NAC.

#### NAC Title 159 – Rules and Regulations, Underground Storage Tanks

RCRA regulates the installation, maintenance, monitoring, and closure of new and existing underground storage tanks. In Nebraska, Federal regulations are implemented through the State Fire Marshal's Office, which enforces 159 NAC. NDEQ oversees the investigation and cleanup of petroleum contamination resulting from leaking above-ground and underground storage tanks.

### 3.15.1.3 Sites in the Area of Analysis under USEPA or NDEQ Programs

Figure 3.15-1 presents the six sites that are located within 500 feet on either side of the center line of NPPD’s final route under both action alternatives and that are under USEPA or NDEQ programs pertaining to various environmental regulations. The 500-foot boundary used to identify the sites extends beyond the 200-foot ROW for NPPD’s proposed transmission line and was estimated to include any area that might be disturbed by Project activities. The sites identified below are known environmental areas that NPPD could potentially encounter during construction activities with harmful consequences.

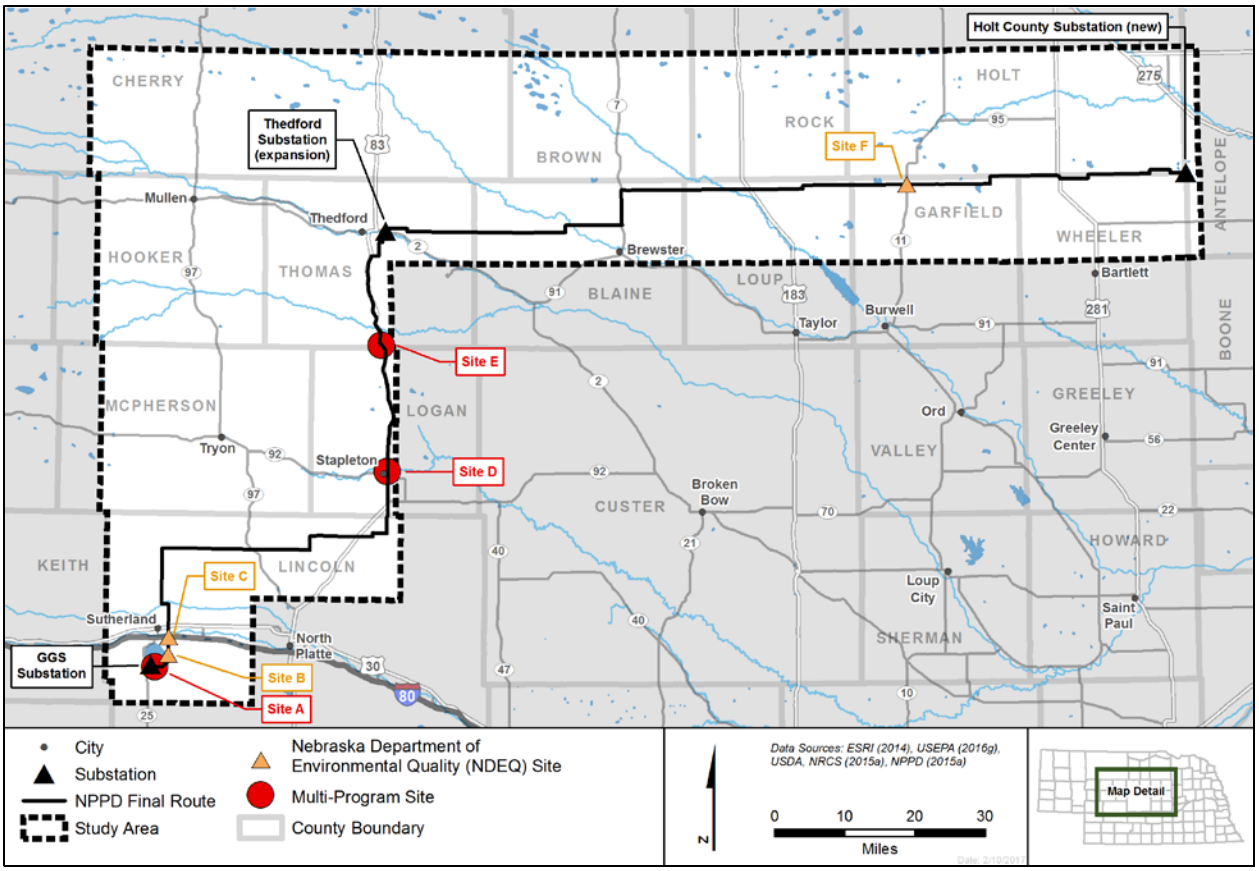



**Figure 3.15-1. Sites in the Effects Analysis Area under USEPA or NDEQ Programs**

The information about the six sites was accessed from the Facility Registry Services, a centrally managed database by the USEPA that identifies facilities, sites, or places subject to environmental regulations or of environmental interest and provides Internet access to a single integrated source of comprehensive (air, water, and waste) environmental information about those facilities, sites, or places (USEPA 2016e). The Facility Registry Services website links to Envirofacts, which provides access to several USEPA databases containing information about environmental activities that may affect air, water, and land anywhere in the United States. It was further refined with the information from the NDEQ database for the pertinent counties and cities

(NDEQ 2016a, 2016b). Table 3.15-1 presents the six sites and the USEPA or NDEQ programs pertaining to those sites.

**Table 3.15-1. Sites in the Area of Analysis under USEPA or NDEQ Programs**

| Site | City, County | Distance To Centerline (feet) | USEPA or NDEQ Programs |
|---|---|---|---|
| A | Sutherland, Lincoln | 390 | NPDES, RCRAINFO, Toxic Substances Control Act, Clean Air Act |
| B | Sutherland, Lincoln | 71 | NPDES |
| C | Sutherland, Lincoln | 402 | NPDES |
| D | Stapleton, Logan | 175 | NPDES permits and compliance |
| E | Stapleton, Logan | 87 | NPDES, Leaking Underground Storage Tank |
| F | Burwell, Garfield | 185 | Leaking Underground Storage Tank |

Sources: USEPA (2016f, 2015c, 2015d); NDEQ (2016a, 2016b)

Of the six sites listed in Table 3.15-1 and depicted on Figure 3.15-1, sites E (Stapleton, Logan County) and F (Burwell, Garfield) are under NDEQ program for leaking underground storage tanks (USEPA 2015c, 2015d). According to the NDEQ database for Leaking Underground Storage Tanks and Surface Spills, both sites are listed as incident closed and no further action required (NDEQ 2016c, 2016d). It should also be noted that the six sites were within 500 feet of the centerline based on the coordinates in the USEPA database; however, NPPD would need to confirm the locations of the sites to avoid encountering them.

#### 3.15.1.4 Sites under CERCLA Investigation

Currently, 15 National Priorities List Superfund sites and 1 proposed site are located in Nebraska; however, none of those sites is located in the 14 counties associated with the study area (USEPA 2016f).

### 3.15.2 Direct and Indirect Effects

The use of heavy equipment and other construction-related materials would likely include the use of oil, hydraulic fluids, antifreeze, fuels, and other potentially hazardous materials. Also, while it is not anticipated at this time, and is unlikely due to the rural land uses in the area, the disturbance of ground materials could reveal the presence of hazardous or potentially hazardous materials. This section discusses the potential effects associated with the use and storage of hazardous materials and generation of hazardous wastes resulting from implementation of either of the two action alternatives.

For purposes of this analysis, the effects analysis area encompasses the transmission line ROW and substation sites, plus anticipated construction operations on access routes, construction sites, and laydown areas. Transportation routes are not included in the area for effects analysis; however, any potential effects from the transportation of hazardous materials and hazardous wastes in the Project area are described for those that could occur within the 500 feet on either side of the center line of NPPD's final route.

#### 3.15.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit and NPPD would not construct the R-Project. For purposes of effects analysis and comparison in this EIS, it is assumed that the R-Project would not occur and that the environmental effects associated with construction, operation, and maintenance of the transmission line and substations would not occur. The No-action Alternative would not affect public health or the environment associated with hazardous materials and hazardous waste generation.

#### 3.15.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

##### Direct and Indirect Effects

As described above, Figure 3.15-1 presents the sites within 500 feet on either side of the centerline of NPPD's final route; these sites are regulated under USEPA or NDEQ environmental programs. Because the two sites identified as having leaking underground storage tanks do not require further action, construction related ground disturbance would not affect those sites. However, if areas contaminated with hazardous materials, toxic substances, or petroleum products that may pose an immediate threat to human health or the environment are discovered during construction, NPPD requires its contractor to notify NPPD immediately. NPPD contractors must also immediately report to NPPD other conditions, such as large dump sites, drums of unknown substances, suspicious odors, or stained soil, if encountered. In these situations, the contractor would not be allowed to disturb such contaminants until NPPD notifies the appropriate authorities and appropriate investigations are completed.

Many types of hazardous materials, such as hydraulic fluids, antifreeze, fuels, and lubricants, would be used during construction of the R-Project, but only in small quantities and for short periods of time, and only small amounts of hazardous waste would be generated. NPPD requires its employees and contractors to handle and dispose of hazardous waste in accordance with Federal regulations and Nebraska's Hazardous Waste Regulations (Title 128 NAC).

Accidental release of contaminants during construction (short term) and operation and maintenance (long term), such as an inadvertent spill of gasoline, oil, or lubricants when fueling or storing construction equipment, could affect surface water, groundwater, and wetlands located down gradient from the Project area. However, an uncontained spill of hazardous materials or hazardous wastes would likely affect a limited area because the volume of these materials would likely be relatively small. NPPD's contractor would develop and implement a spill prevention and response plan, which would help ensure that any spill would be cleaned up before it reached any wetlands or waterbodies. Hazardous materials or hazardous wastes would not be stored for long periods at construction yards. In addition, the implementation of required spill prevention and response plans would limit potential effects from a spill, if one were to occur.

Potential contaminants, such as oils, hydraulic fluids, antifreeze, and fuels, would not be disposed of at the Project site, and all spills would be immediately cleaned up. Contractor workers would be trained prior to starting work in the appropriate procedures for handling and storage of hazardous materials and hazardous wastes. All hazardous materials and hazardous wastes would be properly stored to prevent an accidental release; however, effects on human health and the environment could occur if hazardous materials or hazardous wastes were to leak from containment vessels, storage containers, or construction vehicles. Accordingly, the effects from hazardous materials associated with Alternative A would be low intensity in both the short term and long term.

#### Substation Oil Containment

The R-Project would require expanding two existing substations and constructing a new substation. Some types of electrical equipment found at substations, such as transformers and circuit breakers, are filled with an insulating mineral oil. Oil containment requirements are dictated by the amount of oil onsite and the likelihood that released oil could enter a waterway. NPPD would update existing SPPC Plans for the existing substation locations (GGS Substation and Thedford) and prepare an SPCC Plan for the new Holt County Substation, if required. If no oil-filled equipment is installed at the Holt County Substation, then oil containment would not be required. However, for equipment that does contain oil, appropriate containment requirements outlined in the SPCC Plan would be implemented. The effects from substation oil containment would be of low intensity in the short term and the long term.

#### Right-of-Way Vegetation Management

NPPD would provide maintenance on the ROW to keep the ROW clear of any trees and woody vegetation that may reach heights that could affect the integrity of the transmission line. Depending on the type of trees or woody vegetation, control may include cutting trees or woody vegetation to the ground and removing the stumps or treating the stumps with an appropriate herbicide that would prevent the regrowth of the tree or woody vegetation. NPPD would not spray the ROW with any herbicides to control or remove grasses and broad leaf plants that may grow naturally in the ROW area and do not pose a risk to the integrity of the transmission line (NPPD 2015a); the licensed application of herbicides would be used to control noxious weeds as necessary during restoration efforts for areas disturbed as part of construction.

NPPD currently has many miles of existing transmission line where vegetation management is necessary and access roads are limited. Management is implemented on a case-by-case basis considering the scope and location of each effort. Efforts could include walking into areas with backpack spray equipment; utilizing equipment mounted on ATVs, UTVs or pickups; and/or control of vegetation by use of herbicides or physical control measures such as cutting or trimming.

NPPD would ensure that employees or hired contractors who are employed to maintain the ROW areas under NPPD’s transmission lines are either Nebraska Certified Pesticide Applicators or are under the direct supervision of an employee or contractor who is certified. Only certified applicators can apply restricted-use pesticides in Nebraska. Contrary to common practice along transmission line ROWs, NPPD has made a commitment for the R-Project not to use herbicides for vegetation control, just tree clearing and treatment of stumps. Herbicides will be used for the treatment of trees and tree stumps and to control noxious weeds during restoration. Herbicide applications could affect non-target vegetation via aerial drift during application or transport by surface water runoff. However, requirements that herbicides be applied by properly licensed applicators in accordance with label and application permit directions make it unlikely that such effects would occur. Effects from using herbicides for ROW management in the manner described above would be of low intensity.

#### 3.15.2.3 Alternative B: Tubular Steel Monopole Construction Only

As described in Chapter 2, Alternative B would be identical to Alternative A, except NPPD would construct the R-Project transmission line using steel monopoles throughout the entire 225-mile length of the line, rather than using a combination of steel monopoles and lattice towers.

Alternative B would involve the limited use of helicopters for construction and would increase the area of ground disturbance associated with access improvements and tower foundation construction. Alternative B Construction activities would increase the duration of ground equipment operation associated with monopole construction. However, the ROW requirement would be 200 feet, the same as Alternative A. Additionally, the increase in structure work area for the monopole only construction to 200 x 200 feet would be within the 500 feet on either side of the centerline as analyzed for Alternative A. Therefore, under Alternative B, direct and indirect effects related to hazardous material use and generation of hazardous material would be similar to those described for Alternative A, and construction personnel associated with the R-Project would be required to follow applicable Federal and state regulations for handling hazardous materials. Accordingly, the effects from hazardous materials associated with Alternative B would be of low intensity in both the short term and long term.

### 3.15.3 Avoidance, Minimization, and Mitigation Measures

Because hazardous materials would be used in small quantities and are anticipated to have a low potential of resulting in harmful effects on public health or the environment, NPPD does not propose any specific mitigation measures. NPPD would implement the following avoidance and minimization measures, which are standard for all NPPD projects, under Alternative A and Alternative B:

- Develop an SPCC Plan for the Holt County Substation to prevent discharge of oil into navigable waters of the United States or adjoining waterbodies.
- Direct the contractor to develop a spill prevention and response plan to help avoid and respond to accidental spills and leaks during construction.
- Require all contractors to notify NPPD immediately if they encounter unusual conditions during construction, such as large dump sites, drums of unknown substances, suspicious odors, or stained soil.
- Equip each fuel truck with automatic shutoff valves.
- Equip all fuel trucks and all pertinent sites with spill response kits and train construction personnel in the use of the kits.

- Allow only Nebraska Certified Pesticide Applicators to apply restricted-use herbicides for ROW vegetation management.

### 3.15.4 Effects Summary

Under either action alternative, construction, operation, and maintenance, including emergency repairs, of the R-Project would necessitate the use of various hazardous materials and generate hazardous wastes. NPPD and all personnel associated with the R-Project would be required to follow applicable Federal and state regulations for handling hazardous materials and hazardous wastes. In the event of a release, NPPD personnel and its contractors would immediately implement response actions articulated in the spill prevention and response plan for the R-Project. Consequently, the effects from hazardous materials and hazardous waste under either action alternative would be of low intensity in both the short term and long term. Consequently, the R-Project would not pose a significant impact from hazardous materials and hazardous waste.

## 3.16 Public Health and Safety

During the NEPA scoping period, members of the public raised concerns about potential safety issues associated with the R-Project, specifically health hazards related to high-voltage electrical transmission lines. As discussed in more detail below, in areas that now have electrical transmission and distribution lines, people in proximity to the lines may be exposed to extremely low-frequency EMFs and a small, but increased, potential for electric shock. Other safety issues related to R-Project construction and maintenance and operation include a concern about increased potential for wildfires and worker safety during construction and emergency repairs.

This section is divided into two parts: the first (Section 3.16.1) describes the affected environment for public health and safety in the study area and the second (Section 3.16.2) describes in a qualitative manner the direct and indirect effects based on the criteria provided in Table 3.1-2. Avoidance, minimization, and mitigation measures that NPPD would implement to reduce detrimental effects are presented in Section 3.16.3.

### 3.16.1 Affected Environment

This section provides a summary of EMFs and an overview of public health and safety risks associated with an increase in EMFs, electric shock, worker safety, and potential risk of wildfire in the study area.

#### 3.16.1.1 Regional Setting

The study area is located in the north-central portion of Nebraska, which is rural in character and sparsely populated. The area is dominated by agricultural land uses, primarily pasture/rangeland and some cropland. More than 90 percent of total land acreage in the study area is ranch and farm land. Individuals susceptible to EMFs or electric shock would primarily be ranchers and farmers in the area who traverse under existing transmission lines on a daily basis and residents with homes and property immediately adjacent to the transmission line. Currently, high-voltage transmission lines carry electrical power to communities in every county of the study area, although existing lines carry lower voltages (69 kV or 115 kV) than the R-Project (345 kV).

Public health and safety impacts that may result from the construction and operation of the proposed Project would likely occur in those areas immediately adjacent to the proposed transmission line ROW, particularly near the existing and proposed substations. The analysis area for the discussion of public health and safety includes those areas in the proposed ROW or 300 feet of either side of the alignment centerline, because beyond this distance the potential effects resemble EMF background levels that would be anticipated in a typical household (as explained below). Potential human health and safety impacts, if they occur, would be limited to those areas in immediate proximity to the proposed Project alignment, access routes/roads and substations.

A concern of landowners in the Nebraska Sandhills during dry periods is the potential for wildfire. While wildfires once occurred quite frequently and helped to define the Sandhills landscape, they now occur infrequently. Wildfires are viewed as destructive by ranchers because they can be a threat to human safety, destroy equipment, result in lost forage and hay resources, kill livestock, and disturb fragile sandy soils and encourage wind erosion. Signage on major roads traversing the study area warns travelers to take extra precautions to prevent wildfires.

#### 3.16.1.2 Electric and Magnetic Fields

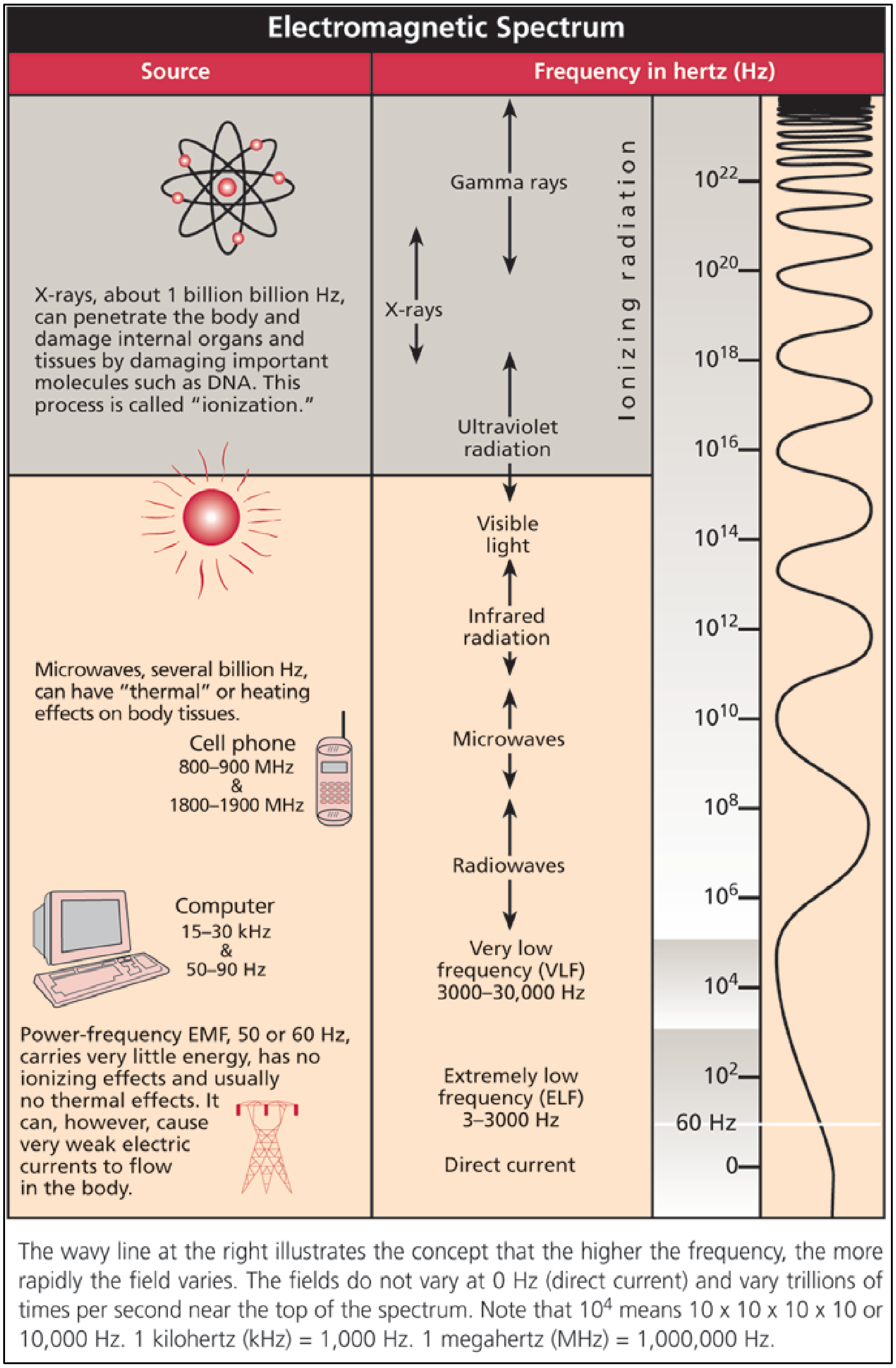
Concern was raised during public scoping for this DEIS about the health effects from exposure to EMFs generated by transmission and distribution lines. Exposure to EMFs is not unique to transmission lines. It is found in homes, schools, work places, businesses, and public facilities; in fact, in every place where electricity is present.

The following overview of EMFs was retrieved from the National Institute of Environmental Health Sciences' (NIEHS) *Electric and Magnetic Fields Associated with the Use of Electric Power Manual* (NIEHS 2002). EMFs are generated whenever electricity is generated, transmitted, or used. They are the direct effect of the presence and/or motion of electric charges. EMFs are invisible lines of force that surround any electrical device, including power lines, electrical wiring, and electrical equipment. The majority of electrical equipment needs to be turned on for a magnetic field to be produced; however, electric fields are often present even when equipment is turned off as long as it is plugged into a power source. Additional sources of electromagnetic waves include x-rays, visible light, microwaves, and radio waves, as illustrated in Figure 3.16-1. The difference between electric fields and magnetic fields is explained in the follow sections. Similar to both, however, is that their magnitude decreases rapidly as they move away from the source generator.

#### Electric Fields

Electric fields are produced by voltage and increase in strength as the voltage increases. The intensity of an electric field is proportional to the voltage of the transmission line. They can be easily shielded or weakened by materials that conduct electricity or even materials that conduct poorly such as trees and buildings. Electric field strength is measured in volts per meter or in kV per meter.[5] The electric field from a transmission or distribution line is a function of the voltage of the line, the phase conductor arrangement, and distance from the line. Because the voltage of a line is essentially constant over time, the magnitude of the electric field remains constant regardless of the amount of the load on the line. Electric fields are protected by grounded objects such as fences, trees, and buildings.

[5] One kV is equal to 1,000 volts.




Source: NIEHS (2002)

Note: A wide range of sources of electromagnetic waves occur from home computers and cell phones to the sun itself.

**Figure 3.16-1. Examples of Emitting Sources of Electromagnetic Waves and Frequency Range**

### Magnetic Fields

Magnetic fields result from the flow of current through wires or electrical devices and are proportional to current flow. Unlike electric fields, they pass through most materials and are therefore difficult to shield. Most research on EMFs focuses on magnetic fields. Magnetic fields, the component of EMFs of primary health concern, are generated by electrons *moving* in a conductor, such as a transmission wire (Public Service Commission of Wisconsin 2010).

Magnetic fields are measured in units of gauss or Tesla. Gauss is the unit most commonly used in the United States. Tesla is the internationally accepted scientific term and the conversion between the two is 1 tesla = 10,000 gauss. Because most environmental EMF exposures involve magnetic fields that are only a fraction of a Tesla or a gauss, they are commonly measured in units of microtesla ($\mu$T) or milligauss (mG).[6]

Electrical energy is often supplied as an alternating current where the electricity flows in one direction and then in the other to complete a cycle. EMFs are characterized by their wavelength, frequency, and amplitude (strength). At a distance of approximately 300 feet and at times of average electricity demand, magnetic fields from many transmission lines can be similar to typical background levels found in most homes. Figure 3.16-2 depicts typical EMF levels for several voltages of transmission lines and structures and the decrease of EMFs as the distance from the structure increases.

The level of the magnetic field produced by an electric transmission line depends on the configuration of the conductors (spacing and orientation), the height of the conductors, the distance from the line, the electrical load on the line, and the proximity of other electrical lines. In general, the load on a transmission line varies continually on a daily and seasonal basis. The magnetic fields likewise vary throughout the year and during the day.

In general, the strongest EMFs are concentrated in areas outside a substation where transmission lines enter and leave the substation. EMFs from substation equipment, such as transformers, reactors, and capacitor banks, decrease at a rapid rate when moving away from these point sources. Such effects are typically indistinguishable beyond the immediate range (e.g., 20-50 feet) of such facilities (NIEHS 2002). Also, NPPD substations are secured areas with established buffers that are fenced, further preventing the public from being in proximity to EMFs emitted from substation equipment.

[6] A microtesla is 1/1,000,000 of a tesla, while a milligauss is 1/1,000 of a gauss; therefore, 1 tesla = 1,000,000 $\mu$T and 1 gauss = 1,000 mG. To convert a measurement from $\mu$T to mG, multiply by 10 (NIEHS 2002).

## Typical EMF Levels for Power Transmission Lines*

**115 kV**

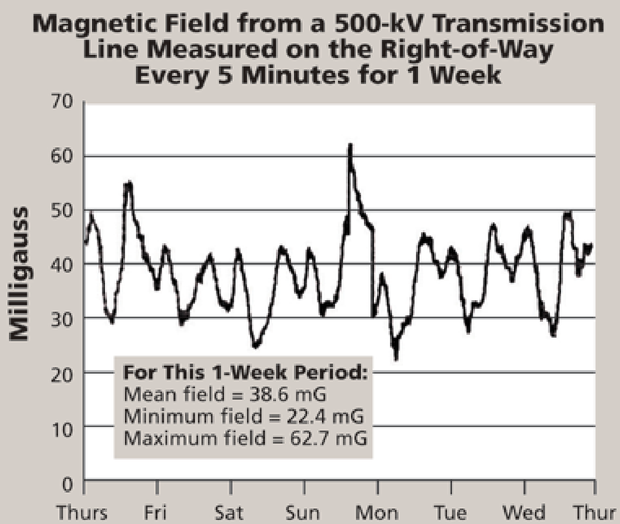
| | | Approx. Edge of Right-of-Way 15 m (50 ft) | 30 m (100 ft) | 61 m (200 ft) | 91 m (300 ft) |
|---|---|---|---|---|---|
| Electric Field (kV/m) | 1.0 | 0.5 | 0.07 | 0.01 | 0.003 |
| Mean Magnetic Field (mG) | 29.7 | 6.5 | 1.7 | 0.4 | 0.2 |

**230 kV**

| | | Approx. Edge of Right-of-Way 15 m (50 ft) | 30 m (100 ft) | 61 m (200 ft) | 91 m (300 ft) |
|---|---|---|---|---|---|
| Electric Field (kV/m) | 2.0 | 1.5 | 0.3 | 0.05 | 0.01 |
| Mean Magnetic Field (mG) | 57.5 | 19.5 | 7.1 | 1.8 | 0.8 |

**500 kV**

| | | Approx. Edge of Right-of-Way 20 m (65 ft) | 30 m (100 ft) | 61 m (200 ft) | 91 m (300 ft) |
|---|---|---|---|---|---|
| Electric Field (kV/m) | 7.0 | 3.0 | 1.0 | 0.3 | 0.1 |
| Mean Magnetic Field (mG) | 86.7 | 29.4 | 12.6 | 3.2 | 1.4 |




Electric fields from power lines are relatively stable because line voltage doesn't change very much. Magnetic fields on most lines fluctuate greatly as current changes in response to changing loads. Magnetic fields must be described statistically in terms of averages, maximums, etc. The magnetic fields above are means calculated for 321 power lines for 1990 annual mean loads. During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels above. The graph on the left is an example of how the magnetic field varied during one week for one 500-kV transmission line.

*These are typical EMFs at 1 m (3.3 ft) above ground for various distances from power lines in the Pacific Northwest. They are for general information. For information about a specific line, contact the utility that operates the line.
Source: Bonneville Power Administration, 1994.

Source: NIEHS (2002)

**Figure 3.16-2. Typical Electric and Magnetic Field Levels of Transmission Lines**

#### 3.16.1.3 Regulatory Framework

Currently, no Federal or Nebraska regulations are in place to dictate the permitted strength of electrical fields beneath high-voltage transmission lines. Public and occupational magnetic-field exposure guidelines that do exist are based on studies evaluating the impacts of short-term exposure to EMFs. The Institute of Electrical and Electronics Engineers' International Committee on Electromagnetic Safety on Non-Ionizing Radiation has established public exposure guidelines of 9,040 mG for magnetic fields (ICES 2002). The International Commission on Non-Ionizing Radiation Protection's (ICNIRP) *Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields* also recommends limits for both occupational and general public exposure to time-varying fields. At 60 hertz, ICNIRP electric field reference level is 4.2 kV per meter and magnetic field reference level is 2,000 mG for public exposure (ICNIRP 2010). OSHA oversees the working conditions for U.S. workers by implementing and managing occupational safety and health standards. OSHA requirements are designed to protect workers and prevent workplace accidents, injuries, or illnesses and include regulations such as 29 CFR Part 1926, *Safety and Health Regulations for Construction*, and applicable subparts of 29 CFR Part 1910, *Occupational Safety and Health Standards*. Specifically, 29 CFR Part 1910.269, *Electric Power Generation, Transmission, and Distribution*, covers the operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment.

Additionally, the NESC ensures the safeguarding of persons and utility facilities during the installation, operation, and maintenance of electric supply and communication facilities and the 2017 NESC is the most recent version available.

#### 3.16.1.4 Potential Public Health Effects

For the past 40 years, there has been concern that prolonged exposure to EMFs can be a contributor to cancer, leukemia, and other diseases. Since the 1970s, numerous epidemiological studies have been conducted to assess the potential effect of magnetic fields on the risks of cancer and other diseases. While there have been many studies done regarding the health effects of transmission lines, the results are inconclusive.

The World Health Organization (2012) reports:

> 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.

USEPA (2006) states:

> Much of the research about power lines and potential health effects is inconclusive. Despite more than two decades of research to determine whether elevated EMF exposure, principally to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. The general scientific consensus is that, thus far, the evidence available is weak and is 'not sufficient to establish a definitive cause-effect relationship.'

While many findings are still inconclusive at this time, USEPA (2006) reports:

> In 1998, an expert working group, organized by the NIEHS, assessed the health effects from exposure to extremely-low frequency EMF, like those you would find in a home with power lines close by. Based on studies about childhood leukemia that involved a large number of households, they found that power line frequency magnetic fields are a possible cause of cancer. The NIEHS working group also concluded that the results of EMF animal, cellular, and mechanistic studies do not confirm or refute the finding of the human studies.

### Implantable Medical Devices

Pacemakers are used to treat arrhythmias, which are problems associated with the rate or rhythm of the heartbeat. During an arrhythmia, the heart can beat too fast, too slow, or with an irregular rhythm. When this happens, the heart may not be able to pump enough blood through the body. Pacemakers can relieve some arrhythmia symptoms and are designed to detect abnormal heart rhythms (HHS 2012).

Pacemakers and other cardiac electronic devices rely on complex micro-circuitry and use electromagnetic waves for their communication with the programmers. As a result, they are susceptible to interference from the surrounding EMFs. Electromagnetic interference can be defined as any signal, biological or not, that falls within a frequency spectrum that is being detected by the sensing circuitry of the pacemaker. This can interfere with the devices optimal function and is often a concern for patients (Lakshmanadoss et al. 2004).

Currently, no standardized guidance is available regarding acceptable levels of EMF for pacemakers. However, the American Conference of Governmental Industrial Hygienists has prepared recommendations for occupational exposures including EMFs. These guidelines are designed to identify levels that nearly all workers may be exposed to repeatedly without adverse effect. For EMF, the recommendations suggest that persons with pacemakers or similar devices limit their exposure to electric fields to 1 kV per meter and magnetic fields to 1,000 mG (ACGIH 2011). These exposure limits are not applicable to the R-Project because no member of the public would be living on a permanent basis within the transmission line ROW.

#### Electric Shock

Potential safety considerations attributed to an electric transmission line include the potential for electric shock. The electric field created by a high-voltage transmission extends from the conductors to other conducting objects nearby such as vehicles, persons, and vegetation. These effects can include induced currents, steady-state shocks, and spark discharge shocks (DOE 2003). These effects are generally avoided and limited by the NESC's induced-current requirement.

- Induced currents—Electric currents can be induced by EMFs in conductive objects near transmission lines. For magnetic fields, the concern is for very long objects parallel and close to the line. The level of the induced current varies by the strength of the electrical field strength and size and shape of the object. Generally, facilities including those paralleling the transmission line, such as fences, are grounded to reduce this impact.
- Steady-state shock—Steady-state currents are those that flow continuously after a person contacts an object, such as a vehicle, and provides a path to ground for the induced current. The effects of these shocks range from involuntary movement in a person to direct physiological harm. Steady-state current shocks occur in instances of direct or indirect human contact with an energized transmission line.
- Spark-discharge shock—Induced voltages appear on objects such as vehicles when an inadequate ground is available. If the voltage is sufficiently high, a spark-discharge shock will occur as contact is made with the ground. Spark-discharge shocks that create a nuisance occur in instances of carrying or handling conducting objects, such as irrigation pipe, under transmission lines.

### 3.16.2 Direct and Indirect Effects

This section discusses potential impacts and their duration and intensity on public health and safety resulting from the construction, operation, and maintenance of either action alternative and from the No-action Alternative. Definitions for duration and intensity associated with public health and safety developed for this Project are described in Table 3.1-2. The discussion includes potential effects associated with construction activities, increased exposure to EMFs and wildfire in areas in general proximity to the proposed Project.

#### 3.16.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue to a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Implementation of the No-action Alternative would not affect public health and safety.

### 3.16.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

#### Disruption of Farming and Ranching Operations

Under Alternative A, NPPD would install several hundred structures to support the electric current carrying conductors. Many of these structures would be located in or adjacent to agricultural lands and may create obstacles for ranching and farming equipment. Agricultural operations, including the use of equipment near proposed structures, could result in contact and/or damage to machinery, structures, and/or operators. As the Project is further designed, NPPD would work with affected property owners to locate structures in areas that would avoid or have reduced concern for potential impacts on ranching and farming operations. The effects on safety to ranching and farming operations would be low intensity for both the short term and long term.

#### Safety Risk during Construction

Direct contact between an object on the ground and an energized conductor power line poses the most serious risk of injury or death from a high-voltage transmission line. During construction of the proposed Project, crossings of existing energized lines would be encountered, both transmission and distribution, in addition to upgrades to existing substations. However, it is not anticipated that direct contact with energized lines would occur. Additionally, temporary guard structures would be used at crossing locations to protect existing facilities and worker safety. Prior to construction activities, NPPD would work with utility owners to coordinate line outages or other avoidance measures to ensure the safe implementation of the proposed Project. NPPD contractors would be responsible for ensuring compliance with OSHA's safety regulations during construction activities. Workers would be knowledgeable of the protocols in place and required to follow all procedures during construction activities. However, the potential does exist for minor and major injuries to occur during the construction of the proposed Project; these effects would be of low intensity for the short term.

#### Electric Shock

Once in operation, Alternative A has the potential to cause induced voltage from improperly grounded equipment under the transmission line. If this occurs, some farm and ranch equipment (e.g., barns, fences, and gates) may be subject to developing small electric charges that could be transferred to humans or livestock upon contact with equipment, structures, or facilities. NPPD would ensure that proper grounding measures are implemented wherever the risk of electric shock exists prior to energizing the line. Additionally, if induced voltage concerns are identified following construction activities, NPPD would correct the circumstances by grounding the equipment.

The risk of shock to the public and livestock under Alternative A is expected to be of low intensity for the long term for several reasons. The potential for shock from induced currents is expected to be low because the facilities that might conduct such currents (e.g., fences parallel to and near the transmission lines) would be grounded. Spark-discharge shocks can occur when people carry conducting objects (such as aluminum irrigation pipe) under transmission lines, but such nuisance shocks do not pose a health risk. Steady-state shocks, which can occur when an object comes in contact with or is close to a transmission line, can be lethal to an individual touching that object. Contact with transmission line conductors is rare, however, because the wires are elevated high enough above the ground to allow normal vehicles (including large farm machines) to pass safely underneath. In addition, the R-Project alignment traverses sparsely populated areas over the great majority of its route, further reducing the likelihood of injury from shock. In addition, NPPD compliance with the NESC's induced-current requirement would minimize this effect. NPPD contractors would be responsible for ensuring compliance with OSHA's regulations and the NESC regulation.

Corona noise, a crackling or hissing sound generated by transmission lines under certain conditions (see Section 3.14, *Noise*), may be perceived as unsafe, but this noise does not pose a health risk.

### EMF Health Risk

As discussed at more length in Section 3.16.1, no scientific studies have shown a cause-and-effect relationship between EMF exposure and disease. Results of epidemiological studies have been mixed with a few studies demonstrating a statistical relationship between proximity to transmission lines and childhood leukemia (NIEHS 1999). EMF exposure associated with transmission lines diminishes rapidly with distance from the ROW centerline. Within 200 feet of the centerline, exposure levels are very low. Given the sparsely populated rural areas that the R-Project would cross for the great majority of its length, few individuals would be within 200 feet of the centerline for any appreciable length of time. NPPD has routed the R-Project Transmission line to stay 500 feet away from residences. Consequently, the risk of significant exposure from EMF to the general public is expected to be minimal. The effects of EMFs as a health risk would be of low intensity for the life span of the R-Project and would not be a health hazard to individuals with implantable medical devices, such as pacemakers.

### Risk of Structure Collapse

Transmission line support structures occasionally collapse, but it is a rare occurrence and usually the result of extreme weather events, particularly heavy ice and wind storms that characterize winter conditions in Nebraska. High winds, including tornado-force winds, also occur in the region and could cause one or more structures to collapse in isolated events. If a structure were to collapse and a conductor were to break or contact some object, flow of power would automatically shut off. Given the sparsely populated nature of the Project area and the very few habitable structures near the R-Project alignments, it is highly unlikely that a collapsing structure would threaten human safety because it would be a localized event. NPPD designs transmission lines in compliance with the NESC criteria to minimize the risk of structure collapse and conductor damage. If a line is physically down for whatever reason (e.g., a structure collapses or a conductor breaks), the line would be de-energized and would no longer pose electrical risk. Necessary repairs would then be completed in a safe and timely manner. The risk of a health effect from a transmission line structure collapse are of low intensity over the duration of the life span of the R-Project.

#### Risk of Wildfire

The primary wildfire threats associated with high-voltage transmission lines are indirect, often consisting of human-caused accidents during construction and maintenance activities and are a result of increased access to areas inaccessible prior to development of utility corridors. Construction and maintenance activities that may ignite fires include the use of equipment such as welding equipment, operating vehicles under dry conditions, and the presence of personnel who may inadvertently ignite fires while smoking. Because of the precautions NPPD would put into place the potential effects of wildfire are of low intensity for the short term.

The public has expressed concern that power lines can cause the ignition of wildfires. However, power line-caused fires are relatively rare and more prevalent for distribution and lower voltage transmission lines (e.g., 69 kV) when compared with higher-voltage transmission lines such as the R-Project. The energized conductors on distribution and lower-voltage transmission lines are much closer together (as close as 4 feet) than higher-voltage transmission lines, which have conductors spaced farther apart (more than 27 feet for the R-Project 345 kV lines). Wind-blown tree limbs and debris can more easily come into contact with and bridge two distribution conductor phases, which can cause electrical arcs and set fire to woody debris. Because higher-voltage transmission line conductors are spaced much farther apart, this is an extremely rare occurrence. The standard use of protection systems on transmission lines, which are designed to shut off power flow in a fraction of a second if something were to contact the conductors, also minimizes the potential for wildfires.

### 3.16.2.3 Alternative B: Tubular Steel Monopole Structures Only

Because of the similarity in construction and operation practices for either of the two action alternatives from a potential human health and safety perspective (e.g., potential interference with ranching and farming operations, safety risk during construction, electric shock, and EMF) the effects on human health and safety under Alternative B would be low intensity for the short term and long term.

## 3.16.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid or minimize effects on public health and increase safety:.

- Work with affected property owners to locate transmission structures in areas that would minimize effects on farming or ranching operations.
- Provide information to landowners along the line route educating them about the risks of equipment contact with electric power lines and how to avoid contact.
- Install a grounding system at the base of each transmission structure that consists of copper ground rods embedded in the ground in immediate proximity to the structure foundation and connected to the structure by a buried copper lead. After installation of the ground rods, test the grounding to determine the resistance to ground, and if the

resistance to ground for a transmission structure is excessive, install additional ground rods to lower the resistance.

- Require a grounding system (buried copper conductor arranged in a grid and driven ground rods, typically 8 to 10 feet long) in each substation to transfer faults to ground and ensure personnel safety. Connect the ground rods and any equipment and structures to the grounding conductor; and calculate the amount of conductor and length and number of ground rods required based on fault current and soil characteristics.
- Provide lightning protection via overhead ground wires along the line.
- Ground all fences, metal gates, and pipelines that cross or are within the transmission line ROW to prevent electrical shock.

### 3.16.4 Effects Summary

All potential short- and long-term public health and safety effects resulting from implementation of either action alternative would not adversely affect workers or public health and safety. The greatest potential for adverse effects to the general public would occur after the transmission line is energized and is operational. The implementation of avoidance and minimization measures described above would reduce the magnitude of potential effects on public health and safety. Over the long term, adverse impacts from the operation and maintenance under either of the action alternatives are anticipated to be of low intensity. Consequently, the R-Project does not pose a significant impact to public health and safety.

## 3.17 Socioeconomics

Under the action alternatives, issuance of a permit and subsequent implementation of the R-Project would affect socioeconomic conditions in the study area. The R-Project has the potential to affect demographic characteristics and economic conditions through employment and spending associated with construction, operation, and maintenance activities of the Project, including implementation of the HCP. This section is divided into two parts: the first (Section 3.17.1) describes the affected environment for socioeconomic conditions in the 14 counties in the study area, and the second (Section 3.17.2) describes and quantifies the direct and indirect effects and qualitatively measures impact intensity based on the criteria provided in Table 3.1-2.

Socioeconomic data used for this effects analysis are primarily available at the county level. County boundaries do not correspond exactly with the study area defined in this DEIS. Consequently, the analysis area for socioeconomics consists of the 14 counties that contain portions of the study area. Because demographic and economic baseline information cannot be aggregated specifically for the study area, county level data are used to characterize current socioeconomic conditions in this section. Thus, information presented in this section (e.g., population, employment/unemployment, and income) reflects conditions in an area that is larger than the designated study area and is referred to in this section as the analysis area.

### 3.17.1 Affected Environment

The analysis area is located in the north-central portion of Nebraska, which is mostly rural in character and sparsely populated. The area is dominated by agricultural land uses, primarily pastureland/rangeland with some cropland. More than 90 percent of total land acreage in the analysis area is ranch and farm land. Most of the cropland located in the analysis area is outside the study area. Within the DEIS designated study area, cropland accounts for approximately 5 percent of the total area (Table 3.5-1) and is located in the North and South Platte rivers area and the eastern edge of the study area. Agriculture, primarily ranching, is a key economic driver in the area. For the counties included in the study area, ranch and farm employment as a percent of total employment ranged between 5.5 and 40.3 percent in 2014 (all higher than the overall statewide percentage of 4.2 percent), and the market value of all agricultural products sold in 2012 totaled nearly $3 billion.

The study area includes all or portions of 14 counties: Antelope, Blaine, Brown, Cherry, Garfield, Holt, Hooker, Lincoln, Logan, Loup, McPherson, Rock, Thomas, and Wheeler. The study area also includes the incorporated villages of Brewster (Blaine County), Chambers (Holt County), Ewing (Holt County), Hershey (Lincoln County), Mullen (Hooker County), Stapleton (Logan County), Sutherland (Lincoln County), and Thedford (Thomas County), as well as the unincorporated communities of Brownlee (Cherry County), Seneca (Thomas County), and Tryon (McPherson County) (Figure 3.8-1).

#### 3.17.1.1 Demographic Characteristics

**Population**

The 14 counties in the analysis area are predominantly rural in nature. In the analysis area, small populations are concentrated in incorporated villages and communities located primarily along major transportation routes. No urban areas are located in the DEIS designated study area; Cherry, Lincoln, and Holt counties include urban areas located outside the study area, but the other 11 counties do not include any urban areas (NEDED 2012a). Lincoln County has the highest population among the analysis area counties (35,815 persons in 2014), followed by Holt County (10,403 persons). Five other counties have populations between about 1,400 and 7,000 (Rock, Garfield, Brown, Cherry, and Antelope counties), while the remaining seven counties have populations of fewer than 800 persons (Table 3.17-1).

**Table 3.17-1. Population by County, Selected Years, 1990–2014**

| County | 1990 | 2000 | 2010 | 2014 | Percent Change 1990–2014 |
|---|---|---|---|---|---|
| Antelope | 7,965 | 7,452 | 6,685 | 6,398 | -19.7 |
| Blaine | 675 | 583 | 478 | 504 | -25.3 |
| Brown | 3,657 | 3,525 | 3,145 | 2,941 | -19.6 |
| Cherry | 6,307 | 6,148 | 5,713 | 5,762 | -8.6 |
| Garfield | 2,141 | 1,902 | 2,049 | 2,003 | -6.4 |
| Holt | 12,599 | 11,551 | 10,435 | 10,403 | -17.4 |
| Hooker | 793 | 783 | 736 | 728 | -8.2 |
| Lincoln | 32,508 | 34,632 | 36,288 | 35,815 | +10.2 |
| Logan | 878 | 774 | 763 | 750 | -14.6 |
| Loup | 683 | 712 | 632 | 588 | -13.9 |
| McPherson | 546 | 533 | 539 | 498 | -8.8 |
| Rock | 2,019 | 1,756 | 1,526 | 1,443 | -28.5 |
| Thomas | 851 | 729 | 647 | 687 | -19.3 |
| Wheeler | 948 | 886 | 818 | 766 | -19.2 |
| **Total** | **72,570** | **71,966** | **70,454** | **69,286** | **-4.5** |

Sources: U.S. Census Bureau (1990a, 2000, 2010a, 2015a)

Populations in all but one of the analysis area counties have decreased over the last 25 years (Table 3.17-1). Lincoln County, which includes urban areas outside the designated study area, is the only county in the study area that has increased in population between 1990 and 2014. Statewide, the rural population has been decreasing since the mid-1900s, while the urban population has been increasing since the early 1900s (NEDED 2012b). For all but Lincoln County, populations are projected to continue to decrease through 2030 (NEDED 2009).

The designated study area includes eight incorporated villages with 2014 populations ranging from 18 persons in Brewster to 1,344 persons in Sutherland (Table 3.17-2). Only the villages of Hershey and Sutherland, which are both in Lincoln County, have grown in the last 25 years, while the population of Stapleton has remained relatively stable. Populations in the other five villages have decreased between 9.6 and 21.4 percent.

**Table 3.17-2. Population of Incorporated Villages, Selected Years, 1990–2014**

| City | County | 1990 | 2000 | 2010 | 2014 | Percent Change 1990–2014 |
|---|---|---|---|---|---|---|
| Brewster | Blaine | 22 | 29 | 17 | 18 | - 18.2 |
| Chambers | Holt | 341 | 333 | 268 | 268 | - 21.4 |
| Ewing | Holt | 449 | 433 | 387 | 383 | - 14.7 |
| Hershey | Lincoln | 579 | 572 | 665 | 663 | + 14.5 |
| Mullen | Hooker | 554 | 491 | 509 | 501 | - 9.6 |
| Stapleton | Logan | 299 | 301 | 305 | 300 | + 0.3 |
| Sutherland | Lincoln | 1,032 | 1,129 | 1,286 | 1,344 | + 30.2 |
| Thedford | Thomas | 243 | 211 | 188 | 200 | - 17.7 |
| **Total** | | **3,519** | **3,449** | **3,625** | **3,677** | **+ 4.5** |

Sources: U.S. Census Bureau (1990a, 2000, 2010a, 2015a)

### Income and Poverty

While median household income has increased over the last 25 years in all 14 counties, only two counties had higher household incomes than the statewide median of $51,672 during the 2006–2013 period: McPherson County ($54,926) and Thomas County ($55,089). For the other 12 counties, median household incomes ranged from $33,647 in Brown County to $48,158 in Lincoln County (Table 3.17-3).

**Table 3.17-3. Median Household Income and Percent Population below Poverty, 1990, 2000, and Five-year Estimates for 2006–2010 and 2009–2013**

| County | Median Household Income ($) | | | | Percent Below Poverty | | | |
|---|---|---|---|---|---|---|---|---|
| | 1990 | 2000 | 2006–2010 | 2009–2013 | 1990 | 2000 | 2006–2010 | 2009–2013 |
| Antelope | 18,447 | 30,114 | 37,058 | 43,518 | 19.4 | 13.6 | 11.4 | 11.0 |
| Blaine | 19,716 | 25,278 | 39,000 | 42,917 | 23.0 | 19.4 | 12.4 | 17.7 |
| Brown | 17,067 | 28,356 | 28,038 | 33,647 | 18.8 | 11.1 | 19.4 | 15.6 |
| Cherry | 18,962 | 29,268 | 43,431 | 45,464 | 22.2 | 12.3 | 7.8 | 13.0 |
| Garfield | 17,308 | 27,407 | 38,709 | 41,892 | 17.5 | 12.6 | 13.4 | 13.0 |
| Holt | 20,059 | 30,738 | 43,452 | 44,427 | 15.2 | 13.0 | 7.8 | 10.2 |

| County | Median Household Income ($) | | | | Percent Below Poverty | | | |
|---|---|---|---|---|---|---|---|---|
| | 1990 | 2000 | 2006–2010 | 2009–2013 | 1990 | 2000 | 2006–2010 | 2009–2013 |
| Hooker | 18,682 | 27,868 | 38,750 | 39,327 | 11.3 | 6.9 | 6.6 | 12.8 |
| Lincoln | 25,915 | 36,568 | 45,181 | 48,158 | 12.1 | 9.7 | 10.1 | 11.4 |
| Logan | 21,250 | 33,125 | 45,192 | 44,417 | 13.4 | 10.5 | 5.6 | 12.1 |
| Loup | 17,933 | 26,250 | 34,219 | 38,125 | 16.4 | 17.7 | 19.1 | 25.8 |
| McPherson | 17,500 | 25,750 | 50,625 | 54,926 | 33.2 | 16.2 | 8.3 | 13.6 |
| Rock | 18,974 | 25,795 | 39,159 | 43,500 | 15.4 | 21.8 | 9.6 | 10.0 |
| Thomas | 17,273 | 27,292 | 48,250 | 55,089 | 20.8 | 14.3 | 9.7 | 7.7 |
| Wheeler | 22,604 | 26,771 | 37,222 | 38,807 | 14.2 | 20.9 | 12.8 | 16.0 |
| **Nebraska** | **26,016** | **39,250** | **49,342** | **51,672** | **11.1** | **9.7** | **11.8** | **12.8** |

Sources: U.S. Census Bureau (1990b, 2003, 2010b, 2013)

Poverty rates have varied over the last 25 years (Table 3.17-3). In 1990 and 2000, poverty rates for nearly all counties exceeded the statewide rate. For the 2006–2010 period, poverty rates in only five counties—Blaine, Brown, Garfield, Loup, and Wheeler counties—exceed the statewide rate. Poverty rates for the 2009–2013 period increased for most counties, likely reflecting effects of the 2008–2012 economic downturn. Half of the counties had poverty rates that were higher than the statewide average during this period, and the rates for all but one of the counties were above 10 percent. The exception was Thomas County, which had a poverty rate of 7.7 percent. The highest poverty rate for the 2009–2013 period was 25.8 percent in Loup County.

Per capita personal income increased for all counties from 2010 to 2014; however, a wide range of incomes and relative increases in incomes occurs between counties (Table 3.17-4). Wheeler County had the highest per capita income of the 14 study area counties for all 5 years. In 2010, nearly all the counties had incomes lower than the statewide average; only Antelope and Wheeler counties had higher incomes in 2010. In 2011 and 2013, eight counties had incomes higher than the statewide average, while four counties had incomes higher than the statewide average in 2012. In 2014, 12 of the counties had incomes higher than the statewide average; only Logan and Lincoln counties had incomes below the statewide average.

**Table 3.17-4. Per Capita Personal Income in the Analysis Area, 2010–2014**

| County | 2010 | 2011 | 2012 | 2013 | 2014 | Percent Change 2010–2014 |
|---|---|---|---|---|---|---|
| Antelope | $46,901 | $64,747 | $64,645 | $64,995 | $66,330 | 41.4 |
| Blaine | $36,131 | $51,877 | $38,480 | $48,763 | $69,036 | 91.1 |
| Brown | $34,036 | $42,791 | $43,673 | $50,929 | $60,491 | 77.7 |

| County | 2010 | 2011 | 2012 | 2013 | 2014 | Percent Change 2010–2014 |
|---|---|---|---|---|---|---|
| Cherry | $35,210 | $43,620 | $44,427 | $46,957 | $60,729 | 72.5 |
| Garfield | $32,231 | $44,277 | $42,379 | $45,346 | $50,518 | 56.7 |
| Holt | $37,681 | $47,988 | $49,806 | $49,812 | $49,971 | 32.6 |
| Hooker | $32,223 | $37,543 | $38,100 | $37,251 | $50,581 | 57.0 |
| Lincoln | $37,588 | $42,356 | $44,362 | $42,447 | $46,195 | 22.9 |
| Logan | $32,279 | $46,551 | $40,134 | $45,137 | $41,076 | 27.3 |
| Loup | $32,698 | $39,485 | $44,925 | $52,838 | $75,240 | 130.1 |
| McPherson | $28,829 | $40,775 | $39,964 | $41,426 | $79,900 | 177.2 |
| Rock | $37,711 | $54,721 | $57,475 | $56,858 | $79,579 | 111.0 |
| Thomas | $39,069 | $47,154 | $42,398 | $45,328 | $63,815 | 63.3 |
| Wheeler | $48,113 | $67,984 | $68,643 | $93,460 | $135,907 | 182.5 |
| **Nebraska** | **$40,023** | **$43,820** | **$45,578** | **$46,254** | **$47,557** | **18.8** |

Source: BEA (2014a)

Note: All dollar estimates are in current dollars (not adjusted for inflation).

Net earnings for the 14 analysis area counties totaled $2.5 billion in 2014, while 2014 net earnings for the entire state were $60 billion (BEA 2014b).

#### Racial and Ethnic Characteristics

Similar to the entire state of Nebraska, the 14 counties in the analysis area have small minority populations (Table 3.17-5). The proportion of the total population reported as White Alone, Not Hispanic or Latino, is lowest in Lincoln (88 percent) and Cherry (89 percent) counties and is 95 percent or higher in all the other study area counties, compared to a statewide proportion of 80 percent. With few exceptions, minority populations are smaller in the study area counties than they are statewide. Cherry County has a higher proportion of its population reported as Two or More Races compared to statewide, while Cherry, Hooker, and Logan counties have higher proportions of American Indian or Alaska Native Alone compared to statewide (Table 3.17-5). The relatively large proportion of American Indian or Alaska Native Alone in Cherry County (5.6 percent) is likely because of its proximity to the Pine Ridge Reservation (Oglala Sioux) and Rosebud Reservation (Rosebud Sioux), both located in southern South Dakota, and the panhandle region where Nebraska residents of the Oglala Sioux Tribe primarily reside.

**Table 3.17-5. Racial and Ethnic Characteristics in the Analysis Area, 2014**

| County | Total Population | White Alone | White Alone, Not Hispanic or Latino | Black Alone | American Indian or Alaska Native Alone | Asian Alone | Hawaiian and Other Pacific Islander Alone | Two or More Races | Total Hispanic or Latino | White Hispanic or Latino | Other Than White Alone, One Race or Combination of Races, Hispanic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antelope | 6,398 | 98% | 96% | 0.3% | 0.2% | 0.4% | 0% | 0.6% | 3.0% | 2.8% | 0.2% |
| Blaine | 504 | 99% | 99% | 0.2% | 0.2% | 0% | 0% | 0.8% | 0.2% | 0.2% | 0% |
| Brown | 2,941 | 98% | 97% | 0.2% | 0.5% | 0.2% | 0% | 1.1% | 1.2% | 1.1% | < 0.1% |
| Cherry | 5,762 | 91% | 89% | 0.4% | 5.6% | 0.3% | < 0.1% | 2.8% | 2.8% | 1.8% | 1.0% |
| Garfield | 2,003 | 99% | 98% | 0.3% | 0% | < 0.1% | < 0.1% | 0.5% | 1.3% | 1.3% | < 0.1% |
| Holt | 10,403 | 98% | 95% | 0.3% | 0.6% | 0.4% | 0.1% | 0.6% | 3.9% | 3.4% | 0.5% |
| Hooker | 728 | 97% | 96% | 0% | 2.1% | 0% | 0.1% | 0.8% | 1.4% | 1.2% | 0.1% |
| Lincoln | 35,815 | 96% | 88% | 1.0% | 0.9% | 0.9% | < 0.1% | 1.5% | 8.3% | 7.3% | 1.0% |
| Logan | 750 | 98% | 95% | 0.1% | 1.5% | 0.1% | 0% | 0.7% | 2.1% | 2.1% | 0% |
| Loup | 588 | 99% | 97% | 0.5% | 0.2% | 0% | 0% | 0% | 2.2% | 2.2% | 0% |
| McPherson | 498 | 98% | 97% | 0.4% | 0% | 0% | 0% | 1.4% | 1.6% | 1.6% | 0% |
| Rock | 1,443 | 98% | 96% | < 0.1% | 0.9% | 0.5% | 0% | 0.4% | 2.1% | 1.9% | 0.3% |
| Thomas | 687 | 99% | 97% | 0.1% | 0.4% | 0.3% | 0% | 0.6% | 1.7% | 1.7% | 0% |
| Wheeler | 766 | 99% | 98% | 0% | 0.1% | 0.5% | 0% | 0.5% | 0.9% | 0.9% | 0% |
| **Nebraska** | **1,881,503** | **89%** | **80%** | **4.9%** | **1.4%** | **2.2%** | **0.1%** | **2.0%** | **10.2%** | **8.9%** | **1.3%** |

Source: U.S. Census Bureau (2015b)

Note: Percentages based on total population.

#### 3.17.1.2 Economic Conditions

**Employment**

Labor forces in the analysis area counties generally follow total population patterns. Nearly half of the labor force in the study area counties is located in Lincoln County (18,969 persons in 2014). Five counties have labor forces between 1,200 and 6,000 persons: Antelope, Brown, Cherry, Garfield, and Holt. The other eight counties have labor forces of fewer than 900 persons (Table 3.17-6). Since 2010, labor forces for the analysis area counties have remained fairly stable.

For the most part, unemployment rates were relatively low (below 5 percent) for all of the analysis area counties and statewide between 2005 and 2014. 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. Unemployment rates in most analysis area counties were lower than the statewide rate during most years between 2005 and 2014. The exceptions were Blaine, Hooker, Loup, and Thomas counties, where unemployment rates were higher than the statewide rate during most years, and Brown County, where the unemployment rate was higher than the statewide rate from 2010 through 2014 (Table 3.17-6).

From February 2015 through January 2016, monthly unemployment rates for most analysis area counties were very low (3 percent or less), while rates for the state as a whole ranged between 2.5 and 3.4 percent. Blaine, Brown, Hooker, and Loup counties generally have higher monthly unemployment rates than other analysis area counties and the state overall (Table 3.17-7).

Ranching and farming account for more than 10 percent of full- and part-time employment in all analysis area counties, except Lincoln County. Ranching and farming account for more than 30 percent of employment in four counties: Logan (40.3 percent), Loup (37.1 percent), McPherson (35.7 percent), and Wheeler (31.2 percent) (Table 3.17-8). For all 14 analysis area counties, ranch and farm employment is higher than it is statewide (4.2 percent). Government employment also accounts for large portions of employment in the analysis area counties, ranging from 7.8 percent in Wheeler County to 22.1 percent in Logan County.

For several counties, retail trade also accounts for a large portion of employment. Antelope, Brown, Cherry, Holt, and Lincoln counties all have retail trade employment higher than 10 percent (Table 3.17-8). In Lincoln County, 14.3 percent of employment is in transportation and warehousing, and 14.2 percent is in health care and social assistance employment. However, most of the employment in these two categories is likely associated with the urban portions of Lincoln County that are outside the analysis area.

### Major Employment Industries in the Analysis Area

#### *Agriculture*

For the 14 analysis area counties, more than 90 percent of the total land area is used for agriculture, mostly as large ranches or farms (1,000 or more acres) (Table 3.17-9). More than 95 percent of each county's total agricultural land is used for ranching (mostly beef cattle) or growing crops. For the analysis area counties together, nearly 80 percent of agricultural land is used as pastureland/rangeland, 20 percent is used as cropland, and a small percentage is used for other agricultural activities.

Approximately 95 percent of the Sandhills is maintained as grasslands, primarily for beef production (cattle ranching). Grasses, available water, and range conservation combine to make this area one of the world's premier cow/calf production regions (NPPD 2015a). In 2012, Nebraska had the second-highest inventory of cattle and calves in the nation, and Lincoln (third), Cherry (fourth), Antelope (fifth), Holt (sixth), Brown (eleventh), and Wheeler (thirteenth) counties ranked near the top of the 93 counties in Nebraska with cattle and calves (USDA 2014a).

A few Sandhill ranches owned by local residents manage bison as well. Other livestock-related land uses include independently owned livestock feedlots and larger-scale confined livestock feeding operations (NPPD 2015a). Livestock other than beef is also managed in the analysis area, including hogs and pigs, horses and ponies, sheep and lambs, and layer chickens (USDA 2014b).

Major crops grown in the analysis area include forage (including hay), corn, and soybeans. Other crops include popcorn, wheat, sorghum, triticale, dry edible beans, and nursery stock (Table 3.17-9). Less than half of the cropland within the analysis area is irrigated (USDA 2014b). Within the designated study area, approximately 73 percent of the cropland is irrigated, primarily through the use of center-pivot irrigation. Other agriculture-related land uses include agricultural processing plants and storage facilities (NPPD 2015a).

Cattle ranching in the analysis area primarily involves cow/calf operations for beef production. Ranchers maintain cow herds that typically calve in February or March, and they sell the calves in the fall to generate income. Because calving occurs in late winter, calving areas with windbreaks (typically treed areas, such as shelterbelts) are necessary to protect the cows and calves from cold winter winds that can increase stress, health problems, and food consumption. In the study area, ranchers depend on the grasslands to feed their herds. The cattle feed primarily by grazing on grasslands year-round, although supplemental feeding (i.e., hay) may be necessary when grasses are dormant. Some ranchers also grow and harvest hay from their grasslands, either to feed their own herd or sell as a cash crop. To maximize forage available to their herds and minimize the need for supplemental feed, ranchers rotate their herds between pastures throughout the year, allowing previously grazed grasslands to regrow for subsequent grazing (or hay production). Additionally, pastures used by herds for winter grazing must provide access to shelter and watering facilities that can function in the winter.

**Table 3.17-6. Annual Labor Force and Unemployment Rate (Percent) in the Analysis Area, 2005–2014**

| County | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Force | Rate | Force | Rate | Force | Rate | Force | Rate | Force | Rate | Force | Rate | Force | Rate | Force | Rate | Force | Rate | Force | Rate |
| Antelope | 3,859 | 3.4 | 3,759 | 2.8 | 3,631 | 2.8 | 3,649 | 3.0 | 3,738 | 3.7 | 3,526 | 3.6 | 3,598 | 3.6 | 3,585 | 3.2 | 3,633 | 3.2 | 3,629 | 2.7 |
| Blaine | 285 | 3.9 | 270 | 3.0 | 238 | 3.8 | 244 | 4.9 | 261 | 5.4 | 258 | 5.0 | 280 | 5.4 | 284 | 5.3 | 273 | 5.1 | 266 | 4.5 |
| Brown | 1,923 | 3.2 | 1,903 | 2.9 | 1,813 | 2.6 | 1,847 | 2.7 | 1,839 | 3.1 | 1,461 | 4.7 | 1,465 | 4.6 | 1,455 | 4.1 | 1,442 | 3.9 | 1,435 | 3.4 |
| Cherry | 3,693 | 2.4 | 3,620 | 2.2 | 3,389 | 2.2 | 3,403 | 2.4 | 3,490 | 2.6 | 3,385 | 3.0 | 3,454 | 3.0 | 3,488 | 2.9 | 3,505 | 2.8 | 3,456 | 2.5 |
| Garfield | 1,068 | 3.0 | 1,050 | 2.6 | 1,037 | 2.5 | 1,054 | 2.6 | 1,086 | 2.9 | 1,202 | 3.1 | 1,206 | 3.4 | 1,222 | 3.0 | 1,237 | 3.2 | 1,216 | 2.6 |
| Holt | 6,218 | 3.1 | 6,157 | 2.7 | 6,038 | 2.6 | 6,138 | 2.7 | 6,240 | 3.1 | 5,832 | 3.6 | 5,942 | 3.4 | 5,980 | 3.2 | 6,034 | 3.1 | 5,995 | 2.7 |
| Hooker | 451 | 3.3 | 500 | 2.8 | 465 | 2.8 | 415 | 4.3 | 412 | 5.1 | 410 | 5.1 | 447 | 4.7 | 439 | 4.6 | 437 | 4.8 | 432 | 4.2 |
| Lincoln | 21,077 | 3.5 | 21,171 | 2.8 | 21,756 | 2.6 | 21,981 | 3.0 | 21,821 | 4.0 | 19,401 | 4.5 | 19,425 | 4.4 | 19,305 | 3.9 | 19,303 | 3.7 | 18,969 | 3.2 |
| Logan | 447 | 2.5 | 452 | 2.2 | 471 | 2.8 | 464 | 2.2 | 458 | 3.1 | 492 | 4.5 | 509 | 3.5 | 506 | 3.0 | 505 | 3.2 | 503 | 3.2 |
| Loup | 339 | 4.4 | 354 | 3.7 | 333 | 4.2 | 339 | 3.8 | 336 | 5.1 | 368 | 5.7 | 379 | 4.7 | 393 | 3.8 | 379 | 4.5 | 378 | 3.7 |
| McPherson | 291 | 2.1 | 287 | 2.1 | 300 | 2.0 | 310 | 2.3 | 292 | 3.8 | 353 | 2.8 | 366 | 2.5 | 361 | 3.6 | 373 | 3.8 | 378 | 2.9 |
| Rock | 937 | 3.0 | 950 | 2.3 | 877 | 2.6 | 848 | 2.8 | 878 | 3.0 | 891 | 2.8 | 899 | 2.7 | 881 | 2.5 | 889 | 3.0 | 883 | 2.6 |
| Thomas | 414 | 3.6 | 393 | 3.3 | 378 | 3.7 | 373 | 4.0 | 359 | 4.5 | 396 | 4.8 | 426 | 5.2 | 429 | 4.0 | 456 | 3.7 | 428 | 3.5 |
| Wheeler | 472 | 2.8 | 452 | 2.4 | 417 | 2.9 | 486 | 2.3 | 462 | 3.7 | 515 | 3.9 | 524 | 3.2 | 522 | 3.3 | 527 | 3.2 | 523 | 2.9 |
| **Nebraska** | **972,992** | **3.8** | **970,052** | **3.1** | **978,763** | **3.0** | **989,757** | **3.3** | **991,583** | **4.6** | **993,398** | **4.6** | **1,003,437** | **4.4** | **1,016,459** | **4.0** | **1,022,062** | **3.8** | **1,022,152** | **3.3** |

Source: BLS (2015)

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**Table 3.17-7. Monthly Unemployment Rate (Percent) in the Analysis Area by County, February 2015–January 2016**

| Month | Antelope | Blaine | Brown | Cherry | Garfield | Holt | Hooker | Lincoln | Logan | Loup | McPherson | Rock | Thomas | Wheeler | Nebraska |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| February 2015 | 2.8 | 4.6 | 3.2 | 2.2 | 3.0 | 2.5 | 4.5 | 2.7 | 2.6 | 2.6 | 2.1 | 2.5 | 3.2 | 2.3 | **3.2** |
| March 2015 | 2.8 | 3.5 | 3.5 | 2.2 | 2.4 | 2.4 | 4.1 | 2.7 | 2.6 | 2.6 | 1.6 | 2.4 | 2.9 | 2.3 | **3.1** |
| April 2015 | 2.2 | 4.3 | 2.9 | 2.2 | 2.1 | 2.1 | 3.2 | 2.5 | 2.6 | 2.9 | 1.8 | 1.8 | 3.2 | 2.3 | **2.8** |
| May 2015 | 2.1 | 3.8 | 3.4 | 2.2 | 2.2 | 2.1 | 3.2 | 2.5 | 2.5 | 3.4 | 1.6 | 2.0 | 3.1 | 2.4 | **2.9** |
| June 2015 | 2.3 | 4.6 | 4.0 | 2.5 | 2.43 | 2.3 | 3.3 | 2.9 | 2.4 | 4.2 | 2.3 | 2.4 | 2.9 | 2.3 | **3.2** |
| July 2015 | 2.2 | 3.7 | 4.1 | 2.2 | 2.3 | 2.2 | 3.1 | 2.8 | 2.1 | 2.8 | 2.6 | 2.7 | 2.5 | 2.4 | **3.4** |
| August 2015 | 2.1 | 3.8 | 3.4 | 2.0 | 1.8 | 2.2 | 3.1 | 2.5 | 2.5 | 2.1 | 1.8 | 2.6 | 2.6 | 2.6 | **3.0** |
| September 2015 | 2.0 | 4.7 | 3.1 | 1.8 | 1.7 | 1.9 | 3.3 | 2.4 | 2.6 | 2.5 | 1.9 | 2.7 | 3.0 | 2.6 | **2.8** |
| October 2015 | 2.2 | 4.9 | 3.5 | 2.3 | 1.8 | 2.2 | 2.8 | 2.6 | 2.4 | 3.1 | 1.9 | 2.4 | 2.3 | 1.9 | **2.7** |
| November 2015 | 2.1 | 4.5 | 3.5 | 2.0 | 1.8 | 1.9 | 2.6 | 2.4 | 3.6 | 3.0 | 2.9 | 2.1 | 2.1 | 2.1 | **2.5** |
| December 2015 | 2.7 | 4.0 | 4.0 | 2.2 | 2.1 | 2.3 | 3.9 | 2.6 | 2.6 | 3.8 | 2.4 | 2.6 | 2.1 | 2.0 | **2.9** |
| January 2016 | 3.5 | 4.8 | 5.0 | 2.6 | 2.9 | 2.6 | 5.4 | 3.5 | 3.1 | 4.8 | 1.9 | 3.2 | 3.1 | 1.8 | **3.4** |

Source: BLS (2016)

**Table 3.17-8. Total Full-Time and Part-Time Employment (Percent of Total Employment) in the Analysis Area by North American Industry Classification System Industry, 2014**

| Industry | Antelope | Blaine | Brown | Cherry | Garfield | Holt | Hooker | Lincoln | Logan | Loup | McPherson | Rock | Thomas | Wheeler | Nebraska |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranch and farm employment | 18.2 | 27.0 | 17.0 | 18.2 | 14.9 | 18.7 | 10.4 | 5.5 | 40.3 | 37.1 | 35.7 | 21.8 | 17.9 | 31.2 | 4.2 |
| Non-ranch and non-farm employment | 81.8 | 73.0 | 83.0 | 81.8 | 85.1 | 81.3 | 89.6 | 94.5 | 59.7 | 62.9 | 64.3 | 78.2 | 82.1 | 68.8 | 95.8 |
| Private non-ranch and non-farm employment | 71.5 | 57.4 | 62.8 | 67.0 | 75.2 | 70.4 | 76.3 | 81.0 | 37.6 | 46.4 | 51.0 | 61.2 | 61.2 | 61.0 | 82.1 |
| Forestry, fishing, and related activities | N/A | N/A | 2.5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0.9 |
| Mining | N/A | 0.0 | 0.8 | N/A | N/A | 0.9 | 0.0 | N/A | N/A | 4.3 | 0.0 | 0.0 | N/A | 0.0 | 0.3 |
| Utilities | N/A | 0.0 | N/A | N/A | 0.0 | N/A | 0.0 | 0.1 | 0.0 | 0.0 | N/A | 0.0 | 0.0 | N/A | 0.1 |
| Construction | 9.2 | N/A | 5.7 | 6.5 | 5.7 | 4.4 | N/A | 5.4 | N/A | 3.3 | 4.0 | N/A | N/A | 2.3 | 5.5 |
| Manufacturing | 2.6 | 3.5 | 2.1 | 2.0 | 4.6 | 2.9 | N/A | 1.6 | N/A | 4.5 | N/A | N/A | N/A | 1.1 | 7.9 |
| Wholesale trade | 5.9 | N/A | 6.7 | 3.6 | 9.4 | 5.0 | N/A | 2.8 | N/A | 2.4 | N/A | 5.9 | 0.0 | 6.9 | 3.6 |
| Retail trade | 10.2 | N/A | 13.7 | 13.0 | 9.4 | 10.8 | 5.7 | 12.8 | 4.4 | N/A | N/A | 5.9 | 9.3 | N/A | 10.4 |
| Transportation and warehousing | N/A | N/A | N/A | N/A | 4.2 | N/A | N/A | 14.3 | N/A | N/A | 7.5 | 4.7 | 3.6 | N/A | 5.0 |
| Information | 0.7 | 0.0 | N/A | 0.9 | 0.8 | 0.9 | N/A | 1.0 | N/A | 0.0 | N/A | N/A | 0.0 | N/A | 1.5 |
| Finance and insurance | 6.0 | N/A | N/A | 2.8 | N/A | 5.1 | N/A | 3.8 | N/A | N/A | N/A | 9.9 | N/A | N/A | 6.4 |
| Real estate and rental and leasing | 3.1 | 0.0 | N/A | 2.8 | N/A | 2.3 | N/A | 2.4 | 0.0 | 0.0 | 0.0 | 6.4 | N/A | 7.6 | 2.8 |
| Professional, scientific, and technical services | N/A | 2.2 | 2.0 | 3.3 | 2.8 | 1.7 | N/A | 3.0 | N/A | 2.9 | N/A | N/A | N/A | 1.4 | 4.9 |
| Management of companies and enterprises | 0.4 | 0.0 | N/A | N/A | 0.0 | 0.5 | 0.0 | 0.2 | 0.0 | N/A | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 |
| Administrative and waste management services | N/A | N/A | 1.8 | N/A | 1.2 | 1.6 | 3.7 | 2.4 | N/A | 0.0 | N/A | 1.6 | 0.0 | N/A | 5.0 |
| Educational services | 0.9 | 0.0 | 0.6 | 0.5 | N/A | N/A | N/A | 0.7 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | N/A | 1.8 |

| Industry | Antelope | Blaine | Brown | Cherry | Garfield | Holt | Hooker | Lincoln | Logan | Loup | McPherson | Rock | Thomas | Wheeler | Nebraska |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Health care and social assistance | 8.9 | N/A | 5.2 | 6.7 | N/A | N/A | N/A | 14.2 | N/A | N/A | 0.0 | 2.6 | N/A | 1.7 | 11.0 |
| Arts, entertainment, and recreation | 1.1 | 5.0 | N/A | 2.4 | N/A | 0.7 | N/A | 1.0 | N/A | N/A | N/A | N/A | N/A | 3.1 | 1.9 |
| Accommodation and food services | 2.9 | N/A | N/A | 8.3 | N/A | 4.7 | 3.4 | 8.4 | N/A | N/A | N/A | N/A | 8.9 | 3.1 | 6.2 |
| Other services, except public administration | 7.3 | N/A | 5.3 | 5.5 | 6.7 | 6.1 | N/A | 5.7 | 9.4 | N/A | N/A | 5.1 | N/A | N/A | 5.4 |
| Government and government enterprises | 10.3 | 15.6 | 20.2 | 14.8 | 10.0 | 10.9 | 13.3 | 13.5 | 22.1 | 16.5 | 13.3 | 17.0 | 20.9 | 7.8 | 13.7 |
| Federal, civilian | 0.6 | 4.8 | 0.9 | 1.3 | N/A | 0.6 | N/A | 1.1 | N/A | N/A | N/A | N/A | N/A | N/A | 1.3 |
| Military | 0.5 | N/A | 0.5 | 0.5 | N/A | 0.5 | N/A | 0.6 | N/A | N/A | N/A | N/A | N/A | N/A | 1.0 |
| State and local | 9.2 | 10.4 | 18.8 | 13.0 | 9.0 | 9.8 | 12.7 | 11.8 | 20.7 | 15.6 | 12.1 | 16.4 | 18.5 | 7.0 | 11.4 |
| State government | 0.7 | N/A | 2.2 | 1.3 | 1.5 | 0.7 | N/A | 1.7 | N/A | N/A | N/A | 1.3 | 3.4 | N/A | 2.7 |
| Local government | 8.5 | N/A | 16.5 | 11.7 | 7.6 | 9.1 | N/A | 10.0 | N/A | N/A | N/A | 15.2 | 15.1 | N/A | 8.7 |
| **Total employment** | **5,056** | **540** | **2,186** | **4,074** | **1,707** | **8,118** | **844** | **22,335** | **362** | **418** | **347** | **1,277** | **497** | **874** | **1,276,299** |

Source: BEA (2014c)

Notes: Bureau of Economic Analysis does not report farm and ranch employment separately and refers to both as “farm employment.”
Percentages based on total employment.
N/A – Employment estimate for individual industry was not available, either to avoid disclosure of confidential information or because fewer than 10 jobs were reported. Estimate is included in the total.

**Table 3.17-9. Characteristics of Agriculture in the Analysis Area by County, 2012**

| Characteristic | Antelope | Blaine | Brown | Cherry | Garfield | Holt | Hooker | Lincoln | Logan | Loup | McPherson | Rock | Thomas | Wheeler |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Land in ranches and farms (acres) | 475,017 | 402,530 | 725,395 | 3,756,545 | 345,908 | 1,414,445 | 436,820 | 1,423,398 | 330,151 | 282,989 | 470,820 | 644,551 | 367,535 | 357,134 |
| Percent total land area in county | 86.6 | 88.5 | 92.8 | 98.5 | 94.9 | 91.6 | 94.6 | 86.7 | 90.4 | 77.8 | 85.6 | 99.9 | 80.6 | 97.0 |
| Percent by land use | | | | | | | | | | | | | | |
| Pastureland and rangeland | 23.0 | 91.1 | 82.5 | 89.7 | 78.1 | 53.6 | 96.1 | 67.3 | 80.9 | 88.3 | 94.8 | 75.6 | 97.6 | 72.3 |
| Cropland | 72.4 | 8.1 | 15.1 | 9.5 | 20.4 | 42.5 | 3.6 | 30.4 | 18.6 | 10.4 | 4.3 | 22.8 | 2.2 | 25.5 |
| Other uses | 4.6 | 0.8 | 2.4 | 0.8 | 1.4 | 3.9 | 0.3 | 2.3 | 0.5 | 1.3 | 0.9 | 1.6 | 2.4 | 2.2 |
| Number of ranches and farms | 767 | 117 | 328 | 566 | 226 | 1,279 | 82 | 1,168 | 149 | 138 | 118 | 247 | 87 | 198 |
| Number with permanent pasture and rangeland | 399 | 96 | 258 | 485 | 179 | 856 | 74 | 767 | 120 | 116 | 109 | 202 | 73 | 150 |
| Average acres of permanent pasture and rangeland | 274 | 3,822 | 2,319 | 6,944 | 1,510 | 886 | 5,671 | 1,249 | 2,226 | 2,155 | 4,094 | 2,413 | (D) | 1,722 |
| Number with cropland | 629 | 68 | 196 | 368 | 150 | 1,010 | 24 | 779 | 97 | 96 | 53 | 188 | 42 | 150 |
| Average acres of cropland | 547 | 479 | 558 | 974 | 471 | 595 | 653 | 555 | 633 | 306 | 381 | 781 | 191 | 606 |
| Hired ranch/farm workers | 991 | 121 | 326 | 1,040 | 283 | 1,685 | 85 | 1,023 | 86 | 151 | 72 | 269 | 113 | 347 |
| Average per ranch/farm | 1.3 | 1.0 | 1.0 | 1.8 | 1.3 | 1.3 | 1.0 | 0.9 | 0.6 | 1.1 | 0.6 | 1.1 | 1.3 | 1.8 |
| Market value of agricultural products sold ($1,000) | 535,116 | 34,657 | 195,431 | 246,761 | 64,771 | 636,353 | 17,261 | 782,661 | 41,995 | 32,072 | 30,107 | 97,788 | 22,426 | 259,840 |
| Percent as livestock sales[a] | 52 | 84 | 80 | 68 | 65 | 48 | 89 | 66 | 38 | 76 | 80 | 60 | (D) | 86 |
| Percent as crop sales[b] | 48 | 16 | 20 | 32 | 35 | 52 | 11 | 34 | 62 | 24 | 20 | 40 | (D) | 14 |
| Number of cattle and calves | 112,756 | 43,542 | 121,860 | 261,834 | 44,054 | 228,446 | 21,307 | 267,865 | 28,823 | 29,362 | 36,247 | 91,469 | 26,151 | 113,174 |
| Top crops in terms of acreage | Corn[c] (178,567) soybeans for beans (115,272) forage[d] (22,527) popcorn (6,198) | Forage[d] (26,029) corn[c] (3,361) triticale (D) soybeans for beans (D) | Forage[d] (55,912) corn[c] (29,834) soybeans for beans (8,053) wheat for grain (D) | Forage[d] (286,223) corn[c] (29,091) soybeans for beans (3,052) dry edible beans, excluding limas (3,019) | Forage[d] (36,291) corn[c] (19,368) soybeans for beans (3,185) sorghum for silage (D) | Forage[c] (262,815) corn[c] (195,808) soybeans for beans (68,920) popcorn (15,732) | Forage[d] (12,101) | Corn[c] (210,745) forage[d] (85,956) soybeans for beans (42,392) winter wheat for grain (13,453) | Forage[d] (24,635) corn[c] (22,904) soybeans for beans (3,818) winter wheat for grain (859) | Forage[d] (17,677) corn[c] (5,397) soybeans for beans (2,268) wheat for grain (147) | Forage[d] (14,186) corn[c] (3,362) soybeans for beans (386) sorghum for silage (D) | Forage[d] (105,047) corn[c] (21,351) soybeans for beans (11,323) popcorn (D) | Forage[d] (4,361) corn[c] (1,898) nursery stock crops (D) | Forage[d] (44,499) corn[c] (27,661) soybeans for beans (9,101) sorghum for grain (D) |

Source: USDA (2014a, 2014b)

Notes: (D) – Withheld to avoid disclosing data for individual farms or ranches

[a] Includes nursery and greenhouse crops

[b] Livestock, poultry, and their products

[c] For grain and silage

[d] Land used for all hay and haylage, grass silage, and greenchop

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The market value of all agricultural products sold in 2012 was nearly $3 billion for the 14 counties in the analysis area (Table 3.17-9). Ranching is the primary agricultural use in the analysis area; the sale of livestock, poultry, and associated products generated about $1.9 billion in market value in 2012. The market value of crops sold in 2012 was about $1.1 billion.

#### *Government*

Government employment accounts for a larger portion of employment in the analysis area counties compared to other industries (except agriculture and retail trade), ranging from 7.8 percent in Wheeler County to 22.1 percent in Logan County (Table 3.17-8). In addition to Logan County, Blaine, Brown, Cherry, Loup, Rock, and Thomas counties have higher rates of government employment than the state as a whole. Most government employment in the analysis area counties is with local government agencies. Rates of state government, Federal government, and military employment are low (less than 5 percent) or nonexistent in the study area counties.

A large portion of local government employment in Nebraska and the analysis area counties is associated with primary and secondary education (NEDED 2014). Eight public school districts are located in the designated DEIS study area: Hershey Public Schools, Sutherland Public Schools, Stapleton Public Schools, McPherson County Schools, Thedford Public Schools, Mullen Public Schools, Chambers Public Schools, and Ewing Public Schools with a total enrollment of about 1,700 students in 16 schools (NPPD 2015a). Other local government employment includes government administration, public utilities, police protection, fire protection, and health and social services.

#### *Retail Trade*

For several counties, retail trade also accounts for a large portion of employment; Antelope, Brown, Cherry, Holt, and Lincoln counties all have retail trade employment higher than 10 percent (Table 3.17-8). Antelope County’s retail employment (10.2 percent) is close to the statewide rate (10.4 percent), while the rates for the other four counties (10.8 to 13.7 percent) are higher than the statewide rate. In Garfield County, wholesale and retail trade combined account for about 19 percent of full- and part-time employment.

The majority of retail businesses in the study area include convenience stores; feed, seed, automobile and machinery sales; service stations; retail stores; bars; restaurants; wineries; and art galleries. These businesses are located in or around communities and near the on- and off-ramps of I-80 (NPPD 2015a).

### Tax Revenues

Tax revenues in Nebraska are generated from a variety of sources, including local property taxes, state income taxes, state and local sales taxes, and county lodging taxes. These sources are discussed below.

Under Nebraska Administrative Code, Title 350, Chapter 41, *In Lieu of Tax Regulations*, NPPD is required to make payments in lieu of property taxes, aggregating 5 percent of the gross revenue derived from electric retail sales within the city limits of incorporated cities and villages served directly by NPPD. NPPD's in-lieu payments totaled $10,141,000 in 2014 (NPPD 2015e).

Nebraska's individual income tax is largely based on wages and salaries. Individual income taxes collected between 2009 and 2013 were substantially higher in Lincoln County than in the other study area counties (Table 3.17-10). Loup, McPherson, and Blaine counties have the lowest income tax totals during that period.

**Table 3.17-10. Individual Income Tax in the Analysis Area by County, 2009–2013**

| County | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|
| Antelope | $3,594,244 | $3,518,056 | $4,305,554 | $5,666,990 | $5,066,156 |
| Blaine | $373,605 | $274,671 | $335,083 | $327,121 | $270,499 |
| Brown | $1,294,434 | $1,374,718 | $1,743,805 | $2,337,185 | $2,058,171 |
| Cherry | $2,340,776 | $2,778,869 | $2,973,272 | $4,595,228 | $3,771,725 |
| Garfield | $837,395 | $1,045,996 | $1,180,994 | $1,285,034 | $1,347,953 |
| Holt | $4,933,356 | $5,521,370 | $6,287,581 | $8,168,910 | $7,589,914 |
| Hooker | $297,749 | $415,213 | $421,403 | $526,236 | $437,213 |
| Lincoln | $23,800,837 | $25,298,100 | $26,665,954 | $30,705,297 | $28,306,982 |
| Logan | $453,987 | $481,071 | $495,632 | $706,311 | $587,150 |
| Loup | $115,582 | $152,181 | $153,681 | $173,880 | $125,437 |
| McPherson | $110,871 | $119,979 | $214,456 | $201,839 | $202,056 |
| Rock | $666,964 | $704,254 | $776,861 | $1,313,547 | $1,001,465 |
| Thomas | $400,525 | $357,671 | $413,636 | $436,490 | $428,913 |
| Wheeler | $227,945 | $287,478 | $331,660 | $469,556 | $679,920 |
| **Nebraska** | **$1,504,214,236** | **$1,654,475,531** | **$1,747,269,160** | **$2,055,423,439** | **$1,978,927,984** |

Source: Nebraska Department of Revenue (2015a)

State sales taxes are collected in Nebraska on the purchase of non-food items (with other exemptions as specified by Nebraska statutes and regulations). None of the communities in the study area has enacted a local option sales tax. State sales taxes collected between 2010 and 2014 were substantially higher in Lincoln County than in the other study area counties (Table 3.17-11). Blaine, Loup, and McPherson counties collected the smallest amounts of sales taxes during that period.

**Table 3.17-11. State Sales Tax Revenue in the Analysis Area by County, 2010–2014**

| County | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Antelope | $2,214,012 | $2,409,525 | $2,680,957 | $2,683,825 | $2,483,879 |
| Blaine | $34,796 | $36,554 | $35,263 | $39,593 | $39,832 |
| Brown | $1,673,956 | $1,772,635 | $1,950,801 | $2,131,022 | $2,143,931 |
| Cherry | $2,946,501 | $3,146,898 | $3,252,215 | $3,670,454 | $3,937,955 |
| Garfield | $888,316 | $983,473 | $1,028,104 | $1,081,322 | $1,097,415 |
| Holt | $5,975,491 | $6,134,918 | $6,653,260 | $7,013,745 | $6,986,712 |
| Hooker | $459,994 | $471,865 | $458,425 | $504,361 | $560,473 |
| Lincoln | $24,204,877 | $24,961,306 | $26,256,082 | $26,265,698 | $26,184,302 |
| Logan | $156,458 | $170,352 | $154,573 | $222,568 | $195,878 |
| Loup | $50,391 | $59,958 | $70,307 | $68,575 | $67,377 |
| McPherson | $23,596 | $22,831 | $29,293 | $27,472 | $34,903 |
| Rock | $470,618 | $509,933 | $548,637 | $604,373 | $540,642 |
| Thomas | $285,392 | $298,397 | $305,788 | $314,602 | $379,616 |
| Wheeler | $124,188 | $141,003 | $186,888 | $186,405 | $210,823 |
| **Nebraska** | **$1,299,184,126** | **$1,377,466,874** | **$1,429,337,008** | **$1,507,276,736** | **$1,556,834,705** |

Source: Nebraska Department of Revenue (2015b)

Lodging taxes are collected by most of the counties in the analysis area (Table 3.17-12). The tax is imposed on total gross receipts charged for paid sleeping accommodations, including hotels, motels, bed and breakfasts, campgrounds (charges for RV pads or tent sites), and inns. The state collects a 1 percent state lodging tax to promote, encourage, and attract visitors to the state and enhance the use of travel and tourism facilities. Counties may impose a lodging tax of up to 4 percent to use for local visitor promotion and improvement activities. Of the 11 counties that collect lodging taxes, Cherry and Lincoln counties had the highest lodging tax revenues between 2010 and 2014, while Blaine County had the lowest (Table 3.17-12).

**Table 3.17-12. Lodging Tax Revenue in the Analysis Area by County, 2010–2014**

| County | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Antelope | $10,061 | $10,140 | $10,774 | $11,376 | $10,134 |
| Blaine | $653 | $599 | $759 | $1,064 | $527 |
| Brown | $15,449 | $16,800 | $17,860 | $17,750 | $18,753 |
| Cherry | $168,062 | $191,552 | $195,949 | $200,790 | $213,540 |
| Garfield | $15,303 | $18,590 | $18,850 | $16,992 | $21,278 |
| Holt | $39,771 | $79,860 | $93,723 | $89,724 | $97,386 |
| Hooker | $40,855 | $41,976 | $40,808 | $49,293 | $54,232 |
| Lincoln | $713,300 | $734,224 | $781,511 | $796,525 | $853,279 |

| County | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Logan | (A) | (A) | (A) | (A) | (A) |
| Loup | $6,046 | $6,207 | $6,307 | $9,262 | $7,956 |
| McPherson | (A) | (A) | (A) | (A) | (A) |
| Rock | N/A | $3,627 | $2,027 | $2,321 | $2,643 |
| Thomas | $22,015 | $18,927 | $22,190 | $21,516 | $21,316 |
| Wheeler | (A) | (A) | (A) | (A) | (A) |
| **Nebraska** | **$13,888,267** | **$14,243,715** | **$15,878,674** | **$16,572,557** | **$18,048,369** |

Source: Nebraska Department of Revenue (2015c)

Notes: (A) – County did/does not collect lodging tax.
N/A – Not available or none reported.

### Electrical Transmission System

Commercial and industrial operations depend on a stable and reliable supply of electricity. Without it, these businesses can suffer economic losses, close, or choose to relocate, affecting employment and tax revenues. Additionally, any potential for new businesses choosing to locate in the area would be lower without a stable and reliable supply of electricity, reducing opportunities for additional employment and tax revenues. Residential electricity customers may also be affected by unstable and unreliable supply, potentially having to spend money on fuel for diesel generators to supply electricity or choosing to relocate.

As discussed in Chapter 1, *Purpose and Need*, transmission capacity in the western region of Nebraska's high-voltage transmission network, which includes the study area, is fully allocated. There is no available existing transmission capacity to interconnect any new generating sources without exceeding limits for maintaining system stability and service reliability. Based on its load forecasts, the SPP has determined declines in electric service reliability could begin to affect residential, commercial, and industrial growth and development throughout the western region as soon as 2017 (NPPD 2015a). Declines in electric service reliability could also begin to affect existing residential, commercial, and industrial customers in the analysis area, as described above.

As discussed above, the analysis area is dominated by agricultural land uses, primarily pastureland/rangeland with some cropland; greater than 90 percent of total land acreage in the analysis area counties is ranch and farm land. Production and processing of agricultural products can be affected by reduced electric service reliability. The north-central Nebraska area consists of a high concentration of electric irrigation load (NPPD 2015f), and the analysis area includes agricultural processing plants (NPPD 2015a) that also require load. As an example, because of severe hot and dry weather conditions, electric load delivery issues in 2012 resulted in extreme peak load levels and unprecedented loads from irrigation demand, and load delivery issues arose because of limited transmission capacity (NPPD 2015f) (see Section 1.7.1 for a more detailed discussion of this issues).

NPPD supplies electricity to retail customers (those directly billed by NPPD) and wholesale customers (e.g., towns, other public power districts, and cooperatives). As a public corporation, its electricity rates are set on a not-for-profit, cost-of-service basis. Costs factored into the rates include generation, transmission, and distribution of electric power, as well as long-term debt payments on general revenue bonds used to finance capital projects. In the last 5 years (2012 through 2015), NPPD has increased average retail and/or wholesale rates 4 times: 6.75 percent in 2012, 3.75 percent in 2013, 0.5 percent in 2015 (wholesale only), and 3.8 percent in 2016 (wholesale only) (NPPD 2011, 2015e, 2015g, 2015h). However, Nebraska's average electric rates remain among the lowest of all 50 states, with homeowners spending around $3.52 per day for electricity on average (NPPD 2016g). Nebraska's major public utilities, including NPPD, have set renewable resources policies for the amount of renewable generation in their portfolios. NPPD's policy is to have 10 percent of its generation resources come from renewable resources by the year 2020. Legislative Bill 1048, signed by Governor Heineman on April 12, 2010, provides a pathway for the development and export of renewable energy for Nebraska's considerable wind resources. This legislation was designed to allow Nebraska to achieve its wind energy potential, participate in the clean energy economy, and provide meaningful employment and educational opportunities to Nebraskans. As indicated in the *Integrated Transmission Plan 10-Year Assessment Report*, Nebraska has significant need for the development of wind energy to meet current needs in the state, export needs into the SPP region, and provide transmission access to meet the intent of Legislative Bill 1048. Because the western region of Nebraska's high-voltage transmission network is fully allocated, currently no available transmission capacity exists to interconnect any new generating resources to support NPPD's renewable resources policy or the intent of Legislative Bill 1048.

### 3.17.2 Direct and Indirect Effects

This section describes the potential direct and indirect effects of the alternatives on socioeconomic conditions in the 14 analysis area counties over the short and long term. Analyses in this section compare how changes to NPPD's electrical system are expected to affect socioeconomic conditions in the analysis area counties under the No-action Alternative, Alternative A (construction of the R-Project with a combination of steel lattice towers and tubular steel monopole structures as described in Chapter 2), and Alternative B (construction of the Project with tubular steel monopole structures only, described in Chapter 2). Anticipated effects on socioeconomic conditions are assessed in terms of changes in population, employment and income, and tax revenues, as well as changes in electrical system capacity and reliability. Definitions for duration and intensity of socioeconomic impacts are described in Table 3.1-3.

***Jobs Definitions***

***Direct jobs** are those created to work on a project.*

***Indirect jobs** are those created to supply goods and services for a project.*

***Induced jobs** are those created in the broader economy from spending by direct and indirect workers.*

Comparisons of effects on socioeconomic conditions between the three alternatives are based on estimated costs and direct employment for construction of the proposed transmission line (Table 3.17-13) and expected future electrical system capacity and reliability with or without the proposed transmission line. Expenditures and jobs associated with construction of the proposed transmission line are expected to be temporary, lasting through a 21- to 24-month construction period.

**Table 3.17-13. Estimated Expenditures, Labor–related Costs, and Number of Created Jobs for Transmission Line Construction by Alternative**

| | No-action Alternative | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures[a] | Alternative B: Tubular Steel Monopole Structures Only[a] |
|---|---|---|---|
| Total costs ($ million) | 0 | 350 to 390 | 350 to 390 |
| Total non-labor costs ($ million) | 0 | 230 to 250 | 230 to 250 |
| Total onsite labor-related costs ($ million)[b] | 0 | 120 to 140 | 120 to 140 |
| Direct jobs (temporary only)[c] | | | |
| Number created | 0 | 300 to 360 | 300 to 360 |
| Average annual income per job ($ thousands)[d] | 0 | 167 to 200 | 167 to 200 |
| Indirect and induced jobs | | | |
| Number created[c] | 0 | 93 to 112 | 93 to 112 |
| Average annual income per job ($ thousands) | 0 | 25 | 25 |

Source: NPPD (2015i, 2016h)

[a] Based on a 21- to 24-month construction period, assuming an average of 150 workers for each of two crews on the two line segments, plus an average of 20 workers for 6 months on each of the three substations, plus NPPD on-site and engineering.

[b] Labor-related costs typically include employee compensation, including base pay, overtime, travel, per diem, benefits, and other adders.

[c] Jobs are considered temporary, lasting only through the construction period.

[d] Includes travel and per diem pay.

After the transmission line is energized, under both action alternatives, operation and maintenance would continue through the remainder of the 50-year permit period. However, operation and routine maintenance of the proposed transmission line, including emergency repairs, are not expected to noticeably affect socioeconomic conditions in the analysis area over the long term and are not considered further in this analysis. Operation and routine inspection and maintenance of the transmission line are expected to generate no new jobs and low expenditures. All routine maintenance and inspections would be performed by existing NPPD crews, and expenditures would be limited to food and lodging expenses for crews stationed at other NPPD locations and the purchase of any services, materials, and supplies not brought in from other NPPD locations. Additionally, routine scheduled maintenance and repairs would not begin until 30 years after the in-service date and would continue for the next 20 years of the life of the transmission line (NPPD 2015i). Unforeseen events requiring emergency repairs, such as damage from storms, would require additional labor and expenditures for short periods; however, the occurrence, location, and severity of damage from such events cannot be reliably predicted.

#### 3.17.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Consequently, because no new transmission facilities would be constructed, no expenditures and no new direct jobs would be generated by the Project. Because no new direct jobs would be created, no indirect or induced jobs would be created during the construction period to provide machinery and supplies for construction of the transmission facilities and services and supplies for construction workers. Additionally, no new income, sales, or lodging tax revenues would be generated during construction of the transmission facilities.

As discussed in Section 3.17.1.2, *Economic Conditions*, because the western region of Nebraska's high-voltage transmission network has no available existing transmission capacity to interconnect any new generating resources without exceeding limits for maintaining system stability and service reliability, declines in electric service reliability could begin to affect residential, commercial, and industrial growth and development throughout the western region, as well as existing residential, commercial, and industrial customers in the analysis area, as soon as 2017. Under the No-action Alternative, the R-Project would not be constructed to improve reliability, reduce congestion, and provide new transmission capacity for new energy development projects.

Under the No-action Alternative, the projected summer season electricity demands in the western half of the north-central Nebraska region, based on SPP's load forecast, would not be met over the 50-year permit period, leading to increased energy costs because of the continued dependence on local diesel generation resources to serve these loads on a system with very limited transmission capacity (see Section 1.7.1 for more detail). Also, without the proposed Project to strengthen the electrical system in north-central Nebraska, reliability of the electrical system would be reduced and could result in power outages to customers located within the analysis area. The No-action Alternative would indirectly affect existing socioeconomic conditions because residential, commercial, and industrial customers in the analysis area would not benefit from the improved electric reliability and capacity that would be provided by the proposed Project (NPPD 2015j).

A sustained electricity capacity shortfall would likely limit future development activities needed to accommodate agricultural-based load growth in north-central Nebraska, including electric irrigation load. Residential, commercial, and industrial growth and development throughout this region could begin to experience declines in electric service reliability as early as 2017. If the load forecast is greater than what is currently anticipated, service reliability would be affected earlier. Declines in service reliability would likely lead to lost productivity and declines in agricultural-based growth. Without Project construction, load growth in north-central Nebraska would be capped at the projected 2016 load level. No new load growth could be accommodated in the western half of north-central Nebraska, and transmission system reliability for the entire Nebraska region would be decreased (NPPD 2015j).

In addition to the potential for lost productivity and declines in agricultural-based growth, declines in service reliability and limited system capacity could adversely affect commercial and industrial operations, resulting in economic losses, closures, or relocations of operations outside the affected area. Loss of businesses or business productivity could reduce employment, income, and tax revenues in analysis area counties. Additionally, new businesses may choose not to locate in the analysis area without a stable and reliable supply of electricity, reducing opportunities for additional employment opportunities and increased tax revenues. Potential reductions in employment opportunities and wages could increase poverty and unemployment rates and reduce population by causing residents to move away to seek employment elsewhere.

Recent decreasing population trends in the analysis area may intensify because of an unstable and unreliable electricity supply. Reductions in population could then lead to further reductions in employment, especially in government (including primary and secondary education), retail trade, and other industries that provide services and supplies to residents in the analysis area.

#### 3.17.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

As summarized in Table 3.17-13, Alternative A, would create an estimated 300 to 360 temporary jobs associated with transmission line construction with an average annual income ranging from $167,000 to $200,000 (including travel and per diem pay). Total expenditures by NPPD to construct the line are expected to range between $350 and $390 million, and approximately $120 to $140 million of this amount would be for onsite labor-related costs (including base, overtime, travel, and per diem pay, as well as benefits).

Although construction would occur over a 21- to 24-month period, individual crews may be required for only a few months in a particular construction area before moving to another area on a subsequent phase of the Project. Additionally, construction would not be confined to one area or community. Workers would be spread out over nearly 225 miles with approximately 150 workers for each of two crews on the two line segments and 20 workers for 6 months each at the three substations (NPPD 2015k).

Although the proposed transmission line would be constructed to provide additional transmission system capacity for renewable energy development projects, no such projects are part of the proposed R-Project. Consequently, growth-inducing socioeconomic effects under Alternative A as a result of renewable energy development projects are not addressed in this analysis. However, to the extent future renewable energy projects trigger an environmental review process, project-specific effects of those renewable energy projects would likely be analyzed as part of that review process during project development. Additionally, Chapter 4, *Cumulative*

*Impacts*, addresses reasonably foreseeable future wind energy development based on currently available information as part of the analysis of cumulative effects.

### Direct Effects

Alternative A would result in direct socioeconomic effects within the analysis area, including:

- Temporary increase in population as a result of the influx of construction workers
- Temporary increase in income as a result of the influx of construction workers
- Potential temporary decrease in poverty rates as a result of the influx of construction workers
- Negligible increase in income, decrease in poverty rates, and increase in employment from NPPD's purchase and/or lease of approximately 500 acres of mitigation lands to be managed by a third party
- Potential temporary change in racial and ethnic characteristics as a result of the influx of construction workers
- Potential temporary increase in employment and decrease in unemployment during construction
- Minimal reductions in agricultural cropland production (including haying) from loss of land for structure placement and the Holt County Substation
- Reductions in livestock operations (grazing and haying) from conversion of grassland from transmission line structures, permanent access, and expansion of the Thedford Substation or land disturbance during construction or emergency repairs over the life of the Project
- Temporary increase in demand associated with spending on local goods, services, and construction materials and machinery
- Temporary increase in income tax revenues as a result of the influx of construction workers
- Temporary increase in sales taxes associated with spending on local goods, services, and construction materials and machinery
- Temporary increase in demand for temporary lodging facilities and lodging tax revenues as a result of the influx of construction workers
- Improved electric reliability and increased capacity
- Increased transmission capacity to support agricultural growth (farming, ranching, and processing)
- Increased transmission capacity to accommodate new wind energy development
- Potential permanent increase in retail and/or wholesale electricity rates

These direct effects are discussed in more detail below.

### Population

As discussed in Section 3.17.1.1, *Demographic Characteristics*, the 14 counties in the analysis area are predominantly rural in nature with small populations concentrated in incorporated villages and communities and populations decreasing over the last 25 years for most villages and counties. Because transmission construction requires specialized expertise and workforce, the estimated 300 to 360 construction workers expected for this Project would likely relocate to (or near) analysis area counties for the 21- to 24-month construction period, temporarily increasing the population in these counties during that time.

Temporary population increases from an influx of 300 to 360 construction workers would result in short-term, low- to moderate-intensity effects on populations in the analysis area. With populations ranging from 18 persons in Brewster to 1,344 persons in Sutherland, temporary population increases would likely be noticeable in the eight incorporated villages in the study area. However, workers would likely relocate to villages where lodging is available, or they may relocate to cities outside analysis area counties (such as North Platte in Lincoln County) to find lodging or take advantage of additional amenities offered in these larger cities. Temporary population increases in some villages may not occur for the entire 21- to 24-month construction period because some workers may relocate more than once within analysis area counties as construction proceeds along each segment.

### Income and Poverty

Alternative A could potentially result in a short-term, low-intensity increase in income in analysis area counties from the influx of specialized transmission line construction workers. The estimated average annual income for transmission line construction workers ($167,000 to $200,000, including travel and per diem pay) (Table 3.17-13) would likely be higher than the current incomes of most residents in the study area counties. These higher incomes could result in higher year-over-year increases in median household income and per capita income for counties where construction workers reside during construction, but this effect would be temporary and would not likely have a noticeable effect in the counties of the analysis area, given a total workforce of more than 30,000 persons in the analysis area counties (Table 3.17-6). Additionally, with total net earnings of $2.5 billion in the analysis area counties (BEA 2014b), estimated total income for transmission line construction workers ranging between $50 and $72 million would represent less than 3 percent of total earnings in the analysis area counties.

Construction under Alternative A could potentially result in a short-term, low-intensity decrease in poverty rates in the analysis area counties. Poverty rates in some counties could be directly affected if some 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 would be temporary, lasting until construction of the transmission line is complete.

Finally, to offset temporary and permanent impacts of the R-Project on occupied beetle habitat, NPPD would purchase and/or lease approximately 500 acres of mitigation lands. Effects from the purchase of lands for mitigation would be short-term and would likely reflect full market value of the lands acquired at the time of purchase, while effects from leasing would be long-term, with smaller payments likely occurring over the full term of the lease. The potential for creation of new jobs by a third party identified to manage the mitigation lands is not known but is expected to be minimal. Because of the small amount of land involved relative to the analysis area, as well as employment levels and total net earnings in the analysis area counties, acquisition and management of the mitigation lands would have a negligible effect on income and poverty rates in the analysis area counties.

#### *Racial and Ethnic Characteristics*

As described in Section 3.17.1.1, *Demographic Characteristics*, analysis area counties have small minority populations. The addition of 300 to 360 transmission line construction workers for the 21- to 24-month construction period would not likely result in a noticeable effect on racial and ethnic characteristics in the analysis area counties. Because the construction workers would likely leave the analysis area once the transmission line is completed, any potential changes in racial and ethnic characteristics would be short term.

#### *Employment*

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 percent) (Table 3.17-6), most of the construction workforce would likely come from outside the region. Because few local workers would likely be hired, and permanent jobs are not expected to be created in the analysis area as a result of the operation and maintenance of the proposed Project (NPPD 2015k), any potential increases in employment and decreases in unemployment associated with the transmission line would be short term and of low intensity, lasting until construction of the transmission line is complete. As noted above, the potential for creation of new jobs by a third party identified to manage the approximately 500 acres of mitigation lands that would be purchased and/or leased by NPPD is not known but is expected to be minimal and would have a negligible effect on employment in the analysis area.

#### *Agriculture*

Alternative A would result in both short- and long-term effects on agriculture. As discussed in Section 3.17.1.2, *Economic Conditions*, more than 90 percent of the total land area in the analysis area counties is used for agriculture, mostly as large ranches (1,000 or more acres) and some farms, and the market value of all agricultural products sold in 2012 in these counties was nearly $3 billion (Table 3.17-9).

During construction, potential short-term effects on farming in the ROW would include crop damage or interference with harvest operations (depending on the time of year for construction across specific fields), soil disturbance, and potential loss of production for one growing season as a result of construction activities and the transport of construction equipment and vehicles, restricting or preventing planting of lands in or adjacent to the ROW. Other potential short-term effects would include construction activities impeding access to certain fields or plots of land and obstructing farm vehicles and equipment. However, NPPD would work with landowners on a case-by-case basis to avoid interfering with farming operations during construction and would pay damages for any hay and crop production lost to construction. If any lands used for pastureland or hay production are disturbed and require reclamation, the loss of production could last longer than one growing season until reclamation is complete.

Potential short-term effects on ranching activities would include the need to move cattle during construction activities in areas where the ROW would cross pasture and rangeland, possible disturbance of livestock with construction noise and fugitive dust. Moving cattle during construction may also require ranchers to alter their grazing systems by taking certain pastures out of rotation during construction, which could affect their ability to efficiently feed their cattle and maintain productive grasslands. Additionally, loud noises during construction (from helicopters or implosive splicing) could stress cattle and calves or spook them, potentially resulting in injury to themselves or damage to pasture fences. NPPD would notify landowners prior to construction activities so if cattle were in the area they could be moved and would not be affected. Other potential short-term effects would include construction activities impeding access to certain pastures and obstructing ranch vehicles and equipment. However, NPPD would work with landowners to avoid obstruction to access.

Approximately 530 acres of dryland cropland, 173 acres of irrigated cropland, and 3,790 acres of pasture/rangeland would be located in the ROW of NPPD’s final route (NPPD 2015a). However, effects on agricultural lands in the ROW would not occur across the entire 4,493 acres. NPPD would locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas based on availability and landowner approval. Additionally, NPPD would prepare an Access Plan for the Service review to delineate location and types of access for each type of equipment allowed to travel on each type of access. Construction would temporarily disturb approximately 1,419 acres and permanently affect approximately 52 acres of agricultural land along with approximately 49 acres of ROW tree clearing (NPPD 2016i, 2016j). The majority of effects would be short term and would occur during construction activities. Temporary disturbance during construction would impact approximately 247 acres of dryland cropland, 37 acres of irrigated cropland, and 1,135 acres of pasture/rangeland for access, structure work areas, fly yards/assembly yards, construction yards/staging areas, pulling and tensioning, and distribution power line relocations (NPPD 2016j). Approximately 248 acres of additional agricultural land may be affected by emergency repairs (assuming 20 percent of temporary disturbance), although the amount of each agricultural land type affected cannot be predicted.

NPPD would offer to pay each landowner 80 percent of the fair market value of the land needed for the ROW. An easement would permit the landowner to continue the existing use of the land for most activities, such as agricultural operations, once construction is complete. However, because of safety considerations, buildings, structures, wells, or trees taller than a certain height would not be allowed in the ROW (NPPD 2015a). Substation areas have been acquired in fee from the landowners (NPPD 2015a). However, in cases where a landowner refuses to grant an easement for the ROW, NPPD would acquire that easement or land using eminent domain.

Long-term, direct loss of agricultural land would occur as a result of transmission line structure placement and construction of two substations. Approximately 27 acres of agricultural land would be permanently converted to non-agricultural use from transmission line structures (1.2 acres) and permanent access roads (26 acres) (NPPD 2015a). Construction of the expanded Thedford substation in Thomas County would permanently convert 13 acres of pasture/rangeland. Construction of the new substation in Holt County would permanently convert 12 acres of center-pivot irrigated cropland. Combined, permanent conversion of agricultural lands, including both cropland and pasture/rangeland, would be approximately 52 acres (NPPD 2016i).

Because ranchers rely on grasslands to feed their herds (grazing and hay production), the short-term effects (i.e., during construction) described above may last longer after construction if the disturbed grasslands cannot be successfully restored to pre-Project conditions or if pasture rotation for grazing and hay production cannot be restored following completion of construction activities. As discussed in Section 2.4.8, *Site Restoration*, NPPD would stabilize and revegetate temporarily disturbed areas and restore them within 3 to 5 years after construction. If restoration efforts are unsuccessful, NPPD would implement adaptive management measures specified in its Restoration Management Plan. For restoration of beetle habitat in the permit area, NPPD would also establish an escrow account to ensure successful restoration. Reduced grazing or hay production could subsequently affect ranchers' ability to maintain their pre-construction herd sizes or require them to lease other grazing lands or purchase additional supplemental feed. However, as previously noted, NPPD would pay damages for any hay production lost to construction.

Additionally, removal of any trees during construction that provide windbreaks for calving areas and/or winter pastures would reduce or eliminate the protection these windbreaks provide during winter months, potentially increasing stress, health problems, and food consumption. Outside the ROW, these effects would last until replacement trees grow enough to provide levels of protection similar to pre-Project levels. Alternatively NPPD would either microsite the power line to avoid calving areas or replace removed windbreaks with engineered fencing (panels) or other structures if the landowner desires to avoid loss of function. Inside the ROW, removal of trees, and any protection they provide as windbreaks, would be permanent, although NPPD would replace these with trees or structures located outside the ROW to avoid permanent loss of function. NPPD would work with landowners on a case-by-case basis when siting structure locations to avoid removing shelterbelts and other features that the landowners want NPPD to avoid.

The loss of productive farmland may result in financial impacts on farmers, but the amount of financial loss would depend on the type of crop because crop values vary from year to year. NPPD's payments to landowners for ROW easement and fee-purchase of lands for the Holt

County Substation would offset the financial loss. Additionally, once construction is complete, landowners would be able to continue the existing use of the farmland in the ROW that is not converted to non-agricultural use.

For ranchers, lost grazing land, lost hay production, and impacts to pasture rotation could result in financial impacts if additional grazing lands must be leased, surplus hay for sale is reduced, additional supplemental feed must be purchased, or herd sizes must be reduced. As for crops, livestock and hay values vary from year to year, and NPPD's payments to landowners would offset the financial loss. Financial impacts on ranchers may also occur from the loss or reduction of windbreaks in the ROW, including loss of calves and decreased health of cows and surviving calves that cannot be sheltered from cold winter winds. Additionally, ranchers would incur costs if any cattle or calves are injured or cause damage to fences if loud noises during construction (from helicopters or implosive splicing) spook a herd. However, as discussed above, NPPD would work with landowners to avoid, minimize, or mitigate (through replacement or compensation) removal of windbreaks or adverse effects on cattle from construction noise.

Continued reliability of electric service and increased transmission capacity would also support continued load growth to support agriculture (farming, ranching, and processing), which is a key economic driver in the analysis area. As noted in Section 3.17.1.2, *Economic Conditions*, the market value of all agricultural products sold in 2012 was nearly $3 billion for the 14 analysis area counties. Overall, the short-term and long-term effects of Alternative A are expected to be of low intensity for ranching and farming operations. The approximately 1,419 acres of agricultural lands that may be temporarily affected by construction activities and the approximately 52 acres of land that would be permanently converted to non-agricultural use constitute a very small fraction of the agricultural lands in the analysis area counties. Any financial loss for either short-term or long-term loss of agricultural uses would also be a small fraction of the market value of all agricultural products sold in the analysis area counties, which was nearly $3 billion in 2012, and would affect a small number of the ranches and farms located in the Project area.

#### *Retail Trade*

Project construction would generate a certain amount of economic activity. The presence of an estimated 300 to 360 construction workers over a 21- to 24-month period would generate additional sales of food, fuel, lodging, and services (primarily vehicle and equipment repairs). Construction activity would also require concrete, aggregate, lumber, and hardware items. Many of these materials would likely be purchased locally, contributing further to local sales, while most materials for the transmission structures and conductors would be shipped from manufacturers outside the region.

Revenues for local retail businesses would likely increase because construction workers would spend money in the local area and NPPD and its contractors would purchase construction materials and machinery. Because most of the construction workers are not expected to be permanent residents of the analysis area, their spending would likely be considerably less than any local employees that would be hired because the non-local construction workers would likely send a portion of their earnings to their home area. Additionally, NPPD and its contractors would likely purchase specialized construction materials and machinery from suppliers they typically use for ongoing electrical system operation and maintenance, and these suppliers may be located outside the analysis area. Overall, the spending would be short term and would likely have low-intensity socioeconomic impacts on analysis area counties.

#### *Government*

Because of the temporary nature of construction activities, few to no families are expected to accompany construction workers to the analysis area. As a result, construction of the Project would have negligible impacts on schools and enrollment, including primary and secondary education employment.

#### *Tax Revenues*

Property tax revenues of counties within the analysis area would not change as a result of Alternative A. As noted in Section 3.17.1.2, *Economic Conditions*, NPPD is required to make payments in lieu of property taxes based on gross revenue derived from electric retail sales within the city limits of incorporated cities and villages served directly by NPPD. Construction of the transmission line is not expected to directly increase NPPD's electric retail sales within these cities and villages, so no increase in in-lieu payments is expected.

Construction workers would pay income taxes while residing in the state during the 21- to 24-month construction period. The increase in income tax revenues would be temporary, while the transmission line is being constructed. Additionally, because income taxes are paid to the state, any increase in income tax revenues generated by construction workers would not directly benefit analysis area counties. Consequently, any effects on socioeconomic conditions in these counties from increases in income tax revenues would short term and of low intensity.

Any increase in spending within analysis area counties by construction workers on non-food items and by NPPD and its contractors for construction materials and machinery would increase the amount of sales taxes collected. Depending on exemptions allowed under Nebraska statutes and regulations, NPPD and its contractors would pay sales taxes on as much as $230 and $250 million, which is the amount estimated for non-labor-related construction costs. However, the increase in sales tax revenues would be temporary, while the transmission line is being constructed. Additionally, because none of the communities within the analysis area counties have enacted a local option sales tax, sales tax revenues generated from additional Project-related spending would be collected by the state and would not directly benefit communities in these counties. Consequently, any effects on socioeconomic conditions in analysis area counties from increases in sales tax revenues would be short term and of low intensity.

Because most of the 300 to 360 construction workers are not expected to be permanent residents of analysis area counties, they would likely stay in hotels and other types of lodging during the 21- to 24-month construction period. For those 11 analysis area counties that collect local lodging taxes, the influx of construction workers staying in such accommodations would increase lodging tax revenues. Overall, the increase in lodging tax revenues would be short term, lasting as long as construction workers are staying in accommodations throughout the analysis area counties while the transmission line is being constructed. For Lincoln and Cherry counties, which have the highest annual lodging tax revenues, increases would likely have low-intensity socioeconomic impacts. For the other nine counties, increases would likely have low- to moderate-intensity socioeconomic impacts, depending on the number of construction workers staying in each county and the duration of those stays.

#### *Electrical Transmission System*

Alternative A would provide an increase in the load-serving capacity to accommodate the long-term electrical needs of the north-central Nebraska region, including within the analysis area. Load growth projected by SPP would be accommodated and the reliability of the regional transmission system would be increased to better serve the electricity needs of the analysis area counties for residents, commercial and industrial operations, and agricultural activities, including irrigation and processing. The continued reliability of electric service and increased transmission capacity would also support continued growth of load for agriculture (ranching, farming, and processing), which is the key economic driver in the analysis area. Implementation of Alternative A would result in a moderate-intensity impact because retail and wholesale customers in the analysis area counties that are served by the western Nebraska area transmission system could experience more reliable electrical service.

Increased reliability and capacity of the region's transmission system as a result of Alternative A would also accommodate new renewable energy development to meet NPPD's policy of having 10 percent of its generation resources come from renewable resources by the year 2020, as well as the intent of Legislative Bill 1048 to develop Nebraska's wind energy potential, participate in the clean energy economy, and provide meaningful employment and educational opportunities to Nebraskans. The impact intensity resulting from Alternative A accommodating new renewable energy development would be low because there would be no associated impacts resulting from Alternative A by itself. Any socioeconomic impacts would be generated by new renewable energy development projects once they are developed. Additional discussion of these effects is provided in Chapter 4, *Cumulative Effects*.

NPPD wholesale and retail electricity customers would likely experience long-term electricity rate increases to fund project development and implementation of the HCP. The proposed R-Project, as an SPP project, is expected to be financed from General Bonds with a substantial amount of the debt service to be reimbursed by SPP. Costs that are not covered by the SPP would be included in the annual rate setting budgets of NPPD (NPPD 2015i). At this time, not all costs for development of the Project and implementation of the HCP are known; therefore, NPPD cannot forecast what rate increases may be as a result of this Project. Because any retail and wholesale rate increases affect all of NPPD's retail customers and customers of NPPD's wholesale partners, respectively, any increases resulting from Alternative A would be noticeable and have a moderate-intensity impact. However, because the amount of the rate increases cannot be forecast, the level of impact on economic conditions cannot be predicted. Larger increases would have more of an economic impact on residences and businesses than smaller increases, especially for those residents or businesses with limited ability to absorb such increases.

### Indirect Effects

In addition to the direct effects described above, Alternative A would also result in indirect socioeconomic effects.

Spending by NPPD and its contractors for construction materials, such as concrete, aggregate, lumber, and hardware items, and spending by construction workers on food, fuel, lodging, and services would increase revenues at local businesses. This increased business activity would create an estimated 93 to 112 indirect and induced jobs with an average annual income of $25,000 (Table 3.17-13); however, these additional jobs would be temporary, lasting until construction of the transmission line is completed. Given the small number of new jobs that would be created, compared to a workforce of over 30,000 persons in the study area counties (Table 3.17-6), the low estimated average annual income compared to the median and per capita incomes for the study area counties (Tables 3.17-3 and 3.17-4, respectively), and the temporary nature of the jobs, effects on socioeconomic conditions (population, income and poverty, employment [especially retail trade] and unemployment, and tax revenues) are expected to be short term and of low intensity in the study area counties.

As discussed in Section 3.17.1.2, *Economic Conditions*, local lodging tax revenues are used by counties that collect them to enhance the use of travel and tourism facilities. With an estimated 300 to 360 construction workers paying for lodging during the 21- to 24-month construction period, those study area counties that collect local lodging taxes and host construction workers would see a temporary increase in lodging tax revenues. Increased revenues would provide opportunities for those counties to further enhance the use of their travel and tourism facilities, which could increase economic benefits generated by those facilities. While the increase in lodging tax revenues resulting from construction of the proposed transmission line would be short term, potential increases in economic benefits from enhanced travel and tourism facilities could be short term or long term. The increases in economic benefits would likely be of low to moderate intensity, depending on lodging tax revenues generated by construction workers staying within each county and the types of any travel and tourism facility enhancements funded by those tax revenues.

In addition to increasing transmission capacity and reliability of the regional transmission system to better serve NPPD’s existing customers, the improvements could make the analysis area attractive for additional growth opportunities, such as agricultural production and processing and new development opportunities. New growth and development would likely generate new economic activity over the long term, including additional employment opportunities and spending on local goods, services, and lodging in the analysis area. New economic activity may result in population increases and an increased need for government services, including primary and secondary education. However, because of the rural nature of the analysis area counties and decreasing populations in most of the analysis area counties, effects on socioeconomic conditions are expected to be of low intensity.

#### 3.17.2.3 Alternative B: Tubular Steel Monopole Structures Only

As described in Chapter 2, Alternative B would be identical to Alternative A, except NPPD would construct the R-Project transmission line using tubular steel monopoles throughout the entire 225-mile length of the line, rather than using a combination of steel monopoles and lattice towers. The draft HCP measures would also be the same, although NPPD would purchase and/or lease more occupied beetle habitat for permanent protection to be managed by a third party (at least 660 acres compared to a least 500 acres under Alternative A).

For the construction period, total costs, and the number and sizes of work crews, construction using only steel monopoles are not expected to differ from construction using a combination of steel monopoles and lattice towers. Consequently, as shown in Table 3.17-13, estimated expenditures, labor-related costs, and number of jobs created under Alternative B would be the same as Alternative A. Reductions from eliminating use of helicopters for lattice tower installation (but not other activities), corresponding support operations, and decreases in foundation construction costs would be offset by additional costs for increased labor needed for increases in matting requirements, difficulty installing monopoles and foundations in areas with limited access, and restoration efforts, as well as increased material costs for the monopoles (NPPD 2016h).

**Direct Effects**

Because estimated expenditures, labor-related costs, and number of jobs created under Alternative B would be the same as those under Alternative A, overall effects on demographic conditions and most economic conditions would be the same as those described under Alternative A. However, while specific effects at the county or village/community scale cannot be predicted, the locations where the effects described under Alternative A would occur may vary between the two action alternatives. Under Alternative B, lodging and retail businesses closer to the segments where steel monopoles would be installed instead of lattice towers may generate higher revenues than under Alternative A because of the additional time and costs necessary to install steel monopoles and complete restoration efforts in those areas (Figure 2-11).

Under Alternative B, NPPD would purchase and/or lease at least 660 acres of occupied beetle habitat compared to at least 500 acres under Alternative A. Any effects on socioeconomic conditions from the purchase and/or lease of these lands and third-party management, would be negligible, as under Alternative A, because of the small amount of land involved relative to the study area counties and the minimal potential expected for creation of new jobs by a third-party manager.

For agriculture, the types of effects and how NPPD would address those effects, as described under Alternative A, would be the same under Alternative B. However, the magnitude of effects would increase somewhat under Alternative B due to greater temporary and permanent land disturbances associated with steel monopole construction in place of lattice tower installation. Construction under Alternative B would temporarily disturb approximately 1,871 acres and permanently disturb 77 acres (see Table 3.1-4), compared to 1,458 acres and 52 acres, respectively, under Alternative A. Under Alternative B, temporary impacts on agricultural land would decrease for dryland cropland (209 acres), not change for irrigated cropland (37 acres), and increase for pasture/rangeland (1,323 acres), compared to Alternative A (NPPD 2016j). The 25-acre increase in permanent disturbance would result from the conversion of agricultural land to non-agricultural use from additional permanent access for steel monopole installation. There would be no change from Alternative A in the amount of agricultural land converted to non-agricultural use for the Thedford Substation expansion or construction of the new substation in Holt County, and the amount of tree clearing within the ROW would also not differ from Alternative A.

Without installation of lattice towers, heavy-lift helicopters would not be used under Alternative B, although smaller helicopters would still be used for various construction activities, and to support inspection and management of the R-Project by NPPD and string wire. The reduction in helicopter use may decrease the risk of stressing or spooking cattle and calves compared to Alternative A. However, as under Alternative A, NPPD would coordinate with landowners prior to construction activities so that cattle and calves could be moved.

The overall short-term and long-term effects of Alternative B are expected to be of low intensity for farming and ranching. The approximately 1,871 acres of agricultural lands that may be temporarily affected by construction activities and the approximately 77 acres that would be permanently converted to non-agricultural use constitute a very small fraction of the agricultural lands in the study area counties. Any financial loss for either short-term or long-term loss of agricultural uses would also be a small fraction of the market value of all agricultural products sold in the study area counties, which was nearly $3 billion in 2012, and would affect a small number of the farms and ranches located in the study area.

#### Indirect Effects

Indirect effects under Alternative B would be the same as those described under Alternative A. However, similar to direct effects, where the effects described under Alternative A would occur at the county or village/community level may vary based on changes in how labor and local expenditures would be distributed along the route as a result of replacing lattice towers with steel monopoles.

### 3.17.3 Avoidance, Minimization, and Mitigation Measures

NPPD would implement the following measures under Alternative A and Alternative B to avoid, minimize, or mitigate effects on socioeconomic conditions, primarily farming and ranching:

- Complete and submit to the Service for review a final Access Plan that delineates the location and types of access for each structure and the type of equipment allowed to travel on each type of access, once ground-based inspection of potential access is completed.
- Site structures to avoid removal of shelterbelts and other features on a landowner case-by-case basis.

- If a shelterbelt cannot be avoided, construct a comparable replacement windbreak (e.g., wood or metal) outside the ROW, but in the same pasture, if the landowner so desires.
- Work with landowner(s) to compensate for damages if any portion of a pasture cannot be used during construction.
- Grade sites in cultivated agricultural areas following completion of construction activities to approximate original contours and compensate affected landowners for any crop damage.
- Avoid or mitigate for lost hay production and grazing until disturbed areas are fully restored.
- Locate construction yards, fly yards, and staging and assembly areas in previously disturbed areas based on availability and landowner approval.
- Implement the Restoration Management Plan that includes monitoring provisions, following the Service's review and approval to ensure permit requirements are met and successful restoration is achieved.

### 3.17.4 Effects Summary

Implementation of the R-Project under either action alternative would result in mostly short-term, low-intensity effects on socioeconomic conditions when considering implementation of the avoidance, minimization, and mitigation measures discussed above. These effects would primarily occur during the construction phase, and the majority of them would be neutral over the long term and beneficial over the short term, including temporary increases in population, income, spending, employment, and tax revenues. Additionally, increased local lodging tax revenues generated by construction workers could result in longer-term, low- to moderate-intensity, local economic benefits through temporary increased funding to enhance the use of travel and tourism facilities.

Over the long term, the conversion of a small amount of agricultural land (including both farm and ranch land) to non-agricultural use from Project construction would result in a low-intensity, adverse effect. Conversely, the increase in load capacity and reliability of the electrical transmission system would likely result in a moderate-intensity, beneficial effect on economic conditions due to the region-wide nature of such changes that would affect all electric customers in the western Nebraska area transmission system. For farming, short-term effects of low intensity would include the loss of crop lands during construction and interference with harvest operations or access to fields. For ranching, short- and long-term effects of low intensity could occur as a result of the disturbance of grasslands used for cattle grazing or hay production (until restoration is complete), loss of pasture use during construction, and possible loss of function from windbreaks removed from the ROW that shelter cows and calves during winter months. However, impacts on farming and ranching would be mitigated by NPPD through coordination, compensation, replacement of removed windbreaks on a case-by-case basis, implementation of the Restoration Management Plan, and establishment of an escrow account for restoration of disturbed beetle habitat within the permit area. Implementation of Alternative A would not significantly affect socioeconomic resources.

Compared to Alternative A, most socioeconomic effects under Alternative B would be the same, although the distribution of effects among counties and villages/communities may vary based on where steel monopoles would be constructed instead of lattice towers. Effects on agriculture would be slightly higher (but still of low intensity) based on increased temporary and permanent disturbance of agricultural lands, although the potential risk of stressing or spooking cattle and calves from helicopter use during construction would be less. Implementation of Alternative B would not significantly affect socioeconomic resources.

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## 3.18 Environmental Justice

Discussions in this section assess the potential for disproportionately high and adverse effects of the DEIS alternatives on environmental justice populations. Environmental justice populations that could potentially be disproportionately affected by the alternatives are described in Section 3.18.1, *Affected Environment*. Potential disproportionately high and adverse effects of the alternatives (including the No-action Alternative) on these environmental justice populations are evaluated and compared in Section 3.18.2, *Direct and Indirect Effects*.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires each Federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Executive Order 12898 further stipulates that the Federal agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin.

Evaluating whether a proposed action has the potential to have disproportionately high and adverse impacts on minority and/or low-income populations typically involves: 1) identifying any potential high-intensity and adverse human health or environmental impacts of the R-Project, 2) identifying any minority or low-income populations in areas where those potential high-intensity, adverse impacts could occur or any communities that use or depend on resources for which high-intensity and adverse impacts would potentially occur, and 3) examining the spatial distribution of any minority or low-income populations relative to the potential high-intensity and adverse impact areas to determine whether they would be disproportionately affected by these impacts.

### 3.18.1 Affected Environment

The regional setting, as well as demographic and economic conditions in the 14 counties of the study area, are described in Section 3.17, *Socioeconomics*. The north-central portion of Nebraska is mostly rural in character, sparsely populated, and dominated by agricultural land uses, primarily pastureland/rangeland with some cropland in the North and South Platte Rivers area and the eastern edge of the study area. Small populations are concentrated in incorporated villages and unincorporated communities located primarily along major transportation routes. Except for Lincoln County, county and village populations have decreased over the last 25 years. Poverty rates have varied over the years but exceed 10 percent for many counties, and in recent years, they have been greater than 20 percent in Loup County. Similar to the entire state of Nebraska, these 14 counties also have 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. Census blocks and tracts were the smallest geographic areas with minority and poverty data, respectively, available along the entire proposed transmission route. For this evaluation, the study area for minority populations includes those census blocks that are within 0.5 mile of the proposed transmission route, and the study area for low-income populations includes those census tracts that are within 0.5 mile of the proposed transmission route. While other potential environmental justice populations are present elsewhere in the state, census tracts and blocks within 0.5 mile of the proposed transmission route are expected to capture those residents most likely to be adversely affected by the Project, through increased traffic, noise, and fugitive dust, as well as impacts on existing land uses and visual and aesthetic resources.

#### 3.18.1.1 Presence of Minority Environmental Justice Populations

Guidance provided by CEQ (1997) and USEPA (1998) identifies a minority community within the area affected by a proposed action as either: 1) a minority population that exceeds 50 percent 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 percent of the total population within the evaluated area or the minority population percentage is more than 10 percent greater than the benchmark or reference region.

***Minority Population***

…exceeds 50 percent of the total population or is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison.

The most recent racial and ethnic data available are from the 2010 Decennial Census. As noted above, the area of analysis for the environmental justice assessment of minority populations includes all the census blocks within 0.5 mile of the proposed transmission route and substations. The state, as well as the county in which each affected census block is located, was used as the reference areas to identify census blocks with minority populations, whichever had the lower threshold level.

For the 2010 Decennial Census, 367 blocks with a total population of 1,040 persons are located within 0.5 mile of the proposed transmission route and substations. Of these blocks, 233 (64 percent) had no population reported. Each of the other 134 blocks was evaluated as a potential minority population based on the percentage of the total population that identified themselves as something other than non-Hispanic White (those identifying their race as Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, Some Other Race, or Two or More Races, as well as those identifying their ethnicity as Hispanic or Latino).

Of the 134 populated census blocks in the area of analysis, 17 (13 percent) have a higher percentage of minority residents as compared to the state or the counties in which they reside. Eight census blocks are located in Logan County, three in Loup County, two each in Lincoln and Wheeler counties, and one each in Blaine and Thomas counties. Figure 3.18-1 shows the location of these census blocks along the proposed transmission route and substations. The blocks are widely distributed along NPPD's final route, except for a group of five census blocks in the village of Stapleton. Of the 216 residents living in these 17 census blocks, 36 were reported as something other than non-Hispanic White. Major minority groups in these census blocks include residents identifying as White with Hispanic or Latino ethnicity or as Some Other Race. Other minorities include Black or African American, American Indian or Alaska Native, Asian, or Two or More Races. All but two of the other 117 census blocks in the area of analysis had no minority residents. The two other census blocks with minority residents did not meet the threshold criteria for identification as a minority population.

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 Indian tribes that value, use, or depend on cultural, historical, or protected (e.g., treaty) resources that may be affected by a proposed action. While no Indian Reservations are located in the environmental justice population areas of analysis, there are several Indian tribes in other parts of the state and in other nearby states that may have lived in the areas of analysis in the past. As described in Section 3.10, *Cultural Resources*, the Service notified Indian tribes in October 2014 of its intent to prepare an EIS. To date, one tribe responded with concerns regarding viewshed impacts on cultural and historical properties and requested that it be contacted and provided reports for any inadvertent discoveries such as human remains. None of the other tribes contacted responded. However, known cultural and historical properties and any new properties found as a result of the proposed Project will be addressed following the processes described in Section 3.10, *Cultural Resources*.

#### 3.18.1.2 Presence of Low-income Environmental Justice Populations

> ***Poverty Area***
>
> …a census tract or other area where at least 20 percent of residents are below the poverty level.

CEQ (1997) and USEPA (1998) guidelines indicate that low-income populations should be identified based on the annual statistical poverty thresholds established by the U.S. Census Bureau. 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. The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau 2016). Poverty areas are used to identify low-income populations for this analysis.

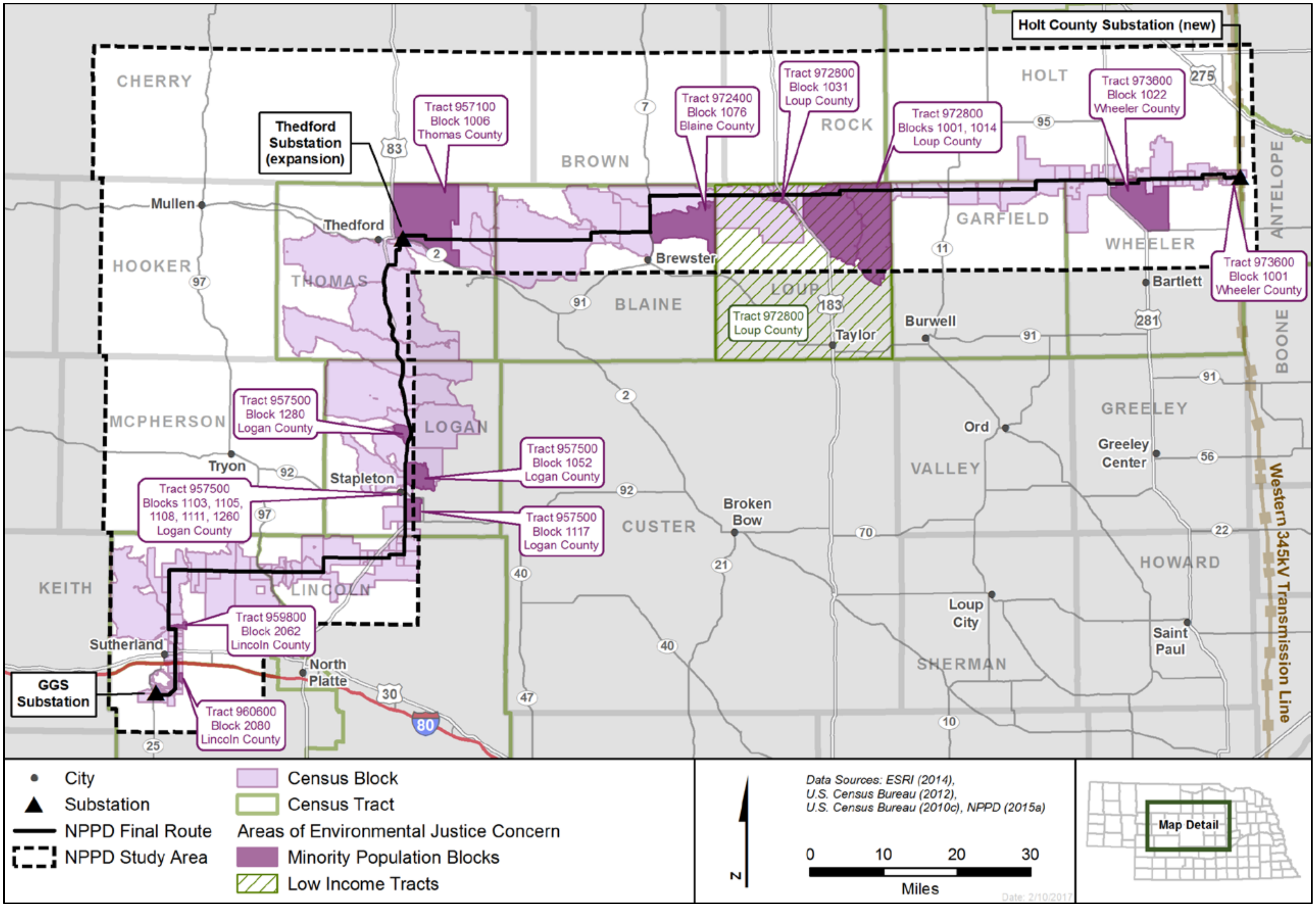


**Figure 3.18-1. Areas of Environmental Justice Concern along NPPD's Final Route**

Because income data were not collected during the 2010 Decennial Census, low-income populations were identified using poverty data from the 2012 American Community Survey, which provides averaged data over the 5-year period of 2008–2012. As for previous decennial censuses, poverty data are reported at the census tract level (using 2010 Census tracts); however, poverty rates are estimated based on survey data collected for the American Community Survey.

> ***Disproportionately High and Adverse Effects***
>
> …significant and adverse ecological, cultural, human health, economic, or social impacts of a proposed action on a minority population, low-income population, or Indian tribe that would (likely) be appreciably greater than such effects on the general population or other appropriate comparison group.

For the 2012 American Community Survey, 11 census tracts with a total population of 21,646 persons are located within 0.5 mile of the proposed transmission route and substations. Six of these tracts represent entire counties (Blaine, Garfield, Logan, Loup, Thomas, and Wheeler counties), while the other five represent portions of counties (Antelope, Holt, and Lincoln counties). Lincoln County is the only county with more than one census tract within 0.5 mile of the proposed transmission route and substations. The census tract representing Loup County is the only tract with a poverty rate above the 20-percent threshold for identifying a low-income population (23.4 percent). Figure 3.18-1 shows the location of this census tract along the proposed transmission route. The other tracts have poverty rates ranging between 4 percent and 19.3 percent.

### 3.18.2 Direct and Indirect Effects

This section describes the potential direct and indirect effects of the alternatives on the environmental justice populations identified in the previous section. Analyses in this section compare how construction, operation, and maintenance, including emergency repairs, of the transmission line under the two action alternatives are expected to affect environmental justice populations in the area of analysis, compared to the No-action Alternative. These effects are then evaluated to determine whether they would be disproportionately high and adverse compared to the general population in other census tracts and blocks within 0.5 mile of the proposed transmission route and substations. Anticipated effects on environmental justice populations are evaluated based on impacts of construction, operation, and maintenance of the proposed transmission line and substations on other natural and human resources discussed in this EIS, while implementing covered activities specified in Appendix C and accounting for the avoidance, minimization, and mitigation measures discussed in this DEIS.

Disproportionately high and adverse environmental effects on environmental justice populations are described by CEQ (1997) as including those significant and adverse ecological, cultural, human health, economic, or social impacts of a proposed action on a minority population, low-income population, or Indian tribe, when those impacts are interrelated to impacts on the natural or physical environment, that would be appreciably or would likely be appreciably greater than such effects on the general population or other appropriate comparison group, including cumulative or multiple adverse exposures from environmental hazards. Definitions for duration and intensity of disproportionately high and adverse effects on environmental justice populations developed for this Project are described in Table 3.1-2.

#### 3.18.2.1 No-action Alternative

Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not occur, and an HCP would neither be required nor implemented. Consequently, because no new transmission facilities would be constructed, the environment and human health would not be affected. Without construction of the R-Project, there would be no potential for disproportionately high and adverse impacts on minority and low-income populations along NPPD's final route resulting from construction, operation, or maintenance of the Project.

However, as discussed in Section 3.17, *Socioeconomics*, without the R-Project, declines in electric service reliability could begin to affect residential, commercial, and industrial growth and development throughout the western region of Nebraska's high-voltage transmission network as soon as 2017 (NPPD 2015a), including the 14 counties of the study area. Minority populations in the area of analysis would likely not be affected differently by any decreased electric service reliability than the general population. However, low-income populations in the area of analysis may have limited ability to respond to any decrease in employment opportunities or wages that could occur for commercial and industrial businesses that may be adversely affected by decreased electric service reliability.

#### 3.18.2.2 Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures

Issuance of a permit and subsequent development of the R-Project transmission line along NPPD's final route under Alternative A would result in direct effects on potential environmental justice populations in the short term and long term. Specific effects on potential environmental justice populations as a result of the various construction, operation, and maintenance activities associated with development of the transmission line under Alternative A are described below.

##### Direct Effects

Minority populations have been identified in 17 of the 367 census blocks within 0.5 mile of the proposed transmission route, and a low-income population was identified in 1 of the 11 census tracts within 0.5 mile of the proposed transmission route and substations. Because potential environmental justice populations of concern exist, it is necessary to: 1) identify any impacts of the Project 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. For this evaluation, residences within 0.25 mile of the proposed transmission route and substations were evaluated because individuals living in these residences would be most likely to experience high-intensity and adverse effects from the Project because of their proximity to the proposed transmission facilities.

Of the estimated 31 residences located within 0.25 mile of the proposed transmission route and substations, two are located in census blocks that were identified as potential environmental justice minority populations and one is located in the census tract that was identified as a potential environmental justice low-income population. The two residences in minority population census blocks are in Logan County, and the residence in the low-income census tract is in Loup County. None of these three homes is located near the existing Thedford Substation (Thomas County) that would be expanded or the new substation that would be constructed in Holt County.

Under Alternative A, potential environmental justice populations could be adversely affected by the potential Project-induced direct impacts on other resource areas (e.g., traffic, noise, air quality, visual resources, cultural and historic properties, agricultural land uses, and public safety). Traffic, noise, and air quality impacts are anticipated to be short term with noise and air emission dispersion limited to the vicinity of construction activities. Once construction is complete, impacts would be primarily limited to land use restrictions within the ROW and the presence of the transmission line and structures on properties. These residents may also experience adverse visual impacts; however, 28 additional residences not located in census blocks or tracts identified as potential environmental justice populations are also located within 0.25 mile of the proposed transmission route and substations that also would experience similar adverse effects. Therefore, the potential environmental justice populations identified for this analysis are not expected to be disproportionately affected.

As discussed in Section 3.10, *Cultural Resources*, there is a potential for high-intensity and long-term, adverse effects on cultural and historic properties from ground disturbance during construction and maintenance, as well as from visual impacts of the constructed facilities. Where adverse impacts are identified, NPPD would consult with the Service, NPS, and the Nebraska SHPO regarding measures to avoid, minimize, or mitigate the impacts. Because all residents within the APE for cultural resources would experience similar effects from these impacts, they are not expected to fall disproportionately on environmental justice populations.

As discussed in Section 3.8, *Land Use,* the majority of land use within the ROW is pasture/rangeland and cultivated croplands. Under Alternative A, approximately 1,419 acres of agricultural land would be temporarily disturbed during construction, and approximately 52 acres of agricultural land would be permanently converted to non-agricultural use where access roads and the transmission line's facilities, such as structures and substations, would be installed. As described in Section 3.17, *Socioeconomics*, some short-term, low-intensity impacts on farming and ranching activities could occur during construction, although NPPD would work with landowners to avoid, minimize, or mitigate such impacts. However, effects of temporary construction disturbance on grasslands may be short term or long term, depending on the time necessary to successfully re-establish the vegetation to pre-Project conditions. Because all landowners with properties inside the ROW could experience these effects, they are not anticipated to fall disproportionately on environmental justice populations.

As discussed in Section 3.16, *Public Health and Safety*, construction, operation, and maintenance of the R-Project could pose potential health and safety risks, including disruption of farming or ranching operations by structures, safety risks during construction, operation health hazards, such as electric shock and exposure to EMF, and ignition of wildfires. However, the R-Project is not expected to adversely affect worker or public health and safety, and, over the long term, adverse impacts from its operation are anticipated to be of low intensity. Because all residents within 0.25 mile of NPPD's final route and substations would similarly experience these effects, they are not anticipated to fall disproportionately on environmental justice populations.

After construction, operation and maintenance activities of the proposed transmission line could result in short-term and long-term effects on human health and the environment for the duration of the R-Project (e.g., noise and visual). The new transmission line would be maintained through regular inspections consisting of annual ground patrols or aerial patrols, and special patrols would be conducted following storm conditions. Additionally, NPPD would manage vegetation in the ROW for the safe operation, maintenance, and access to the transmission system.

Emergency repairs include those that require immediate response by NPPD to repair the line at any time. Depending on the scale of repairs required, short- and long-term effects from these activities on traffic, noise, air quality, land use, and public safety are expected to be less than or similar to the effects described for construction of the transmission line; however, these effects would be limited to the immediate vicinity where repairs would occur, rather than along the entire transmission line route. As discussed above for construction, effects are not anticipated to fall disproportionately on environmental justice populations.

#### Indirect Effects

Implementation of Alternative A may contribute positively to potential environmental justice populations over the short term through additional tax revenues to counties and increased employment opportunities generated during construction, although these effects are expected to primarily be of low intensity (Section 3.17, *Socioeconomics*). Additionally, increased electric system reliability and capacity could result in longer-term benefits if additional employment opportunities are created from development growth within the 14 counties of the study area. The intensity of these longer-term benefits would depend on the level of development growth and cannot be predicted, but is expected to be low to moderate.

### 3.18.2.3 Alternative B: Tubular Steel Monopole Structures Only

As described in Chapter 2, Alternative B would be identical to Alternative A, except NPPD would construct the R-Project transmission line using tubular steel monopoles throughout the entire 225-mile length of the line, rather than using a combination of steel monopoles and lattice towers. Because the transmission line ROW and substation locations would not differ from Alternative A, environmental justice populations potentially affected by the R-Project would be the same under Alternative B.

#### Direct Effects

Effects of R-Project construction, operation, and maintenance, including emergency repairs, under Alternative B on noise, air quality, and public safety are expected to be similar to those described under Alternative A, while effects on traffic, land use, and cultural resources may increase slightly compared to Alternative A. Overall, effects on these resources under Alternative B are expected to be of similar duration and intensity as described under Alternative A. Consequently, disproportionately high and adverse impacts on environmental justice populations are also not expected under Alternative B.

#### Indirect Effects

Under Alternative B, indirect effects would be of similar duration and intensity as Alternative A.

### 3.18.3 Avoidance, Minimization, and Mitigation Measures

No high-intensity, adverse effects have been identified that would fall disproportionately on environmental justice populations. However, NPPD would implement measures to avoid, minimize, and mitigate effects of either action alternative on environmental resources, as described elsewhere in this chapter, and these measures would also benefit environmental justice populations in the same manner as other populations.

### 3.18.4 Effects Summary

Implementation of the R-Project under either action alternative would result in short- and long-term, low-intensity effects on environmental justice populations in the area of analysis, but no disproportionately high and adverse effects. As is the case with the general population, the majority of adverse effects would occur during construction and would consist of traffic, noise, and air quality impacts, with noise and air emission dispersion limited to the vicinity of construction activities. Once construction is complete, impacts would be primarily limited to land use restrictions within the ROW and the presence of the transmission line and structures on properties. Compared to Alternative A, most adverse effects under Alternative B would be the same, although the distribution of effects among counties and villages/communities may vary based on where steel monopoles would be constructed instead of lattice towers. Implementation of the R-Project under either action alternative would not result in significant impact on environmental justice populations.

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# 4.0 CUMULATIVE IMPACTS

Cumulative impacts are defined as the "impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Based on the policy guidance and methodology originally developed by CEQ in 1997 and an analysis of current case law, a process based on four primary steps is employed.

- **Step 1, Identify Resources Affected—**In this step, each resource affected by the incremental impacts of any of the alternatives is identified. These are the same resources described in the affected resources sections of Chapter 3. If there are no impacts to the resource as a result of the alternatives being considered, then there is no cumulative impact.
- **Step 2, Establish Boundaries—**In identifying past, present, and reasonably foreseeable future actions to consider in the cumulative impact analysis, affected resource-specific spatial and temporal boundaries are identified. The spatial boundary is the area where past, present, and reasonably foreseeable future actions have taken place, are taking place, or could take place and result in cumulative impacts to the affected resource when combined with the impacts of the alternatives being considered. This boundary is defined by the affected resource and may be a different size than the proposed Project area. For many resources (e.g., soils and vegetation), impacts occur in or adjacent to the location of the alternatives, but for other resources (e.g., air quality), they also take into account the distances that impacts may travel and the regional characteristics of the affected resources. For example, impacts on water quality of a stream may include the watershed as the appropriate boundary for the cumulative impact analysis, whereas the analysis boundary for GHG emissions may be global. CEQ guidance suggests that analysis on natural systems should use natural ecological boundaries where practical. In this analysis, the delineated natural ecological boundaries are large and are considered for the cumulative impacts analysis when applicable; however, boundaries of lesser extent (e.g., areas of surface disturbance; stream crossings; individual incorporated villages) have also been used for the cumulative impacts analysis.

  The temporal boundary describes how far into the past and forward into the future actions should be considered in the impact analysis. Appropriate spatial and temporal boundaries may vary for each resource. The temporal boundary is guided by CEQ guidance on considering past action and a rule of reason for identifying future actions. The temporal boundary incorporates the sum of the effects of the alternative in combination with past, present, and reasonably foreseeable future actions, as impacts may accumulate or develop over time. The reasonably foreseeable future temporal boundary for the cumulative impacts analysis is generally considered to be 50 years from the time of Project implementation. While it is difficult to assess impacts beyond this time frame, it is acknowledged that the effects identified in the cumulative impacts analysis could continue beyond the 50-year horizon.

- **Step 3, Identify Cumulative Action Scenario—**In this step, the past, present, and reasonably foreseeable future actions to be included in the impact analysis for each specific affected resource are identified. These include Projects, activities, or trends that could affect human and environmental resources within the defined spatial and temporal boundaries. Past and present actions are generally accounted for in the analysis of direct and indirect impacts under each resource area (see Chapter 3) and carried forward to the cumulative impacts analysis. The future actions described in this analysis are those that are "reasonably foreseeable"; that is, they are actively proposed and planned; affect the same resources as the Project; and are funded for future implementation. Actions and issues raised during the scoping process are also considered. These actions fall within the spatial and temporal boundaries established in Step 2. These actions are identified considering guidance from CEQ, such as a document titled *Guidance on Consideration of Past Actions in Cumulative Effects Analysis* and current case law, such as Ecology Center v. Castaneda, 574 F.3d 652, 667 (9th Cir. 2009), where the court gave deference to CEQ's interpretation of NEPA and stated that as it relates to past actions, NEPA requires that an aggregated cumulative effects analysis that includes relevant past projects is sufficient. The agency need not catalog effects that are not truly significant to the area in question.
- **Step 4, Cumulative Impact Analysis—**The final step involves the analysis of the impacts of actions identified in Step 3 in addition to the effects of the action alternatives. These analyses also take into account the issues raised by the public and focus on the environmental effects associated with implementation of the project. The analysis covers the locations of impacts, the times they would occur, the level of impact expected, and the potential for short-term and long-term additive effects, resulting in the total cumulative impact for each resource. The completion of this process and its corresponding analyses result in a meaningful, defensible, and reasonable cumulative impact analysis.

## 4.1 Affected Resources Identified

The completion of this process and its corresponding analyses result in a meaningful, defensible, and exhaustive cumulative impact analysis. The issues to be addressed in the cumulative effects analysis were determined based on the identification of resources that would be directly or indirectly affected by the alternatives being considered for implementing either of the two action alternatives and that have the potential to combine with other past, present, or reasonably foreseeable future actions to produce a cumulative impact. If the analysis in Chapter 3 demonstrates there would be no direct or indirect impact to a resource, it was not included in the cumulative effects analysis because either of the action alternatives would not add to the cumulative impact. Table 4-1 summarizes the screening process and the rationale used to determine those resources that should be included in the cumulative impact analysis.

**Table 4-1. Summary of the Cumulative Effects of the Project**

| Environmental Resource Category | Potential Adverse Effects as Demonstrated in Chapter 3[a] | Cumulative Effects Analysis Required |
|---|---|---|
| Geology and Soils | Short-term and long-term, low-intensity, adverse effects during construction, operation, and maintenance, including emergency repairs | Yes |
| Water Resources | Short-term, low-intensity, adverse effects during construction; long-term, low-intensity effects during operation and maintenance, including emergency repairs | Yes |
| Wetlands | Short-term, moderate- to high-intensity, adverse effects during construction; long-term, low-intensity effects during operation and maintenance, including emergency repairs | Yes |
| Vegetation | Short-term, moderate- to high-intensity, adverse effects during construction; long-term, low- to moderate-intensity effects during operation and maintenance, including emergency repairs | Yes |
| Wildlife | Short-term, low- to moderate-intensity, adverse effects during construction; long-term, low- to moderate-intensity, adverse effects during operation and maintenance, including emergency repairs | Yes |
| Special Status Species | Short-term and long-term, negligible, low-, and moderate-intensity, adverse effects during construction, operation, and maintenance, including emergency repairs | Yes |
| Land Use | Long-term, low-intensity, adverse effects from Project operation and maintenance, including emergency repairs, as well as presence of transmission facilities in conservation easements | Yes |
| Recreation and Tourism | Long-term, moderate-intensity, adverse effects on NRI-listed river segments; long-term, low-intensity, adverse effects (visual disturbance) on users of other recreation areas during operation and maintenance, including emergency repairs | Yes |
| Cultural Resources | Long-term, high-intensity, adverse effects during construction, operation and maintenance, including emergency repairs | Yes |
| Transportation | Short-term, low intensity during construction; long-term, low-intensity, adverse effects during operation and maintenance | Yes |
| Visual and Aesthetics | Long-term, moderate- to high-intensity, adverse effects during operation and maintenance | Yes |
| Air Quality and Greenhouse Gas Emissions | Long-term, low-intensity, adverse effects during operation and maintenance | Yes |

| Environmental Resource Category | Potential Adverse Effects as Demonstrated in Chapter 3[a] | Cumulative Effects Analysis Required |
|---|---|---|
| Noise | Long-term, low-intensity, adverse effects during operation and maintenance, including emergency repairs | Yes |
| Hazardous Materials and Hazardous Wastes | Long-term, low-intensity, adverse effects during operation and maintenance, including emergency repairs | Yes |
| Public Health and Safety | Long-term, low-intensity, adverse effects during operation and maintenance, including emergency repairs | Yes |
| Socioeconomics | Long-term, low- to moderate-intensity, adverse effects during construction, operation, and maintenance, including emergency repairs | Yes |
| Environmental Justice | No high and disproportionate, adverse effects from construction, operation, and maintenance, including emergency repairs | No |

[a] Assumes avoidance, minimization, and mitigation measures are implemented.

## 4.2 Cumulative Effects Boundaries

In identifying past, present, and reasonably foreseeable future actions to consider in the cumulative impact analysis, affected resource-specific spatial and temporal boundaries are identified. The spatial boundary is the area where past, present, and reasonably future actions have taken place, are taking place, or could take place and result in cumulative impacts on the affected resource when combined with the impacts of the alternatives being considered. This boundary is defined by the affected resource and may be a different size than the proposed Project area. Table 4-2 provides a summary of cumulative impact boundaries by resource area. A detailed assessment of cumulative effect boundaries for each resource considered, including both spatial and temporal boundaries, are described further in the cumulative effects analysis section of this chapter.

**Table 4-2. Summary of the Cumulative Impact Boundaries**

| Affected Environmental Resource | Spatial Boundary | Temporal Boundary |
|---|---|---|
| Geology and Soils | Transmission line ROW, additional land area disturbed by construction and staging areas within the R-Project area and adjacent lands | Total construction period (2 years) for construction activities and emergency repairs; life of transmission line for operation and maintenance activities (50 years) |
| Water Resources | All watersheds crossed by NPPD’s final route and substation land areas. | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |

| Affected Environmental Resource | Spatial Boundary | Temporal Boundary |
|---|---|---|
| Wetlands | Wetlands potentially affected in the R-Project area. | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Vegetation | All Level III and Level IV Ecoregions within the boundaries of the R-Project study area. | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Wildlife | All counties associated with the R-Project study area where wildlife species could occur either in occupied or suitable habitat, or in stopover/flyover habitat. Exceptions include aquatic species (e.g., fish, herptofauna) in all watersheds associated with the R-Project study area; migratory bird species in all counties associated with the R-Project study area within the Central Flyway. | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Specials Status Species | All counties associated with the R-Project study area where special status species could occur either in occupied or suitable habitat, or in stopover/flyover habitat. Exceptions include Blanding's turtle, Topeka shiner, North American river otter, blacknose shiner, finescale dace, and northern redbelly dace in all watersheds associated with the R-Project study area; whooping crane, bald eagle, golden eagle, interior least tern, piping plover, and rufa red knot in counties associated with the R-Project study area within the Central Flyway. | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Land Use | Publicly owned and/or managed lands, private parcels, agricultural lands, center pivot irrigation systems, transmission lines, and conservation easement areas bordered or crossed by the R-Project ROW; occupied residences within 500 feet of the proposed R-Project area; towns or villages within 0.25 mile of the ROW | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Recreation and Tourism | Areas within 1 mile of the R-Project area; and/or extent of visual, air quality, water quality, traffic, and noise impacts whichever is greater | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |

| Affected Environmental Resource | Spatial Boundary | Temporal Boundary |
|---|---|---|
| Cultural Resources | Archaeological—Area of surface disturbance<br>Architectural—Extent of damage, destruction, or change in use or character of historic properties<br>NRHP-listed properties and historic trails—Area of surface disturbance, nearby areas susceptible to vibratory impacts, and properties and trail segments from which the project would be visible | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Transportation | Highways and roads used within 6 miles of the R-Project area | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Visual Resources and Aesthetics | The spatial area within which the Project (including transmission lines, tower structures, and substations) would be visible with an emphasis on locations within 3 miles of NPPD's final route (i.e., the effects analysis area) | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Air Quality and GHG Emissions | Regulated criteria pollutants—airshed in which the R-Project area will occur; GHG emissions—global | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Noise | The spatial boundary contained to all areas in hearing distance of the R-Project area | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Hazardous Materials and Hazardous Wastes | Transmission line ROW and additional areas encompassed by construction and staging areas | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Public Health and Safety | Three hundred feet from the R-Project centerline and 300 feet around permanent access roads and substations | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |
| Socioeconomics | All counties and communities within the R-Project study area | Total construction period (2 years) for construction activities and emergency repairs; life of the transmission line (50 years) |

## 4.3 Cumulative Action Scenario

The following section provides an overview of past, present, and reasonably foreseeable future actions that have affected, are affecting, or have the potential to affect, the resources analyzed in the cumulative effects analysis. As stated in Chapter 1, wind development in Nebraska is curtailed by approximately 15 percent because of the lack of transmission lines. The R-Project would reduce this hindrance that would likely encourage future wind energy farms to be built. At this time, predicting when, where, and what size future wind farms would be built is speculative. While a number of wind energy projects have been announced and discussed with landowners and the Service, none of these have yet signed an interconnection agreement with NPPD, with the exception of the Thunderhead Wind Energy Center. Thus, none of these potential future wind energy projects meet the definition of a reasonable foreseeable future project as defined by CEQ (see introductory text to Chapter 4, Step 3). Thus, this type of future project is treated in a generic manner within the cumulative impact analysis.

Specific projects associated with wind energy development and other projects considered in the cumulative impact analysis are summarized in Table 4-3 and depicted on Figure 4-1. In accordance with CEQ guidance, this list primarily includes present and reasonably foreseeable future actions in the cumulative impact assessment area.

**Table 4-3. Past, Present, and Reasonably Foreseeable Future Activity**

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| **Electrical Utilities** | | | |
| Gerald Gentleman Station Electrical Generating Facility | Past, Present and Future Activity—Gerald Gentleman Station is Nebraska's largest generating station with a capacity to generate 1,365 MW of power and consists of two coal-fired generating units which came on-line in 1979 and 1982. Coal from Wyoming Powder River Basin provides fuel for the plant. No modifications to the generating station are currently planned. | Lincoln County near Sutherland (see Figure 4-1) | • Coal-fired plant<br>• Cooling systems<br>• Surface impoundments<br>• Transmission<br>• Access roads<br>• Railroads |
| Hoskins-Neligh 345/115 kV Transmission Project | Present and Future Activity—NPPD is constructing a 345 kV transmission line and new substation. In addition, four 115,000-volt transmission line segments are currently being built from the new substation to existing lines. Construction of this transmission line is complete, and the line was put into service on June 28, 2016. | Extends from NPPD's Hoskins Substation in Madison County, across the southern portion of Pierce County, to a new substation in the Neligh area in Antelope County to existing lines (see Figure 4-1) | • Transmission lines<br>• Substations and switchyards<br>• Access roads<br>• Temporary work areas<br>• Emergency repairs |
| Muddy Creek-Ord 115 kV Transmission Project | Future Activity—NPPD plans to construct a 115 kV transmission line and new substation. The line is estimated to be 40 miles in length. The final route for this project has been selected, and survey work has begun. Construction is expected to begin in January of 2017. The line expected to be in service by March of 2018. | Extends from a new substation, to be called Muddy Creek, east of Broken Bow in Custer County to an existing substation near Ord in Valley County (see Figure 4-1) | • Transmission lines<br>• Substations and switchyards<br>• Access roads<br>• Temporary work areas<br>• Emergency repairs |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| **Wind Power Development** | | | |
| Grande Prairie Wind Farm | Present and Future Activity—An existing 400-MW wind farm development in O'Neil spanning approximately 54,000 acres that will eventually consist of 266 turbines and connecting to Western's 345 kV transmission line. As of September 2016, 124 of the turbines had been constructed. | Holt County | • Construction of meteorological towers<br>• Construction of turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| Prairie Breeze I Wind Farm | Past, Present, Future Activity—A 200-MW, 118-turbine wind generation facility in Elgin that came online in 2014. | Antelope, Boone, and Madison counties | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| Prairie Breeze II | Past, Present, Future Activity—A 73.4-MW, 41-turbine wind generation facility in Elgin that came online in 2015. | Antelope County | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| Prairie Breeze III Wind Farm | Past, Present, Future Activity—A 38.5-MW, wind generation facility in Elgin that came online in 2015 with 20 turbines. | Antelope and Boone counties | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| Valentine Wind Farm | Past, Present, Future Activity—A 1.85-MW, single-turbine wind generation facility on 1 acre in Valentine that came online in 2014. | Cherry County | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| Petersburg Wind Farm | Past, Present, Future Activity—A 40.5-MW, 27-turbine wind generation facility in Petersburg that came online in 2011. | Boone County | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| Laredo Ridge Wind Farm | Past, Present, Future Activity—An 80-MW, 54-turbine wind generation facility in Petersburg that came online in 2010. | Boone County | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| Ainsworth Wind Farm | Past, Present, Future Activity—A 54.9-MW, 36-turbine wind generation facility in Ainsworth, covering 11,000 acres, that came online in 2005. | Brown County | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| Thunderhead Wind Energy Center | Future Activity—A 300-MW, 168-turbine wind generation facility to be located in northeast Wheeler County approximately 50 miles west of Norfolk; land acquisition activities are currently ongoing; anticipated to be online in 2020 and will interconnect with the Holt County Substation (signed interconnection agreement with NPPD) | Wheeler and Antelope counties | • Turbine towers<br>• Access roads<br>• Electrical collector substations and transformer pads<br>• Ancillary features (including generation tie lines) |
| **Mineral Extraction** | | | |
| Aggregate mining | Past, Present, Future Activity—Silt, sand, gravel, clay, and shale mining operations used for road construction and fill materials. | Blaine, Brown, Cherry, Holt, Hooker Lincoln, Logan, Loup, McPherson, Rock, and Thomas counties | • Surface mines<br>• Access roads<br>• Processing plants<br>• Transportation (road and railroads)<br>• Soil waste (overburden, waste rock, and tailings)<br>• Site reclamation and rehabilitation |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| **Transportation** | | | |
| Highways, roads, streets, and bridges | Past, Present, Future Activities—Public highways and roads outside the limits of any incorporated municipality and public streets within the limits of any incorporated municipality that carry passenger and commercial traffic. | Rural highways, roads, and municipal streets occur throughout the study area | • Interstates<br>• Expressways<br>• U.S. and state highways<br>• County roads<br>• Municipal streets<br>• Construction, operation, and maintenance |
| Railroads | Past, Present, Future Activities—Union Pacific Railroad and Burlington Northern Santa Fe Railway. | • Union Pacific Railroad<br>• Line in southern portion of the study area generally parallel to U.S. Highway 30<br>• Burlington Northern Santa Fe Railway<br>• Spur line west of Sutherland carries coal to GGS Substation<br>• Line in northwestern portion of the study area generally parallel to State Highway 2 | • Railways<br>• Access roads<br>• Rail yards/facilities<br>• Communication and signaling facilities<br>• Road crossings<br>• Bridges/culverts<br>• Operation/maintenance |
| Airports | Past and Present Activities—Thomas County Airport; several private airfields. | Thomas County Airport near Thedford | • Airports<br>• Air traffic towers<br>• Runways/landing strips<br>• Highways/road/streets<br>• Passenger flights<br>• Aerial spraying |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| **Agriculture** | | | |
| Farming | Past, Present, Future Activities—Irrigated and non-irrigated crop (i.e., corn, soybeans, sorghum, beans, alfalfa, small grains); pasture and hay production; summer fallow | Scattered throughout the study area but concentrated mostly in the southwest and eastern portions (row crops = 5 percent; pasture/hay = 1 percent) | • Grassland conversion<br>• Cropland production<br>• Irrigation (center-pivot and gravity-fed)<br>• Local improvements (fences, storage bins, and reservoirs)<br>• Aerial spraying |
| Ranching | Past, Present, Future Activities—Livestock production on rangelands and in feedlots/confined feeding operations. | Throughout the study area but in lesser amounts in the eastern portion (rangelands = 79 percent) | • Fencing/windbreaks<br>• Stock watering systems<br>• Ponds<br>• Buildings/sheds/corrals |
| **Land Use** | | | |
| Urbanization/ residential | Past, Present, Future Activities—Incorporated villages include Brewster, Chambers, Ewing, Hershey, Mullen, Stapleton, Sutherland, and Thedford; unincorporated communities include Brownlee, Seneca, and Tyron. Populations in all counties of the study area, except Lincoln County, have decreased over the last 25 years, and all but Lincoln County are projected to continue to decline through 2030. Lincoln County is projected to experience growth between 0% and 30%. | All 14 counties in the study area | • Population growth/loss<br>• Resource demand/use<br>• Land development<br>• Residential and commercial expansion of existing towns/cities<br>• Highways, roads, and traffic<br>• Employment (jobs, income, and revenue) |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| Commercial and industrial development | Past, Present, Future Activities—Development of commercial enterprises (e.g., retail sales, restaurants, motels) and industrial sites (e.g., manufacturing; warehouses). | Located in and around communities and near on- and off-ramps of I-80 and U.S. Highway 30 | • Construction, operation, and maintenance<br>• Resource demand/use<br>• Land development<br>• Highways, roads, parking lots<br>• Employment (jobs, income, and revenue) |
| Public and semi-public development | Past, Present, Future Activities—Development of public and semi-public facilities; public water supply system. | Generally located near transportation routes and/or communities. Eight school districts are located in the study area. | • Public schools<br>• Childcare and preschool facilities<br>• Hospitals<br>• Senior centers<br>• Long-term care facilities<br>• Churches<br>• Museums<br>• Historical markers<br>• Post Offices<br>• Fire stations<br>• Libraries<br>• Water treatment and sewage disposal facilities<br>• Cemeteries<br>• Highways, roads, and parking lots |

| Activity | Description of Activity | Locations in Cumulative Project Area | Associated Activities and Facilities |
|---|---|---|---|
| Utilities | Past, Present, Future Activities—Existing water, gas, and communication utilities. | Utilities occur throughout the study area but in lesser density in rural areas | • Long-distance and local telephone aerial wires<br>• Buried copper and fiber optic cables<br>• Aerial and buried television lines<br>• Natural gas lines<br>• Domestic water lines and canals<br>• Communication towers |
| **Recreation** | | | |
| Federal, state, and local recreation areas and activities | Past, Present, Future Activities—Various developed and dispersed recreation areas and activities including recreation areas owned and managed by various agencies for parks, recreation, and/or preservation purposes. Recreation areas on public lands include NWRs, National Forests, SRAs, WMAs, scenic byways, and trails. Private lands, communities, counties, school districts, and NRDs offer outdoor recreation facilities. | • Recreation areas and activities occur throughout the study area | • Viewing natural features and wildlife<br>• Boating/kayaking/river floating<br>• Golfing<br>• Sightseeing<br>• Off-road vehicles<br>• Hunting and fishing<br>• Camping, hiking, and picnicking<br>• Stargazing<br>• Train watching<br>• Photography<br>• Visitation of scenic and historic places |

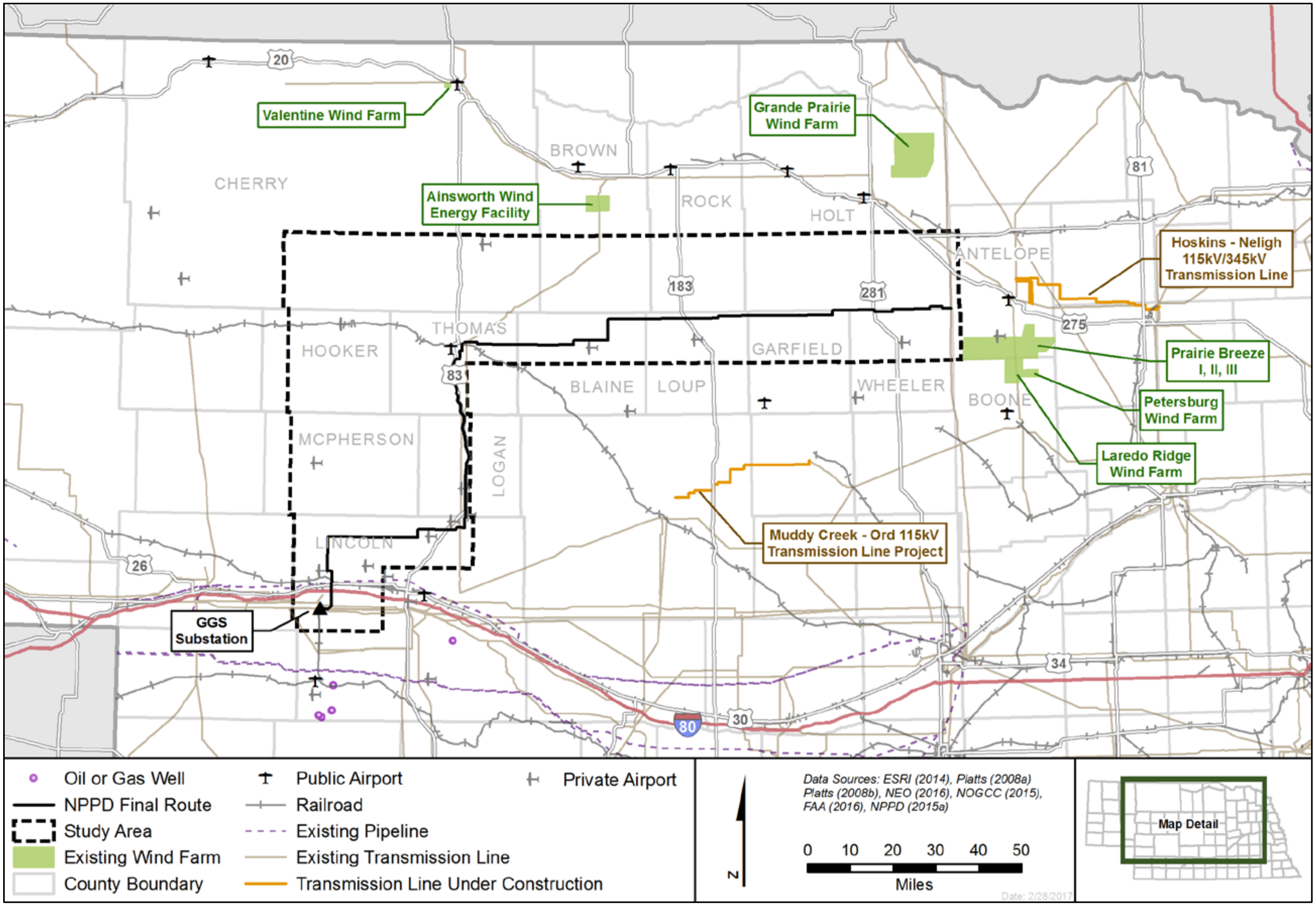


**Figure 4-1. Cumulative Impact Project Locations**

## 4.4 Cumulative Effects Analysis

This section analyzes the impacts of the actions identified above in addition to the impacts of the R-Project for either action alternative, resulting in the total cumulative impact for each resource.

The cumulative impacts analysis presented in the following sections encompasses the direct and indirect impacts associated with both the period of Project construction and the period of operation and maintenance (covered in Chapter 3), and the potential affecting factors for activities associated with other past, present, and reasonably foreseeable future actions. Impact intensity levels (low, moderate, and high) used for the cumulative impacts analysis are the same as those used in Chapter 3 for the analysis of direct and indirect effects.

For this analysis, it is assumed that the requirements of the avoidance, minimization, and mitigation measures identified in Chapter 3 and the provisions of the Restoration Management Plan would be met.

Table 4-4 identifies actions and the potential impacting factors that could cumulatively affect specific, affected resources within the defined spatial boundaries for each resource topic. The table identifies each resource considered and provides an accounting of past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts.

**Table 4-4. Activities Related to Cumulative Activities**

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Geology and Soils** | | |
| Geology | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project, mineral extraction, transportation activities, agricultural activities, land use, recreation | • Changes in topography |
| Soils | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Erosion<br>• Soil compaction |
| Mineral Resources | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Restrict access to mineral resources |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Water Resources** | | |
| Surface Water | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, wind power development, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Resource use and contamination<br>• New or increased impairment<br>• Sedimentation<br>• Vegetation clearing<br>• Altered surface drainage and water flow |
| Ground Water | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Resource use and contamination<br>• Decreased infiltration and recharge |
| Floodplains | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Alteration (loss of function and water storage capacity) from placement of structures<br>• Rise in water levels on properties<br>• Diversion and concentration of flows |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Wetlands** | | |
| Wetland Habitat | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Draining (dredging) or filling of wetlands<br>• Conversion of woody wetlands to herbaceous wetlands<br>• Alteration (loss of diversity or function) from the introduction of noxious weeds |
| **Vegetation** | | |
| Vegetative Cover | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development ((one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Clearing and disturbance of vegetation (including permanent conversion to a non-natural land use)<br>• Introduction of noxious weeds<br>• Use of herbicides |
| **Wildlife** | | |
| Birds, Mammals, Reptiles, Fish and Invertebrates | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, wind power development, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Injury or mortality<br>• Habitat loss or fragmentation<br>• Habitat alteration<br>• Displacement or interference (temporary or permanent) with behavioral activities of species due to increased human activity<br>• Alteration of habitat from the introduction of noxious weeds |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Special Status Species** | | |
| Federally and State Protected Species | • Present—electrical utilities, wind power development<br>• Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project) | • Injury or loss/mortality<br>• Habitat loss/alteration or fragmentation<br>• Displacement or interference (temporary or permanent) with behavioral activities of species due to increased human activity<br>• Alteration of habitat from the introduction of noxious weeds |
| **Land Use** | | |
| Existing Land Use | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Land use conflicts<br>• Loss of rangeland and farming resources |
| State and Federal Properties | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Land use conflicts |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Recreation and Tourism** | | |
| Dispersed & Developed Recreation Activities | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development, (one of the three primary purposes of the R-Project) mineral extraction, transportation activities, agricultural activities, land use, recreation | • Access restrictions<br>• Loss of recreational opportunity from loss of natural habitat<br>• Altered visual environment of recreational use areas |
| **Cultural Resources** | | |
| Recorded Cultural Resources | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Soil disturbance<br>• Resource damage or destruction<br>• Increased accessibility<br>• Vandalism/theft<br>• Altering visual environment of historic properties |
| **Transportation** | | |
| Transportation Infrastructure | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Road deterioration and increased maintenance costs<br>• Traffic delays and decreased public safety during construction<br>• Interference with air traffic from aboveground facilities |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Visual Resources and Aesthetics** | | |
| Natural Resources | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Increased contrast with surrounding landscape<br>• Degradation of visual quality |
| ***Air Quality and Greenhouse Gases*** | | |
| Air Quality Conditions | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Violations of the NAAQS<br>• Fugitive dust emissions<br>• GHG emissions |
| **Noise** | | |
| Ambient Noise Levels | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Increased ambient noise levels |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Hazardous Materials and Hazardous Wastes** | | |
| Environment | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Spills<br>• Ground disturbance of hazardous materials |
| Human Health | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Exposure to hazardous materials and wastes |
| **Public Health and Safety** | | |
| Public Health and Safety | Past—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Present—electrical utilities, mineral extraction, transportation activities, agricultural activities, land use, recreation<br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation activities, agricultural activities, land use, recreation | • Electric shock<br>• EMFs<br>• Risk of wildfires<br>• Risk of injury or death |

| Affected Environmental Resource | Past, Present, and Reasonable Foreseeable Actions | Impacting Factors |
|---|---|---|
| **Socioeconomics** | | |
| Demographics, Economic Conditions, Electrical Transmission System | Past—electrical utilities, mineral extraction, transportation, agriculture, land use, public and semi-public development, utilities, recreation<br><br>Present—electrical utilities, mineral extraction, transportation, agriculture, land use, public and semi-public development, utilities, recreation<br><br>Future—electrical utilities and wind power development (one of the three primary purposes of the R-Project), mineral extraction, transportation, agriculture, land use, public and semi-public development, utilities, recreation | • Expenditures in the local economy<br>• Employment<br>• Population, income, and poverty<br>• Agriculture (farming and ranching)<br>• Taxes/revenues<br>• Electrical transmission system<br>• Retail and wholesale electricity rates |

### 4.4.1 Geology and Soils

Adverse impacts on geology and soils from cumulative impacts relate to the increased potential for erosion, compaction, surface runoff, sedimentation, decreased soil productivity, impacts to sensitive soils, prime farmland soils, soils with low restoration potential, and soil contamination. The cumulative impacts of past and present actions on geology and soils in project sites, ROWs, and adjacent lands have resulted mainly from ground-disturbing activities associated with electrical utilities, and transportation activities. These areas may have experienced disturbance to geology and soils through clearing, grading, excavation, backfilling, heavy equipment traffic, restricting access to aggregate mineral resources, and restoration activities. These impacts would be short term in duration and generally could be controlled through avoidance, minimization, and mitigation measures, so cumulative impacts on geology and soils from past and present actions would be low. Other activities such as farming, ranching, land use, and recreation also contribute to cumulative impacts on geology and soils in the cumulative impacts spatial boundary, but their contribution is low. The effects on geology and soils from past and present actions would likely continue.

Future electrical utility and wind power development, agricultural activities, land use, and recreation actions would result in temporary disturbances to soils, geology, and mineral resources with intensities greater than those associated with normal activities in the cumulative impacts spatial boundary for geology and soils (described in Table 4-2), which are predominantly ranching. Following the construction period for electrical utility, wind power development, and transportation activities, soils within the majority of the limits of disturbance would still be available for the same ranching or farming uses that occurred prior to construction. Permanent conversion of soils would occur in areas of substations, transmission towers, turbine towers, meteorological towers, communication towers, permanent access roads, and transportation projects.

When combined with other past, present, and reasonably foreseeable future actions the R-Project would contribute long-term, low-intensity effects on geology and soils in the cumulative impacts spatial boundary and would cause permanent conversion at the locations of transmission structure foundations, substations, and permanent access roads. However, the amount of permanent soil disturbance for construction of the transmission line is estimated to be small and localized. Generally, R-Project construction would contribute little to disturbance of sensitive soils, prime farmlands, soils with low restoration potential, and surficial geology and would not affect bedrock or permanently restrict access to mineral resources. By implementing the avoidance, minimization, and mitigation measures described in Section 3.2, *Geology and Soils*, the R-Project, regardless of which action alternative is implemented, would have a low-intensity effect on geology and soils during construction, operation, and maintenance. Implementation of either action alternative would provide a low contribution to these cumulative impacts on geology and soils.

### 4.4.2 Water Resources

The cumulative impacts of past, present, and reasonably foreseeable future actions on nearby surface waters, groundwater, and floodplains result from resource use and contamination; impairment; sedimentation; altered surface drainage and water flow; decreased infiltration and recharge of groundwater; or alteration of function and capacity of floodplains in the vicinity of project sites, ROWs, and adjacent areas. Past and present activities that have cumulatively affected surface water, groundwater, and floodplains within watersheds crossed by NPPD's final route (see Figure 3.3-1) include electrical utilities, aggregate mining, wind power development, land use, recreation, and road and utility construction and operation. Agriculture and livestock grazing that result in trampling of riparian vegetation, sedimentation, and decreases in water quality occur throughout the watersheds described in the Affected Environment section. Some of these impacts would be short term in duration and generally could be controlled through avoidance, minimization, and mitigation measures; for this reason, cumulative impacts on water resources from past and present actions would be of low intensity. Present and future wind development projects that result in a decrease in construction and operation of other types of generation facilities (e.g., fossil fuel power plants) that require substantial quantities of cooling water could result in beneficial impacts on the cumulative local and regional groundwater and surface water resources by offsetting consumptive uses and potential effects of thermal pollution on water quality.

Proposed future electrical utility, wind power development, and aggregate mining activities coupled with future land development and ongoing agricultural uses could result in cumulative increases in vegetation removal; fertilizer, chemical, and manure inputs; and soil compaction and erosion. These actions could result in increased runoff of sediment and contaminants that enter into surface waters or leach into groundwater and that could adversely affect water resources in the watersheds as described in the Affected Environment section. Water quality could be degraded by accidental spills and by ground-disturbing activities that increase soil erosion and sedimentation in nearby surface waters, but these effects likely would be rare. These impacts can generally be controlled through avoidance, minimization, and mitigation measures, such as electrical utility transmission projects spanning surface waters and floodplains; for this reason, cumulative impacts on water resources from past, present, and future actions would be of low intensity.

When combined with other past, present, and reasonably foreseeable future actions, the R-Project would contribute long-term, low-intensity effects on water resources in the cumulative impacts spatial boundary (described in Table 4-2) because the R-Project transmission line would span all surface waters, including impaired waters, and avoid placing structures in floodplains when practical. Generally, R-Project construction would contribute little to cumulative, adverse effects on surface water, groundwater, and floodplains from resource use and contamination, impairment, sedimentation, altered surface drainage and water flow, decreased infiltration and recharge of groundwater, or alteration of function and capacity of floodplains. By implementing the avoidance, minimization, and mitigation measures described in Section 3.3, *Water Resources*, the R-Project, regardless of which action alternative is selected, would have a low-intensity effect on water resources during construction, operation, and maintenance. Implementation of either action alternative would provide a negligible contribution to cumulative impacts on water resources.

### 4.4.3 Wetlands

Past, present, and reasonably foreseeable future actions have resulted in cumulative changes to wetlands in the cumulative impacts spatial boundary for wetlands (described in Table 4-2). Wetland loss in the Sandhills has occurred primarily from draining activities to increase hay production and filling activities to facilitate row crop production. However, adverse effects on wetlands from past and present electrical utility transmission projects, transportation, land use, and recreation projects also include draining or filling of wetlands, conversion of woody wetlands to herbaceous wetlands, fragmentation, siltation, and alteration from the introduction of noxious weeds. Some of these changes, though not permanent, extend over the long term until required site restoration occurs. Some impacts are localized and generally can be controlled through avoidance, minimization, and mitigation measures; for this reason, cumulative impacts on wetlands from past and present actions would be of low to moderate intensity.

Future electrical utility transmission projects, wind power development, farming and ranching activities, land use, and recreation could result in short-term effects on wetlands from clearing, trampling, and/or crushing in project sites, ROWs, and adjacent areas. Permanent conversion or loss would occur if forested or scrub-shrub wetlands are maintained as herbaceous vegetation, changes to local site topography cause drainage of wetlands, or fill occurs in a wetland. These ongoing and reasonably foreseeable future actions could result in continued cumulative loss and degradation of wetlands within the cumulative impacts spatial boundary. If a wetland is encountered and could not be avoided, high-intensity effects could occur on the wetland depending on the proximity of the disturbance, the size of the impact, and effects on wetland function, though mitigation, for example restoration or other wetland creation, would likely be required as part of the permitting process of the projects and would help offset the impacts. However, the high cost of permitting and mitigating impacts on wetlands often provides an incentive to avoid or minimize impacts on these areas. It is likely that effects on wetlands would be avoided and can generally be controlled through minimization and mitigation measures, such as using temporary matting or other measures to cross wetlands and sub-irrigated meadows; for this reason, cumulative impacts on wetlands from future actions would be of low intensity.

When combined with other past, present, and reasonably foreseeable future actions, the R-Project would contribute long-term, low- to moderate-intensity effects on wetlands in the cumulative impacts spatial boundary. Placement of structures in wetlands, including sub-irrigated meadows would be avoided by spanning the wetlands when practical; however, NPPD estimates that a small amount of permanent fill of wetlands would occur. By implementing the avoidance, minimization, and mitigation measures described in Section 3.4, *Wetlands*, the R-Project, regardless of which action alternative is selected, would have a low- to moderate-intensity effect on wetlands during construction, operation, and maintenance. Implementation of either action alternative would provide a low to moderate intensity contribution to cumulative effects on wetlands.

### 4.4.4 Vegetation

Past and present actions have resulted in cumulative changes to vegetation types within the cumulative impacts spatial boundary for vegetation (described in Table 4-2). Grassland conversion to cropland, construction of infrastructure related to electrical utility transmission and electrical power generating facilities, aggregate mining, road and utility construction, and land use development have altered these native vegetation communities through temporary and permanent removal and permanent conversion. Adverse impacts include direct injury or removal of vegetation by clearing, grading, trampling, crushing, exposure to contaminants, and permanent infrastructure. Degradation of natural vegetation types has also resulted from fragmentation of remaining native vegetation. Some of these changes, though not permanent, extend over the long term until required site restoration occurs. These impacts are localized and generally can be controlled through avoidance, minimization, and mitigation measures; for this reason cumulative impacts on vegetation from past and present actions are low. Other activities such as ranching and recreation also contribute to cumulative effects on vegetation in the cumulative impacts spatial boundary, but their contribution is low. Past and present activities, such as electrical utilities, aggregate mining, farming and ranching, land use, recreation, and road construction, have cumulatively resulted in the introduction and spread of noxious and invasive weeds.

Future electrical utility transmission projects, wind power development, aggregate mining, road and utility construction, farming and ranching activities, land use, and recreation could result in the removal and conversion of native vegetation types in project sites, ROWs, and adjacent areas. These ongoing and reasonably foreseeable future actions could result in continued cumulative loss and degradation of native vegetation types within the cumulative impacts spatial boundary for vegetation. Following the construction period for oil and gas development, electrical utilities, wind power development, and transportation activities, vegetation types within the majority of the limits of disturbance would still be available for ranching or farming uses that occurred prior to construction. Permanent conversion would occur in areas of substations, transmission towers, turbine towers, meteorological towers, communication towers, permanent access roads, and transportation projects. The spread of noxious and invasive weeds would also continue during the implementation of ongoing and reasonably foreseeable future actions.

When combined with other past, present, and reasonably foreseeable future actions the R-Project would contribute long-term, low- to moderate-intensity effects on vegetation in the cumulative impacts spatial boundary and would cause permanent conversion at the locations of transmission structure foundations, substations, and permanent access roads. The contribution of the R-Project to cumulative, adverse impacts on vegetation would depend in part on the prior land disturbance. Effects would be lower in cropland or previously disturbed or fragmented habitat than in undisturbed habitats of high quality. Soil and vegetation disturbance associated with the R-Project would contribute to potential cumulative spread of noxious and invasive weed populations. However, the potential contribution from the R-Project would be minimized by Project-related avoidance, minimization, and mitigation measures, such as revegetation measures. By implementing the avoidance, minimization, and mitigation measures described in Section 3.5, *Vegetation*, the R-Project, regardless of which action alternative is selected, would have a low- to moderate-intensity effect on vegetation during construction, operation, and maintenance. Implementation of either action alternative would provide a low contribution to cumulative impacts on vegetation.

### 4.4.5 Wildlife

Past and present actions have resulted in cumulative changes to wildlife communities and habitats within the cumulative impacts spatial boundary for wildlife (described in Table 4-2). Past and present actions have likely affected all species populations to some extent. Conversion of native prairie habitats to cropland, construction and operation of electrical utility transmission and power generating facilities, aggregate mining; road and utility construction, and land use development have altered natural communities resulting in changes in wildlife habitats, species abundance, and community composition. Adverse impacts associated with these past and present actions include direct injury or mortality to wildlife; habitat loss or fragmentation; permanent and temporary displacement of wildlife or interference with feeding, mating, nesting, or migratory behaviors; and habitat alteration or degradation associated with the introduction of invasive vegetation or replacement of native vegetation with cropland. Recreational hunting has resulted in direct mortality to some species, but adequate management practices ensure that wildlife populations are maintained at sustainable levels. Utility infrastructure within the cumulative impacts spatial boundary for wildlife, such as transmission lines and wind farms, pose an ongoing threat to migratory birds due to their placement within the Central Flyway. Overall, cumulative impacts on wildlife from past and present actions are low to moderate because although changes to wildlife communities and habitats have occurred, the wildlife cumulative impacts spatial boundary still contains large tracts of unfragmented high quality wildlife habitat which supports healthy populations and diverse wildlife communities.

Reasonably foreseeable future actions including electrical utility transmission projects, wind power development, aggregate mining, road and utility construction, farming and ranching activities, land use, and recreation could result in additional cumulative impacts on wildlife within the cumulative impacts spatial boundary for wildlife. Impacts associated with these actions could include additional injury or mortality to wildlife; habitat loss or fragmentation; permanent and temporary displacement of wildlife or interference with feeding, mating, nesting, or migratory behaviors; and habitat alteration or degradation associated with the introduction of invasive species. Placement of future transmission lines or wind farms within the Central Flyway would create an additional collision hazard for migratory birds, resulting in long-term adverse effects. The Thunderhead Wind Energy Center will be located near the eastern boundary of the Central Flyway in Northeast Wheeler and Southwest Antelope counties and will create a long-term collision hazard for migratory birds. Because reasonably foreseeable future actions would be similar to past and present actions, it is anticipated that these actions would have cumulative, low- to moderate-intensity, adverse effects on wildlife and wildlife habitat.

When combined with other past, present, and reasonably foreseeable future actions the construction, operation, and maintenance of the R-Project, under either of the action alternatives, would contribute long-term, low- to moderate-intensity effects on wildlife and wildlife habitat.

### 4.4.6 Special Status Species

Past, present, and reasonably foreseeable actions have resulted, and will result, in cumulative impacts on special status species within the cumulative impacts spatial boundary for special status species (described in Table 4-2). Impacts on special status species and their habitats would generally be the same as those described in Section 4.4.5, but have affected or may affect individual special status species differently, depending on the nature and location of individual actions. However, effects of specific actions on special status species may be less frequent or require a greater level of avoidance, minimization, or mitigation measures because special status species receive greater protection under Federal and/or state law than other wildlife.

Past and present actions that have resulted in adverse effects on special status species include conversion of native prairie habitats to cropland; construction and operation of electrical utility transmission and power generating facilities, including aggregate mining, road and utility construction, and land use development. These actions have caused cumulative effects on special status species resulting from habitat loss and fragmentation; permanent or temporary displacement of individuals or interference with feeding, mating, nesting, or migratory behaviors; and habitat alteration or degradation; and may have resulted in direct injury or mortality to some individuals. Reasonably foreseeable future actions including electrical utility transmission and wind power development projects, aggregate mining, road and utility construction, farming and ranching activities, land use, and recreation are anticipated to have similar effects and would contribute to future cumulative effects on special status species.

Past, present, or future utility infrastructure development, including transmission lines and wind farms, have affected or may affect special status birds, including whooping cranes, bald eagles, golden eagles, interior least terns, piping plovers, and rufa red knots. Utility infrastructure, such as transmission lines and wind farms, pose an ongoing threat to special status migratory bird species because of their placement within the Central Flyway spatial boundary, and represent the primary source of mortality for whooping cranes. For example, the Thunderhead Wind Energy Center will be located near the eastern boundary of the Central Flyway in Northeast Wheeler and Southwest Antelope counties and will create a long-term collision hazard for whooping cranes and other migratory birds. Therefore, these actions have resulted in or may result in cumulative, long-term, moderate-intensity, adverse effects on whooping cranes and low- to moderate-intensity, adverse effects on other special status migratory bird species. Special status bird species have also been affected or may be affected by habitat loss, fragmentation, or alteration from utility and transportation infrastructure development, land conversion for agriculture, and mineral extraction. However, many adverse effects can be controlled through avoidance, minimization, and mitigation measures. These actions have resulted in or may result in cumulative, long-term, low-intensity, adverse effects on special status birds.

Past, present, or future actions that cause loss, fragmentation, or alteration of prairie or riparian habitats have affected or may affect special status mammal species, including the northern-long eared bat, North American river otter, and swift fox. Impacts on northern-long eared bats and North American river otters would be limited to those actions that have resulted or may result in the removal of riparian habitat, and many potential adverse effects can be controlled through avoidance, minimization, and mitigation measures. These actions have resulted or may result in cumulative, long-term, low-intensity, adverse impacts on special status mammals.

Blanding's turtle is the only special status reptile species that has been affected or may be affected by past, present, or future actions. Effects on this species include any actions that have resulted in loss, fragmentation, or alteration or wetland habitat, as described in Section 4.4.3 *Wetlands*. However, many potential adverse effects can be controlled through avoidance, minimization, and mitigation measures. These actions have resulted or may result in long-term low-intensity, cumulative adverse impacts to Blanding's turtle.

Special status fish including blacknose shiner, finescale dace, northern redbelly dace, and Topeka shiner have been or may be affected by any past, present, or future actions that adversely affect water resources, including degradation of water quality, as described in Section 4.4.2 *Water Resources*. These actions have caused or may cause cumulative, long-term, low-intensity, adverse impacts on special status fish.

The beetle is the only special status insect species and the only species for which take would be permitted under either action alternative. Past, present, and future actions that have caused or may cause direct injury or mortality to individuals or loss, fragmentation, or alteration of beetle habitat within the spatial boundary identified in Table 4-2 include land conversion for agriculture, energy and transportation infrastructure development, and mineral extraction. Beetles are highly sensitive to disturbances and are slow to recover, making them more vulnerable to the effects of habitat fragmentation and alteration, disturbance, and individual mortality than other species. Past and present actions have resulted in cumulative, long-term, low- to moderate-intensity, adverse effects on the beetle within the cumulative impacts spatial boundary for special status species. The lack of development in the Nebraska Sandhills has allowed the Sandhills beetle populations to persist as one of the largest and last remaining beetle populations in the world. Future energy infrastructure development projects, including wind energy development that the R-Project would facilitate, may result in long-term, moderate- to high-intensity effects on the beetle, depending on their specific location within the spatial boundaries identified in Table 4-2 for cumulative impact analysis, and the amount of habitat loss or fragmentation associated with construction. However, many potential adverse effects can be controlled through avoidance, minimization, and mitigation measures.

Past, present, and reasonably future actions that could affect special status plants, including blowout penstemon, western prairie fringed orchid, and small white lady's orchid, such as transportation and wind power development, are generally the same as those described for vegetation and wetlands. However, their low populations make these species more vulnerable to the effects of habitat fragmentation and alteration, disturbance, and individual mortality. The impacts on special status plant species within and around future project sites, ROWs, and adjacent areas would depend in part on the details of project development and their location relative to species populations and suitable habitats. Some impacts related to cumulative actions would be localized and short in duration and are not expected to contribute to adverse cumulative impacts to these species, especially if avoidance, minimization, and mitigation measure are followed. It is likely that impacts on special status plant species would be avoided and can generally be controlled through avoidance, minimization, and mitigation measures, such as pre-construction surveys; for this reason, cumulative impacts on special status plant species from past, present, and reasonably foreseeable future actions would be of low intensity.

When combined with other past, present, and reasonably foreseeable future actions, the R-Project, under either of the action alternatives, would contribute long-term, low- to moderate- to high-intensity, adverse effects on special status species in the cumulative impacts spatial boundary for special status species.

### 4.4.7 Land Use

Existing land uses in the analysis area reflect the effects of past and present activities. Agricultural uses are the predominant activities and are expected to continue to be predominant well into the future. Additional commercial, industrial, and wind energy growth and development that may be supported by increased electrical service reliability and transmission capacity over the 50-year R-Project lifetime would likely result in the conversion of additional agricultural lands to non-agricultural uses. Individual commercial or industrial development projects are expected to convert small areas of agricultural lands to non-agricultural use. Although a wind energy project can cover hundreds to thousands of acres, the area rendered unavailable for other uses is typically limited to structures and facilities (e.g., turbines, access roads, and tie-line) that make up a small proportion of a total project area. As an example and while outside the spatial boundary for land use cumulative impact analysis, the Grande Prairie Wind Farm under development in Holt County will entail the construction of up to 266 turbines in an area of approximately 50,000 acres, but the total area occupied by turbines will be less than 20 acres (Western 2014). For these reasons, cumulative impacts from past, present, and reasonably foreseeable future activities are expected to result in cumulative, low-intensity, adverse impacts on agricultural land uses in the analysis area.

When combined with other past, present, and reasonably foreseeable future actions, the R-Project would contribute long-term, low intensity effects on land uses in the cumulative impacts spatial boundary for land use. Under either action alternative, a small amount of agricultural lands (less than 80 acres of more than 4,000 acres of agricultural lands in the ROW) would be permanently converted to non-agricultural use for access routes, structures, and substations, resulting in a low-intensity, long-term, adverse effects on agriculture within the study area.

As discussed in Section 3.8, *Land Use,* construction and operation of the R-Project under either action alternative could diminish the conservation value of conservation easements near the Project ROW. The potential for either action alternative to contribute to cumulative, adverse impacts on conservation easements and when combined with the impacts of past and present activities would be determined through negotiations with the easement holders. None of the reasonably foreseeable future activities identified in Table 4-3 would be located within or adjacent to the conservation easements that may be subject to direct or indirect effects from the R-Project. Therefore, neither of the action alternatives, when combined with the impacts of past, present, and reasonably foreseeable future activities, is expected to result in cumulative, moderate- or high-intensity, adverse impacts on conservation easements in the analysis area.

#### 4.4.8 Recreation and Tourism

Over the long term, R-Project transmission facilities under either action alternative are not expected to affect access to or use of most recreation areas or recreational facilities in the analysis area and, therefore, would not contribute to cumulative impacts on recreation or tourism in most portions of the analysis area.

The exception to this expectation may occur at crossings of NRI-listed segments of the Calamus, Dismal, and Middle Loup rivers. The presence of R-Project transmission facilities at and near those locations could constitute the introduction of visual intrusions that are out of character with these rivers or alter their setting, potentially affecting their eligibility for inclusion in the National Wild and Scenic Rivers System. None of the past, present, or reasonably foreseeable future activities identified in Table 4-3 would result in permanent modifications to the visual setting within 10 miles of the locations where the R-Project would cross those three rivers. Therefore, neither of the action alternatives, when combined with the impacts of reasonably foreseeable future activities, is expected to result in substantial adverse cumulative impacts on NRI-listed river segments.

Completion of the R-Project is anticipated to facilitate the development of additional wind energy projects in the analysis area; however, without knowledge of the location, size, or nature of the projects, cumulative impacts cannot be determined at this time. The potential for such projects to affect the eligibility of NRI-listed river segments for inclusion in the National Wild and Scenic Rivers System would be disclosed and addressed through the environmental review processes for those projects under Federal jurisdiction.

#### 4.4.9 Cultural Resources

The reasonably foreseeable future projects with the greatest potential to contribute to cumulative, adverse effects on the visual environment of historic properties are wind energy projects, which typically involve the construction of large turbines and transmission lines. None of the proposed wind energy projects identified in Table 4-3 would be located within 10 miles of the proposed R-Project; therefore, none of those projects is expected to contribute to reasonable foreseeable future cumulative, adverse effects on the visual environment of historic properties. Other reasonably foreseeable future projects are not expected to involve the construction of tall structures that would be visible at great distances.

Completion of the R-Project is expected to facilitate the development of additional wind energy projects in the analysis area. The potential for such projects to affect the visual environment of historic properties would depend on the projects’ locations relative to the historic properties and thus cannot be predicted. If any future wind energy or transmission line projects are located in areas adjacent to O'Fallon's Bluff along the Oregon-California Trails and the Sandhill Ruts along the Mormon Pioneer Trail, they could potentially affect the visual environment of these historic properties. Standard transmission siting practices encourage efforts to site new transmission lines parallel to existing linear features. If additional transmission lines are proposed in the analysis area in the future, it is likely that the R-Project would be seen as an opportune site for the construction of additional transmission features. Construction of any such features near historic properties could compound the adverse effects on the visual environment of those properties.

Based on the implementation of field surveys and measures to avoid, minimize, and mitigate adverse effects resulting from the physical disturbance of cultural resources, construction of R-Project transmission facilities under either action alternative is not expected to directly affect cultural resources. Consequently, neither action alternative, when combined with the impacts of past, present, or reasonably foreseeable future activities, is likely to cause cumulative, adverse effects on most cultural resources in the analysis area.

The exception would occur in areas where R-Project facilities would represent visual intrusions that diminish the historic integrity of cultural properties or the characteristics of those properties that qualify them for listing in the NRHP—O'Fallon's Bluff along the Oregon-California Trails and the Sandhill Ruts along the Mormon Pioneer Trail. The nature and extent of these visual impacts, as well as the measures that would be implemented to avoid, minimize, or mitigate those impacts, would be determined by the Service through the consultation with appropriate parties.

When combined with other past, present, and reasonably foreseeable future actions, where R-Project facilities are also visible, the combined effects could result in cumulative, moderate-intensity or even high-intensity, adverse impacts on historic properties. The areas most sensitive to such effects are those where the effects of the R-Project would be considered moderate to high intensity. As noted above, those areas include portions of the Oregon-California and Mormon Pioneer Trails.

### 4.4.10 Transportation

Adverse impacts on transportation from cumulative impacts relate to road deterioration and increased maintenance costs, traffic delays and decreased public safety during construction, and interference with air traffic from aboveground facilities from some of the cumulative actions. NDOR (2016) has identified projects focused on maintaining and improving the transportation system in Nebraska. Projects planned in the analysis area include road resurfacing and bridge repairs on I-80 and U.S. Highway 30 near Sutherland, U.S. Highway 83 near Stapleton and Thedford, Nebraska Highway 2 near Thedford, Nebraska Highways 7 and 91 near Brewster, U.S. Highway 183 north and south of NPPD's final route crossing, U.S. Highway 281 north of the R-Project route crossing, and the Sutherland Bridge project. While road resurfacing and bridge repairs may have short-term, adverse impacts caused by traffic delays during the construction period, the cumulative, long-term impacts would be beneficial from improved roadways and bridges providing better safety, decreased maintenance needs, and increased public safety.

In the long term, decreases in local populations may reduce traffic volumes and associated impacts on roadways. Any such reductions might be offset by temporary, localized increases associated with wind energy development projects. Vehicle traffic associated with inspection and maintenance of wind energy project or transmission facilities is not expected to influence traffic volumes in the analysis area to an appreciable degree and would not contribute to long-term cumulative effects on transportation.

None of the proposed wind energy projects identified in Table 4-3 would be located within 10 miles of any public or private airports in the cumulative effects analysis area for transportation. In addition, any projects that involve the construction of structures taller than 200 feet above ground surface (or those that penetrate the imaginary slope around airport facilities, which can vary) would be subject to notification requirements and permit approval by the FAA and the Nebraska Department of Aeronautics. For these reasons, future wind energy projects are not expected to result in cumulative impacts on air traffic.

When combined with other past, present, and reasonably foreseeable future actions, the cumulative impacts of either of the action alternatives would be low to moderate in the short term and low in the long term. As noted in Section 3.11, *Transportation*, NPPD would coordinate with NDOR and local agencies concerning the routing of traffic during R-Project construction. Such coordination is expected to reduce the potential for future road projects to result in cumulative impacts on traffic flow when combined with the impacts of either of the action alternatives.

### 4.4.11 Visual Resources

Past and present effects on visual resources in most parts of the analysis area are low compared to landscapes that have been extensively developed. As described in Section 3.12, *Visual Resources and Aesthetics*, the predominant visual impacts in the analysis area are those associated with agriculture, highway or road corridors, railroad corridors, and transmission line corridors in some areas. Areas where built features dominate the visual landscape are largely limited to developed areas of Sutherland, Stapleton, Thedford, and other communities around the study area. These elements have been a part of the landscape for decades.

Past actions have resulted in the presence of linear features (e.g., power lines, roads, and railroads) across some visually sensitive areas. By factoring existing visual quality into the assessment of Project-related visual impacts, the analysis of direct and indirect effects in Section 3.12, *Visual Resources and Aesthetics*, addresses the cumulative impacts of the alternatives on visual resources in combination with the impacts of past and present activities.

The reasonably foreseeable future projects with the greatest potential to contribute to cumulative, adverse effects on visual resources are wind energy projects, which typically involve the construction of large turbines as well as transmission lines. None of the proposed wind energy projects identified in Table 4-3 would be located within 10 miles of the proposed R-Project;

therefore, they are not expected to contribute to cumulative, adverse effects on visual resources. Other reasonably foreseeable future projects are not expected to involve the construction of tall structures that would be visible at great distances.

Completion of the R-Project is expected to facilitate the development of additional wind energy projects in the analysis area. The potential for such projects to affect visual resources would depend on the projects' location relative to visually sensitive areas and high sensitivity viewers and thus cannot be predicted. If any future wind energy projects are located in areas where R-Project facilities are also visible, the combined effects could result in moderate- or even high-intensity cumulative impacts on visual resources. Standard transmission siting practices encourage efforts to site new transmission lines parallel to existing linear features. If additional transmission lines are proposed in the analysis area in the future, it is likely that the R-Project would be seen as an opportune site for the construction of additional transmission features.

When combined with other past, present, and reasonably foreseeable future actions, the areas most sensitive to cumulative impacts from the R-Project are those areas where the effects of the R-Project would be of moderate to high intensity. Based on the existing visual quality, visibility, viewer sensitivity, and anticipated changes to the current visual character, the presence of the R-Project transmission line would result in high-intensity impacts on visual features at the Mormon Trail and Oregon Trail interpretive markers, the Dismal River crossing, and the U.S. Highway 83 Dismal River Overlook. Visual impacts would be of moderate intensity at almost all other recreational and historic sites, river crossings, highways, and residential areas in the analysis area.

#### 4.4.12 Air Quality and Greenhouse Gas Emissions

Past, present, and reasonably foreseeable actions have resulted, and may result, in cumulative impacts to air quality and GHG emissions within the cumulative impacts spatial boundary. Nebraska obtains approximately 60 percent of its net electricity from coal-fired power plants (U.S. EIA 2016). Coal-fired power plants are known to emit criteria air pollutants found in the NAAQS, most notably $SO_2$ and NOx. However, because counties in Nebraska have never had a declared non-attainment determination, it is anticipated that adverse impacts from these power plants would be minimal. Electrical utility companies also emit pollutants and GHG emissions during construction and operational activities such as during wind power development or transmission line maintenance. However, these construction and operational emissions would result in limited impacts on air quality from GHGs and would not affect the attainment status of counties in Nebraska. Therefore, impacts from electrical utilities are expected to be long term and of low intensity.

Mineral extraction, transportation activities, agricultural activities, and land-based recreation activities are all known to emit criteria air pollutants such as $PM_{10}$ and $PM_{2.5}$. These particulates can affect visibility; damage soil, plants, and water quality; and stain stone materials. Land clearing, grading, excavation, concrete work, blasting, dynamiting, vehicular and agricultural traffic, and low-flying air traffic attributed to these past, present, and reasonably foreseeable actions would create fugitive dust. However, adverse impacts on air quality from fugitive dust are expected to be short term and of low intensity. The short-term, low-intensity effects on noise from R-Project construction when combined with these past, present, and reasonably foreseeable future actions and the construction, operation, and maintenance of the R-Project under either action alternative, would contribute to low-intensity effects over the long term.

### 4.4.13 Noise

Cumulative impacts from past, present, and reasonably foreseeable actions relate to the increase in ambient noise levels. Agriculture and community activities have occurred and continue to occur in the Project area, and the level of noise, which is localized and depends on the activity, is not significant in scale. Construction activities, including associated vehicle traffic also contribute to cumulative noise impacts, but they are localized, and the amount of cumulative impact depends upon the timing/overlap of the activities compared to other noise generators. When combined with these past, present, and reasonably foreseeable future actions, based on the relatively minimal nature of operational noise, the R-Project would only temporarily contribute to these ongoing cumulative effects for a short time during construction and during routine maintenance and emergency repair activities; there would be no cumulative, long-term noise impacts.

### 4.4.14 Hazardous Materials and Hazardous Wastes

The cumulative impacts from the use of hazardous materials and the generation of hazardous wastes related to the past, present, and reasonably foreseeable future actions would be contamination of soils, surface water, groundwater, and wetlands within the cumulative impacts spatial boundary. As discussed in Section 3.15, *Hazardous Materials and Hazardous Wastes*, under either of the action alternatives, construction, operation, and maintenance actions associated with the R-Project would necessitate the use of various hazardous materials and generate hazardous wastes. However, NPPD and all personnel associated with the R-Project would be required to follow applicable Federal and state regulations for handling hazardous materials and hazardous wastes, including the contractor's SPCC Plan for the R-Project. Therefore, the impacts under either of the two action alternatives would be of low intensity in both the short term and long term and are not anticipated to contribute to cumulative impacts for hazardous materials and hazardous wastes when combined with these past, present, and reasonably foreseeable future actions.

### 4.4.15 Public Health and Safety

Cumulative impacts on public health and safety from past, present, and reasonably foreseeable future actions relate to electric shock, EMF, risk of wildfires, and risk of injury or death. Construction and maintenance activities associated with transmission and distribution lines have the potential to create shock hazards and wildfires. Construction activities, including those associated with road and bridge repairs and maintenance, as well as operations associated with farming and ranching equipment and mineral extraction also pose a risk of accidents that could result in injuries or death. However, most of these activities are governed by standard operating procedures and/or regulations that would be followed to minimize the risk of impacts on public health and safety. The risk of impacts are also somewhat localized and temporary in nature, e.g., occur only during the construction period, and therefore would minimize any cumulative impact.

When combined with these past, present, and reasonably foreseeable future actions, the construction, operation, and maintenance of the R-Project, under either of the action alternatives, would contribute to low intensity effects over the long-term. As the R-Project is further designed, NPPD would require all transmission line and substation contractors to comply with all applicable safety regulations and standards to protect the health and safety of workers and others in the vicinity during the construction of either steel lattice towers or steel tubular monopoles, stringing of the transmission line, and the expansion and development of the substations. Any such effects are anticipated to be localized and would not contribute to cumulative public health and safety effects.

Operation of the R-Project would introduce new EMF sources to the Project area. As demonstrated in Section 3.15, EMFs resulting from the operation of the R-Project alternatives would be well below impact thresholds. Additionally, EMF levels would be reduced to negligible at a distance of 300 feet from the centerline of NPPD’s final route under either action alternative. As a result, neither action alternative would contribute to cumulative, adverse impacts associated with EMFs in the Project area. Because the proposed Project alternatives would help support increased electrical demand, it would help ensure public health and safety by reducing the potential for power outages and brownouts.

### 4.4.16 Socioeconomics

Cumulative impacts from past, present, and reasonably foreseeable future actions relate to expenditures in the local economy; employment; population, income, and poverty; farming and ranching; taxes/revenues; the electrical transmission system; and retail and wholesale electricity rates. The scenario described above in Section 4.3 identifies multiple wind farm projects currently in operation or under construction in or near the study area, as well as additional transmission lines being constructed by NPPD (Table 4-3). As one of the three stated purposes of the R-Project, wind energy development is likely to occur in areas with suitable wind resources that can be connected to the R-Project transmission line and where property owners are willing to sell or lease their lands for such purposes. This is because R-project would increase capacity of the region’s transmission system and accommodate new renewable energy development, as discussed in Section 3.17, *Socioeconomics*.

Additional commercial, industrial, and wind energy development within the study area is expected to result in similar types of potential adverse effects on agriculture as are described in Section 3.17, *Socioeconomics,* including financial losses from disruptions in agricultural operations during construction and loss of production from temporary agricultural land disturbance or permanent conversion to non-agricultural uses. As discussed in Section 4.4.7, *Land Use*, commercial and industrial development is expected to convert small areas of agricultural lands to non-agricultural use (or possibly avoid agricultural lands altogether), while wind energy projects covering hundreds to thousands of acres would likely maintain existing agricultural uses to a large extent to maximize economic benefits generated from the land.

Because developers would likely work with affected farmers and ranchers to minimize disruptions and compensate for unavoidable adverse financial impacts, as would NPPD for the R-Project, any financial losses for either short-term or long-term loss of agricultural uses would continue to be a small fraction of the market value of all agricultural products sold in the study area counties, which was nearly $3 billion in 2012, and would affect a small number of the farms and ranches located within the study area.

Similar to the direct effect of the R-Project potentially increasing NPPD’s electricity rates for its wholesale and retail customers (Section 3.17, *Socioeconomics*), additional costs borne by NPPD to develop wind energy and support transmission infrastructure could be reflected in any future rate increases, along with inflation-related cost increases associated with maintaining its current level of service. As for the R-Project, the amount of the future rate increases cannot be forecast. Larger increases would have more of an adverse economic impact on residences and businesses than smaller increases, and such increases would be experienced by all of NPPD’s wholesale and retail customers, resulting in a moderate-intensity adverse socioeconomic effect.

The analysis area would continue to be dominated by agricultural land uses, and agriculture would continue to be a key economic driver. Implementation of the R-Project, along with future commercial, industrial, and wind energy development resulting from more reliable electrical service and increased transmission capacity, could result in additional beneficial short-term and long-term cumulative effects on socioeconomic conditions within the analysis area, including increases in population, income, employment, and retail and tax revenues. Short-term effects would likely result from temporary workers and expenditures associated construction and decommissioning of transmission lines, wind farms, and other general development, while long-term effects would likely result from permanent workers and expenditures associated with operation and maintenance of constructed wind farms and other general development. Short-term effects would likely be of low intensity because these effects would only occur for short periods necessary to construct or decommission projects. Long-term effects from development would likely be of moderate intensity because development occurs throughout the analysis area.

However, as noted in Section 3.17, *Socioeconomics*, populations within the analysis area have decreased over the last 25 years and are projected to continue to decrease through 2030. Because county populations and unemployment rates are low, many of the permanent employees needed for new development would likely come from outside the study area. For example, the 266-turbine Grande Prairie Wind Farm was projected to require 20 to 30 permanent full-time workers for operation and maintenance (Western 2014). While such population increase may be noticeable in small villages or communities near constructed projects, these increases are not expected to reverse the overall declining population trend within the analysis area. However, these permanent employees coming into the study area would bring or start families, further increasing demands for public services (including schools), retail and commercial services, and infrastructure. These increased demands could lead to additional development and employment opportunities within the analysis area.

When combined with the past, present, and reasonably foreseeable future actions, the construction, operation, and maintenance of the R-Project, under either of the action alternatives, would contribute mostly low-intensity, beneficial impacts in the short term, and both low-intensity, adverse impacts and moderate-intensity, beneficial impacts in the long term to the overall cumulative impacts, and the cumulative impacts would not be significant.

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# 5.0 COMPARISON OF ALTERNATIVES

## 5.1 Comparative Impacts of Alternatives

Three alternatives, the No-action Alternative and the two action alternatives, were carried forward for detailed analysis in this DEIS. Under the No-action Alternative, the Service would not issue a permit to NPPD for the take of the endangered American burying beetle in accordance with Section 10(a)(1)(B) of the ESA; therefore, construction, operation, and maintenance of the R-Project would not happen, and an HCP would neither be required nor implemented. No take of the beetle would occur and other environmental resources would remain unaltered. However, the SPP objective of providing improved reliability, reducing congestion, and providing new transmission capacity for future wind energy development would not be met. The projected summer electricity demands in the western half of the north-central Nebraska region, based on SPP's load forecast, would not be met, leading to increased energy costs. Also, the reliability of the electrical system would be reduced and could result in power outages.

The Service's issuance of a permit to NPPD for the R-Project and implementation of Alternative A with the HCP would result in the take of the Federally endangered beetle, and would result in short- and long-term, moderate-intensity, adverse effects on the beetle. Other special status species would also be affected by activities related to implementation of Alternative A. Long-term effects could occur to habitat for special status species from loss, alteration, or fragmentation and to special status bird and migratory species because of collision hazards. Alternative A would result in the permanent conversion of 52 acres of land to support the transmission line. This permanent conversion would affect soil, vegetation, wetlands, wildlife habitat (including special status species habitat), and land use. Long-term, adverse impacts would also occur to wildlife, recreation and tourism, cultural resources, visual resources and aesthetics, air quality, noise, and public health and safety. Approximately 1,751 acres of land would be temporarily disturbed under Alternative A. Transportation would be affected in the short term from construction-related closures that interfere with regular traffic flow and local emergency response activities. Businesses and surrounding communities would enjoy beneficial economic impacts, both in the long term and short term. No disproportionate and adverse impacts are anticipated to occur on environmental justice populations.

The Service's issuance of a permit to NPPD for the R-Project and implementation of Alternative B with the HCP would generally result in the same type of effects as Alternative A; however, the effects would vary depending on the environmental resource. Alternative B would also result in take of the Federally endangered American burying beetle; however, greater permanent loss of suitable habitat would occur compared to Alternative A and higher take is expected. Alternative B would result in the permanent conversion of 77 acres of land to support the transmission line that would affect the same resources described under Alternative A. Long-term, adverse effects on recreation and visual resources and aesthetics could be less intense where monopoles would be used instead of lattice towers. Approximately 2,245 acres of land would be temporarily disturbed under Alternative B. Therefore, short-term impacts related to Alternative B would be greater compared to Alternative A.

Comparative impacts for the alternatives are summarized in Table 5-1 (presented at the end of this chapter). Those environmental resource topics determined to have potentially significant impacts under either action alternative include:

- Visual—adverse effects on aesthetic resources because of the introduction of a new element to the Sandhills landscape, particularly for permanent residents along the transmission line route
- Cultural resources—adverse effects due to diminishing the location, setting, feeling and association by introducing adverse effects to visual, auditory, and atmospheric integrity on historic sites and trails along NPPD's final route

## 5.2 Selection of Preferred Alternative

The primary criterion used to select a preferred alternative for the DEIS, considering the similarities in the two action alternatives (see Table 5-1), was to minimize the amount of ground disturbance and thus take of the American burying beetle. Because NPPD would use a combination of steel lattice towers and tubular monopole structures under Alternative A, less ground disturbance would occur and consequently less take of beetle would occur than under Alternative B. Tubular steel monopoles, which are typically used on most NPPD projects, require large equipment to install and would be used along the transmission line route where there is available access, along established roads or in cultivated fields. Steel lattice towers would be used in areas of the Sandhills where existing access roads are limited or do not exist. Lattice towers can be constructed with less overall effect on the surrounding area because smaller equipment and helicopter construction can be used for construction. At least 500 acres would be protected through compensatory mitigation measures required for the taking of the beetle to fully offset temporary and permanent impacts on beetle habitat. Under Alternative A, the take of the beetle is estimated at 167 individuals, and 33 acres of suitable beetle habitat would be permanently converted to transmission line usage. Under Alternative B, the take of beetle is estimated at 222 individuals, and 55 acres of suitable beetle habitat would be converted to transmission line usage. Thus, the Service has selected Alternative A as the Preferred Alternative, which is consistent with NPPD's expressed need for the R-Project and complies with applicable laws and regulations.

## 5.3 Irreversible and Irretrievable Commitment of Resources

NEPA analysis requires that an EIS include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible resource commitments are related to the use of nonrenewable resources, such as energy, minerals, and soils, and the effects that the uses of these resources might have on future generations. Such uses are considered irreversible because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over long periods, or at great expense, or because they would cause the resource to be destroyed or removed. Irretrievable resource commitments mean loss of production or use of a resource. Irretrievable refers to the permanent loss of a resource, such as extinction of a species, destruction of a cultural resource site, or loss of soil productivity.

Under either of the two action alternatives, most resource commitments would be neither irreversible nor irretrievable. Potential impacts on species would be both short term and long term. In cases where an NPPD-covered activity would affect beetle habitat resulting in a take, NPPD would reduce impacts from take through implementing avoidance and minimization measures (see Section 3.7, *Special Status Species*) and offset the remaining impacts by several times the amount of habitat that would be permanently affected. Land acquired by NPPD for compensatory mitigation would remain within conservation easement(s) in perpetuity.

Other resources that may have a possible irreversible or irretrievable commitment include vegetation, wildlife, and wetlands. Removal of vegetation for ROW clearing and structure foundations would represent an irretrievable commitment of resources, but permanent loss of vegetation would be relatively small (101.2 acres under Alternative A and 126 acres under Alternative B) compared to the amount of vegetation within the Project area. Mortality of individual animals during construction, operation, and maintenance activities would represent an irretrievable commitment of resources. However, these losses would not result in permanent changes at the population level and would not significantly alter ecosystem structure or population dynamics. Permanent loss of wetlands would also represent an irretrievable commitment of resources, but this loss would be minimal because only a small amount of wetlands would be permanently lost (1.506 acres under Alternative A and 1.6 Acres under Alternative B).

Construction would result in the estimated permanent conversion of 101.2 acres under Alternative A (Table 3.5-3) and 126 acres under Alternative B (Table 3.5-4). Most of these areas are rangelands or lands in agricultural production. The introduction of the R-Project transmission line would permanently change the visual landscape of the Sandhills within the viewshed of the transmission line. Development of land could result in the irretrievable loss of unidentified cultural resources.

The construction of the Project would require the irretrievable commitment of non-recyclable building materials and fuel consumed by construction equipment.

## 5.4 Relationship between Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

NEPA requires that an EIS describe "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity."

Construction of the R-Project would have short-term impacts on environmental resources associated with construction of the transmission line, including installation of structures and conductors, use of construction laydown areas, and use of land as a transmission line ROW during the life span of the transmission line, three substations, and associated facilities. For the purposes of this DEIS, temporary (i.e., short term) is defined as the construction period (estimated to be 21 to 24 months) and time for emergency repairs plus 2 to 3 years for vegetation recovery, and permanent (i.e., long term) is defined as the life of the Project, which is estimated to be 50 years or more. As indicated in the individual resource discussions, the small, permanent footprint of the transmission line and limited resource impacts indicate that operation of the facility would not likely affect regional natural resources to any significant degree. However, the land occupied by transmission structures would be affected for the life of the transmission line, possibly exceeding 50 years. Alternative A would require development of 1.2 acres of land for the footprint of the transmission line structures and 25 acres to accommodate the expansion of one substation (Thedford) and construction of a second substation (Holt County). Additional land would be needed for transmission ROW and access roads; the ROW would remain in its current land cover/use except for an estimated 49 acres of woody vegetation that would need to be cleared. A total of 1,748 acres is expected to be temporarily disturbed over the life of the R-Project: temporary access routes, temporary work areas, and tree clearing for ROW preparation would disturb 1,455 acres, and emergency repairs are expected to disturb an additional 293 acres over the life of the Project. Alternative B would require additional clearing for access, resulting in approximately 25 acres of additional permanent land disturbance. Alternative B would also result in the temporary disturbance of 2,240 acres over the life of the R-Project: temporary access routes, temporary work areas, and tree clearing for ROW preparation would disturb 1,866 acres, and emergency repairs are expected to disturb an additional 374 acres over the life of the Project.

Temporary impacts from construction activities are discussed in Chapter 3 and Table 5-1. As one of the conditions of permit issuance by the Service, NPPD would restore any areas disturbed in the ROW, temporary work spaces, construction access, and other lands affected by construction of the R-Project to pre-Project conditions.

While the total acreage for Alternative A that would be affected temporarily would be 1,748 acres (2,240 acres under Alternative B), much of this area would be returned to its original productivity (e.g., grasslands and cropland) once the transmission line is constructed and operational because most of the Project includes land uses that are compatible with a transmission line ROW. A minimal number of acres (e.g., 52.2 acres under Alternative A and 77 acres under Alternative B) across the entire route alignment would be permanently removed from productivity by the placement of structures, substation expansion and construction, and ancillary facilities.

Construction and operation of either Alternative A or B would have long-term impacts on vegetation, but these effects would be limited to the permanent conversion of vegetated lands to utility land uses; conversion of woody vegetated cover to herbaceous cover; and disturbance related to maintenance activities (e.g., applying herbicides, trimming trees, and removing dangerous trees). Removal of trees for ROW clearing would permanently convert 49 acres of forest to grassland. Long-term (permanent) impacts would also accrue to rangeland and farmland soils where transmission line structures are placed within the ROW under Alternative A; however, these losses would constitute a small fraction of total lands within the ROW and those available throughout the Study Area. These resources would not return to pre-disturbance conditions until the transmission line and associated facilities are removed. Although wetlands would be largely avoided, if conversion of wetlands is necessary, impacts could be mitigated through restoration, permanent protection of other wetlands, or creation of additional wetlands to offset wetland losses.

Direct effects on the beetle from construction activities associated with the Project would include destruction or degradation of occupied habitat. Construction of the R-Project is expected to permanently disturb 33 acres of beetle habitat within the permit area and temporarily disturb an additional 1,042 acres of beetle habitat under Alternative A, and permanently disturb 55 acres of beetle habitat within the permit area and temporarily disturb an additional 1,367 acres of beetle habitat under Alternative B. Emergency repairs are anticipated to temporarily disturb an additional 208 acres of beetle habitat under Alternative A and 284 acres under Alternative B. In addition to the implementation of the avoidance and minimization measures described in Section 3.7, NPPD would be required to secure sufficient compensatory mitigation lands to offset the R-Project's impacts as a condition of the permit. To meet this requirement, NPPD would secure at least 500 acres of occupied beetle habitat under Alternative A or at least 660 acres under Alternative B. Protection of these already-occupied beetle lands would ensure that they remain undeveloped in perpetuity.

A Restoration Management Plan would be finalized and submitted to the Service prior to the start of construction. The Restoration Management Plan would include stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet these stipulations. To ensure restoration of disturbed beetle habitat, NPPD would establish an escrow account to ensure the implementation and success of restoration efforts. NPPD prepared and submitted to the Service an escrow agreement for review that will be finalized prior to implementation of actual construction activities.

Long-term impacts on wildlife would include risk of migratory bird mortality due to collision with the transmission line. Construction of the R-Project would also have long-term impacts on cultural resources, visual resources, recreation, and land use, due to the presence of the transmission line, as described in Chapter 3 and in Table 5-1 below.

During construction, short-term use of the labor force could result in short-term productivity of the economic environment, including employment, personal income, and tax revenue. Short-term employment would be related to construction activities, either directly (construction workers) or indirectly (local businesses workers).

**Table 5-1. Comparison of Effects of Alternatives on Resources**

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| Impact | Permanent | Temporary | Permanent | Temporary | |
| Geology and Soils | No long-term effects on geology or mineral resources are expected.<br>Fifty-two acres of soils would be permanently lost, including loss of prime farmlands, soil with high erosion potential, and/or soils with low soil restoration potential.<br>Loss of soil structure, productivity, and quality would occur in localized areas or where restoration is unsuccessful. | Temporary displacement of surface geology and access restrictions to mineral resources during construction and emergency repairs.<br>A total of 1,748 acres of soil would be disturbed during construction and emergency repairs, including prime farmlands, soils with high erosion potential, and/or soils with low soil restoration potential. | Same as Alternative A, except 77 acres of soils would be permanently lost, including loss of prime farmlands, soils with high erosion potential, and/or soils with low soil restoration potential. | Same as Alternative A, except 2,231 acres of soils would be disturbed during construction and emergency repairs, including prime farmlands, soils with high erosion potential, and/or soils with low soil restoration potential. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Water Resources | Seven perennial waterways, five creeks, three canals, one ditch, and one lake would be spanned.<br>Two impaired streams and one impaired canal would be spanned.<br>No long-term effects on groundwater are expected.<br>Floodplains of seven perennial rivers would be crossed. | The drainage patterns of surface waters would be altered, and streamflow and channel instability could occur.<br>Sediment loads, turbidity, degraded water quality, and contamination to surface waters and groundwater could occur during construction, operation, and maintenance.<br>During construction, 38 acres of floodplain vegetation types would potentially be disturbed. | Same as Alternative A. | Same as Alternative A, except effects would occur over a larger area from an increase in surface disturbance, and 37 acres of floodplain vegetation types could potentially be disturbed during construction. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Wetlands | Conversion of forested wetland (1.5 acres), fill of wetlands (0.006 acre), hydrologic changes, change in vegetation composition and diversity and soil compaction would occur.<br><br>No long-term effects on hydric soils are expected. | Hydric soil compaction, sedimentation, hydrologic changes, reduced habitat suitability and water quality function, the spread of invasive and noxious species, and contamination would occur to wetlands during construction, operation, and maintenance.<br><br>Potential disturbance of 63.0 acres of wetlands during construction.<br><br>Disturbance of 46.8 acres of hydric soils during construction. | Same as Alternative A, except 0.045 acre of fill in wetlands would occur from the larger impact of monopole foundations. | Same as Alternative A, except effects would occur over a larger area because of the increase in surface disturbance; 81.7 acres of wetlands would potentially be disturbed during construction; and 59.0 acres of hydric soils would be disturbed during construction. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| Impact | Permanent | Temporary | Permanent | Temporary | |
| Vegetation | Loss or degradation of vegetation, permanent conversion of woody vegetation, soil compaction, and habitat fragmentation would occur.<br>Up to 52 acres of vegetation would be lost at structure sites, substation sites, and permanent access roads, and 49 acres of woody vegetation would be converted to grassland. | Disturbance of vegetation, erosion and sedimentation, fugitive dust generation, spread of invasive and noxious vegetation, herbicide use, and exposure to contaminants would occur during construction, operation, maintenance, and emergency repairs.<br>A total of 1,748 acres of vegetation would be disturbed during construction and emergency repairs. | Same as Alternative A, except up to 77 acres of vegetation would be lost at structure sites, substation sites, and permanent access roads. | Same as Alternative A, except 2,231 acres of vegetation would be disturbed during construction and emergency repairs. | No effect. |
| Wildlife | Project construction would result in the permanent loss of approximately 101 acres of wildlife habitat, additional habitat fragmentation, and the risk of bird mortality from collisions with power lines. | Project construction would temporarily disturb an estimated 1,458 acres of habitat, consisting mostly of grassland.<br>Emergency repairs would temporarily disturb an additional estimated 293 acres of wildlife habitat over the 50-year life of the Project. | Same as Alternative A, except approximately 124 acres of habitat would be lost at structure sites, substation sites, and permanent access roads. | Same as Alternative A, except 1,832 acres of habitat would be temporarily disturbed during construction and 366 acres would be disturbed during emergency repairs. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Special Status Species | Construction and maintenance activities, including emergency repair activities, would result in the take of approximately 167 beetles and the permanent loss of 33 acres of suitable beetle habitat.<br><br>Project construction and maintenance activities would result in potential loss, alteration, or fragmentation of suitable habitat for some special status species.<br><br>Operation of the R-Project transmission line would create a collision hazard for migratory birds, including whooping cranes. | Construction and maintenance activities would temporarily disturb an estimated 1,250 acres of suitable beetle habitat.<br><br>Project construction and maintenance activities would temporarily disturb suitable habitat for some special status species. | Same as Alternative A, except Alternative B would result in take of approximately 222 beetles and the permanent loss of 55 acres of suitable beetle habitat.<br><br>Effects on potentially suitable special status species habitat from Project construction would be greater because additional permanent disturbances would occur at structure sites, substation sites, and permanent access roads. | Same as Alternative A, except 1,651 acres of habitat would be disturbed during Project construction and maintenance activities.<br><br>Effects on potentially suitable special status species habitat from Project construction would be greater than Alternative A because additional temporary disturbances would occur at structure sites, substation sites, and permanent access roads. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Land Use | Approximately 500 acres of land would be purchased and/or leased for placement in the public domain to mitigate adverse effects on the beetle.<br><br>Construction of substation facilities would necessitate land ownership changes in one parcel in Thomas County and one parcel in Holt County.<br><br>The presence of transmission facilities along the eastern boundary of the North Platte River Easement and crossing the eastern block of the Hansen Phase I conservation easement are incompatible with the conservation purposes of those easements. | Crop damage, interference with planting schedules and harvest operations, impeded access to fields or pasture lands, interference with movement of farm vehicles and equipment, and disturbance of livestock would occur during construction. | Same as Alternative A, except the acreage of land purchased and/or leased to mitigate effects on the beetle would increase to 660 acres. | Same as Alternative A. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Recreation and Tourism | The presence of transmission facilities within or near recreation areas would create visual disturbances that affect user experience. Recreation areas and facilities potentially affected include National Historic Trails, the American Discovery Trail near Sutherland, and several Nationwide Rivers Inventory-listed river segments. | Increased noise, fugitive dust, and traffic congestion would occur in nearby recreational areas during construction.<br><br>Access to some public use areas may be temporarily restricted during construction. | Same as Alternative A, although visual impacts on recreational users may be less in areas where monopoles would be used instead of lattice towers. | Same as Alternative A. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Cultural Resources | Permanent, indirect (visual) effects on five historic properties that gain significance from their setting, including O'Fallon's Bluff (listed in the NRHP) and intact segments of four National Historic Trails would occur.<br><br>Identification of historic properties and determinations of effects are ongoing, and measures to avoid, minimize, or mitigate potential adverse effects would be developed in consultation with the SHPO and other consulting parties.<br><br>Cumulative losses of cultural resources are unlikely because the Project seeks to successfully avoid and minimize effects on historic properties. | Temporary impacts on cultural resources are unlikely because NPPD has identified historic properties of concern and would take precautions to successfully avoid affecting these sites. | Potential permanent, indirect (visual) effects on five historic properties that gain significance from their setting, including O'Fallon's Bluff (listed in the NRHP) and intact segments of four National Historic Trails.<br><br>Identification of historic properties and determinations of effects are ongoing, and measures to avoid, minimize, or mitigate potential adverse effects would be developed in consultation with the Nebraska SHPO and other consulting parties. | Temporary impacts on cultural resources are unlikely because NPPD has identified historic properties of concern and would take precautions to successfully avoid affecting these sites | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| Impact | Permanent | Temporary | Permanent | Temporary | |
| Transportation | No long-term effects on transportation are anticipated.<br><br>No effects on airports or airspace are anticipated. | Construction-related road closures may interfere with regular traffic flow and local emergency response activities, but no substantial disruptions of traffic flow on roads or railways are expected.<br><br>Construction-related helicopter use is not expected to result in substantial adverse effects on the use of airspace. | Same as Alternative A. | Slightly higher potential for construction-related road closures in areas where monopoles would be installed instead of lattice towers, but no substantial disruptions of traffic flow on roads or railways are expected.<br><br>Lower potential for construction-related helicopter use to interfere with airspace use. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| Impact | Permanent | Temporary | Permanent | Temporary | |
| Visual Resources and Aesthetics | Visual quality of communities and residences, recreation and historic sites, river crossings, and highways and scenic byways would be degraded within the Project area. Significant, adverse impacts on visual quality in the areas of the Oregon Trail and Mormon Trail interpretative markers, the Dismal River crossing, and the U.S. Highway 83 Dismal River Overlook.<br><br>Transmission line features would be added to the landscape at the two substation sites. | Construction vehicles and equipment, and possibly fugitive dust, would be visible in areas where construction is underway.<br><br>Vegetation and soil surfaces would be disturbed. | Overall, same as Alternative A, except visual impacts may be less intense in areas where monopoles would be used instead of lattice towers. | Same as Alternative A. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Air Quality | Minimal increase in GHG emissions would result from maintenance activities during operation of the transmission line and substations in localized areas.<br><br>Air quality would not be impaired, would not exceed USEPA de minimis thresholds, and would not affect current attainment status of Nebraska. | Fugitive dust from construction activities, vehicles, and equipment would increase, and emissions, including GHG emissions, would occur as a result of the use of construction vehicles and equipment. | Same as Alternative A. | Same as Alternative; although the amount of fugitive dust created would be grater due to an increase in ground disturbance. | No effect. |
| Noise | The transmission line would produce corona noise and Aeolian noise, and the substation transformers would make humming sounds. | Noise levels would increase along the ROW from construction vehicles, equipment, and crews.<br><br>Helicopter noise would be heard during lattice tower installation and implosive splicing noise would occur during transmission line stringing. | Same as Alternative A. | Same as Alternative A. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| Impact | Permanent | Temporary | Permanent | Temporary | |
| Hazardous Materials | Groundwater and wetlands could be contaminated from the use of hazardous materials (e.g., oils, hydraulic fluids, antifreeze, and herbicides) during construction, operation, and maintenance activities. | Hazardous materials and/or hazardous waste may be encountered and/or generated during construction. | Same as Alternative A. | Same as Alternative A. | No effect. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| Impact | Permanent | Temporary | Permanent | Temporary | |
| Public Health and Safety | Potential for adverse effects would occur after the transmission line is energized and is operational; however, long-term, adverse effects are anticipated to be negligible.<br><br>The operation of farm equipment near proposed structures could result in contact and/or damage to machinery and/or operators, but transmission line design includes consideration of farm equipment and necessary clearances to minimize or eliminate the potential for contact and/or damage to machinery and/or operators.<br><br>Some potential risk of wildfire, electric shock through conductance, and tower collapse. | Direct contact between an object on ground and an energized conductor of high-voltage transmission lines would pose the most serious risk to workers.<br><br>Risk of wildfire would increase during construction. | Same as Alternative A. | Same as Alternative A. | Electrical utility system failures and damage could occur if reliability is not increased and demand during peak periods increases, as projected. |

| | | | | | |
|---|---|---|---|---|---|
| Socioeconomics | Businesses and surrounding communities would experience economic benefits from increased electrical capacity and reliability.<br><br>Wholesale and retail electricity rate increases could be higher to cover R-Project costs not funded by other sources.<br><br>Adverse effects on ranching operations would include loss of windbreaks that shelter cows and calves during calving time in early spring, however, NPPD would work with landowners to avoid these structures and compensate for or replace lost structures.<br><br>Loss of a small amount of agricultural land (52 acres) may adversely affect farming and ranching operations; however, NPPD would compensate landowners for loss of land in the ROW acquisition process. | Local communities would experience economic benefits during construction from construction crews generating local revenue.<br><br>Income taxes and state sales taxes generated by construction and construction workers may benefit study area counties.<br><br>Local lodging tax revenues generated during construction would benefit study area counties that collect them.<br><br>Adverse effects would primarily affect farming and ranching operations (1,419 acres). Effects on ranching operations would include disturbance of grasslands used for cattle grazing or hay production and loss of pasture use during construction; however, NPPD would coordinate with and/or compensate landowners for disturbances to lands and operations. | Same as Alternative A except the loss of a small amount of agricultural land would be greater (77 acres). | Same as Alternative A, except adverse effects that would primarily affect farming and ranching operations would be greater (1,569 acres). | No direct effects would occur; indirect effects would occur if electric reliability and capacity were not improved and would harm local communities by affecting existing businesses and limiting future development opportunities.<br><br>Any increases in wholesale and retail electricity rates would reflect costs associated with existing NPPD operations and maintenance, plus any other future development projects other than the R-Project. |

| Resource | Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures | | Alternative B: Tubular Steel Monopole Structures Only | | No-action Alternative |
|---|---|---|---|---|---|
| **Impact** | **Permanent** | **Temporary** | **Permanent** | **Temporary** | |
| Environmental Justice | No disproportionate and adverse impacts on environmental justice populations are anticipated. | No disproportionate and adverse impacts on environmental justice populations are anticipated. | Same as Alternative A. | Same as Alternative A. | No direct effects would occur; indirect effects would occur if electric reliability and capacity were not improved and would harm local communities by limiting future development opportunities. |

# 6.0 REGULATORY AND PERMIT REQUIREMENTS

This chapter documents the regulatory and permit requirements associated with the R-Project, including permit approvals and consultations. Requirements of the Federal ESA and requirements and guidelines for the preparation of HCPs are detailed below in Sections 6.1 and 6.2 because they are the primary subjects of this draft EIS. Other regulatory and permit requirements are listed in Table 6-1, presented in Section 6.3.

## 6.1 Federal Endangered Species Act

> ***Take***
>
> …to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct

Regulations pursuant to Section 9 of the ESA prohibit the take of threatened and endangered species, except when authorized or exempted. Take is defined as: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The Service further defines *harm* as including substantial habitat modification or degradation that results in death or injury to listed species by impairing essential behavioral patterns, including breeding, feeding, or sheltering. The Service defines *harassment* as intentional or negligent actions that create the likelihood of injury to listed species by annoying them to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding, or sheltering. *Incidental take* is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity.

Pursuant to Sections 11(a) and (b) of the ESA, any person who knowingly violates Section 9 or any permit, certificate, or regulation related to Section 9 may be subject to civil penalties of up to $50,276 for each violation or criminal penalties up to $50,000 and/or imprisonment of up to 1 year. Individuals and state and local agencies proposing actions expected to result in the take of a Federally listed species are encouraged to apply for a permit under Section 10(a)(1)(B) of the ESA.

Section10(a)(1)(B) of the ESA provides a mechanism to authorize incidental take of Federally listed species resulting from non-Federal actions (see Section 6.2 for a description of the application process). Proponents of such actions may apply for a permit by submitting an HCP and meeting requirements of Section10(a)(1)(B). The Service must issue a permit when the following criteria are met:

1. Taking will be incidental.
2. The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking.
3. The applicant will ensure that adequate funding for the plan will be provided.
4. Taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.
5. Other measures, as required by the Secretary of the Interior, will be met.

> ***Jeopardizing the continued existence of a species***
>
> …engaging in an action that is expected to reduce the likelihood of the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution.

Section 7 of the ESA requires Federal agencies to ensure that their actions, including the issuance of permits, do not jeopardize the continued existence of listed species or destroy or adversely modify listed species' critical habitat. The Service describes jeopardizing the continued existence of a species as engaging in an action that reasonably is expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. The Service's issuance of a permit under Section 10(a)(1)(B) of the ESA is a Federal action subject to Section 7 of the ESA. As a Federal ESA is a Federal action subject to Section 7 of the ESA. As a Federal agency issuing a discretionary permit, the Service is required to conduct internal consultation. Delivery of the HCP and a Section 10(a)(1)(B) permit application initiates the Section 7 consultation process within the Service.

The requirements of Section 7 and Section 10 substantially overlap. Elements unique to Section 7 include analyses of impacts on designated critical habitat and listed plant species, if any, and analyses of indirect and cumulative impacts on listed species. Under Section 7, cumulative effects are effects of future state, tribal, local, or private actions not involving Federal activities that are reasonably certain to occur in the action area.

NPPD has included information regarding covered and evaluated species in the draft HCP to assist the Service with its internal Section 7 consultation and issuance of the permit.

## 6.2 Section 10(a)(1)(B) Process—Habitat Conservation Plan Requirements and Guidelines

The Section 10(a)(1)(B) process for obtaining a permit has three primary phases:

1. HCP development phase
2. Formal permit processing phase
3. Post-issuance phase

During the HCP development phase, an applicant prepares a plan that integrates the proposed Project or activity with the protection of listed species. An HCP submitted in support of a permit application must include the following information:

- Impacts likely to result from the proposed taking of the species for which permit coverage is requested
- Measures that will be implemented to monitor, minimize, and mitigate impacts; funding that will be made available to undertake such measures; and procedures to deal with unforeseen circumstances

- Alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be used
- Additional measures the Service may require as necessary or appropriate for purposes of the plan

> ***Federal Register***
>
> The public will be notified of the issuance of the permit in the *Federal Register*.

The HCP development phase concludes and the permit processing phase begins when a complete application package is submitted to the appropriate permit-issuing office. A complete application package consists of: 1) a draft HCP, 2) a permit application, and 3) a $100 fee from the applicant. The Service must also publish a Notice of Availability of the draft HCP in the *Federal Register* for public comment. The Service must also prepare the appropriate environmental analysis to comply with the NEPA (which is this DEIS). The Service typically provides the draft NEPA document for public review concurrently with the draft HCP (as is the case with the R-Project DEIS and draft HCP, which are both available for public review). The Service also prepares an intra-Service Section 7 Biological Opinion and a set of findings that evaluates whether the Section 10(a)(1)(B) permit issuance criteria have been met and provides the rationale for the decision whether to issue a permit. The Service issues a Section 10(a)(1)(B) permit to the applicant after determining that all issuance criteria have been met.

During the post-issuance phase, NPPD will implement the HCP and conditions of the permit, and the Service will monitor NPPD's compliance with the HCP as well as the long-term progress and success of the HCP. The Service's Region 6 office notifies the public of permit issuance in biennial notices in the *Federal Register* of all Section 10 permits issued the previous 6 months.

## 6.3 Other Regulatory Requirements and Permits

Table 6-1 describes other potential regulatory and permit requirements that should be considered, including permits, approvals, and consultation required for the Project. NPPD would be responsible for obtaining any necessary permits or other authorizations from the relevant authorities. The ultimate list of permits, approvals, and consultation required may be refined based on final design of the Project.

**Table 6-1. Potential Project Requirements**

| Agency | Statute or Requirement | Citation | Description |
|---|---|---|---|
| **Potential Federal Requirements** | | | |
| USFWS | BGEPA | 16 U.S.C. §§ 668–668d | This act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald or golden eagles, including their parts, nests, or eggs.<br>A permitting program was established by the Service's, Division of Migratory Bird Management. If activities will result in the take of an eagle or require the removal or relocation of an eagle nest, a permit is required from the Regional Migratory Bird Permit office. NPPD does not anticipate the need for an eagle take permit for the R-Project. |
| USACE | CWA | 33 U.S.C. § 1344 | Section 404 regulates the discharge of dredged or fill material in the jurisdictional wetlands and waters of the United States. NPPD has notified USACE of pending R-Project construction activities, and USACE responded that these activities are covered under a Nationwide permit. |
| FAA | Notice of Proposed Construction or Alteration | 14 CFR § 77 | A Notice of Proposed Construction or Alteration must be submitted to FAA for all structures exceeding 200 feet above the ground level or if any structures would intercept certain defined airspace around airports. |
| USFWS | Migratory Bird Treaty Act | 16 U.S.C. §§ 703–712 | This act protects birds that have common migration patterns between the United States and Canada, Mexico, Japan, and Russia. Under the act, taking, killing, or possessing migratory birds or their eggs or nests is unlawful. Take is allowed only under permits that may be granted by the Service to qualified applicants for the following types of activities: falconry, raptor propagation, scientific collecting, special purposes (rehabilitation, conservation education, migratory game bird propagation, and salvage), take of depredating birds, taxidermy, and waterfowl sale and disposal. NPPD has prepared a draft MBCP, which is being reviewed by the Service. |

| Agency | Statute or Requirement | Citation | Description |
|---|---|---|---|
| CEQ | NEPA | 42 U.S.C. §§ 4321–4347 | NEPA requires that Federal agencies conduct an environmental analysis of their proposed actions to determine if the actions may significantly affect the natural and human environment. |
| ACHP; State Historic Preservation Office (SHPO) | NHPA | 54 U.S.C. §§ 300101–307108 | Section 106 of the NHPA requires that Federal agencies take into account the effects of their actions on properties listed or eligible for listing in the NRHP, including prehistoric or historic sites, and districts, buildings, structures, objects, or properties of traditional religious or cultural importance. The NHPA also requires Federal agencies to afford ACHP an opportunity to comment on proposed actions. Federal agencies must also coordinate with the SHPO, in accordance with the NHPA. |
| **Potential State Requirements** | | | |
| NGPC | NESCA | Nebraska Revised Statutes §§ 37-801 to 37-811 | The intent of this act is to conserve plant and animal species in the state of Nebraska for human enjoyment and scientific purposes and to ensure their perpetuation as viable components of their ecosystems. Under the NESCA, NGPC has created a list of species that are protected as either threatened or endangered within the state of Nebraska. These species are not necessarily protected under the ESA, but any species that occurs in Nebraska and is protected under the ESA is automatically included under the NESCA. Under the NESCA, state agencies are required to ensure actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered or threatened species or result in the destruction or modification of their habitat. NPPD is obtaining the required permits. |
| NDEQ | Nebraska Construction Storm Water General Permit | 33 U.S.C. § 1342, Nebraska Revised Statutes § 81-1505 | Coverage by the Nebraska Construction Storm Water General Permit, issued by NDEQ, would be required for discharge of storm water from construction sites to waters of the State of Nebraska. |
| Nebraska Department of Aeronautics | Application for Permit to Build | Nebraska Revised Statutes § 3-403 | An Application for Permit to Build is required for any structure greater than 150 feet tall. |

| Agency | Statute or Requirement | Citation | Description |
|---|---|---|---|
| Nebraska Power Review Board | Nebraska Power Review Board Application and Approval | Nebraska Revised Statutes § 70-1012 | NPPD must obtain approval from the Nebraska Power Review Board for construction of utility facilities. |
| NDEQ | Section 401 of the CWA; Nebraska Water Quality Certification | 33 U.S.C. § 1341(a)(1); Nebraska Revised Statutes § 81-1505(2)(e) | Section 401 requires certification from the state for any permit or license issued by a Federal agency for any activity that may result in a discharge into waters of the United States within the state, such as a CWA Section 404 permit, to ensure that the proposed Project will not violate state water quality standards. |
| NDOR | Utility Permit | Nebraska Revised Statutes §§ 39-102; 39-1335; 39-1359; 39-1361; 70-515; and 70-667 | NPPD must obtain a utility permit from NDOR for the construction of utility facilities across a state highway. |
| Nebraska Public Service Commission | Application and Approval | Nebraska Revised Statutes §§ 75-701 to 75-724 | An application for Authority to Construct must be submitted to the Nebraska Public Service Commission for this transmission line. |
| **Other Potential Requirements** | | | |
| County Government Units | Flood Zone Permits | | Flood zone permits may be required for the following counties within the study area: Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, Blaine, Rock, Loup, Holt, Garfield, Antelope, and Wheeler, depending upon final structure placement and final location of material or helicopter fly yards and extent of improvements. |
| NPPD | Railroad Crossing or Encroachment Agreements | | NPPD must execute Railroad Crossing or Encroachment agreements with Union Pacific Railroad and Burlington Northern Santa Fe Railway. |

# 7.0 AGENCIES AND TRIBES CONTACTED

**Cooperating Agencies**

- Nebraska Game and Parks Commission
- Nebraska State Historical Society
- North Platt/Lincoln County Visitors Bureau

**Federal Agencies Contacted**

- U.S. Army Corps of Engineers
- National Park Service
- U.S. Department of Agriculture
- Natural Resources Conservation Service
- Department of Energy
- U.S. Environmental Protection Agency

**Nebraska Agencies Contacted**

- Nebraska Game and Parks Commission
- Nebraska Department of Environmental Quality
- Nebraska State Historical Society
- Nebraska Power Review Board

**Tribes Contacted**

- Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana
- Cheyenne and Arapaho Tribes, Oklahoma
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
- Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
- Pawnee Nation of Oklahoma
- Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Nation of Oklahoma
- Sac and Fox Tribe of the Mississippi in Iowa

- Santee Sioux Nation, Nebraska
- Standing Rock Sioux Tribe of North and South Dakota
- Yankton Sioux Tribe of South Dakota
- Arapaho Tribe of the Wind River Reservation, Wyoming
- Oglala Sioux Tribe
- Omaha Tribe of Nebraska
- Ponca Tribe of Nebraska
- Winnebago Tribe of Nebraska

**Other Agencies and Organizations Contacted**

- Oregon-California Trails Association
- North Platte/Lincoln County Visitors Bureau
- Ducks Unlimited
- Nebraska Wildlife Federation
- Sierra Club, Nebraska Chapter
- Audubon Nebraska
- Twin Platte Natural Resources District
- Upper Loup Natural Resources District
- Lower Loup Natural Resources District
- Upper Elkhorn Natural Resources District

# 8.0 DISTRIBUTION LIST

### Federal Agencies

- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- National Park Service
- U.S. Department of Agriculture, Natural Resource Conservation Service
- U.S. Department of Agriculture, Farm Service Agency
- U.S. Department of Agriculture, U.S. Forest Service
- Federal Aviation Administration
- Federal Emergency Management Agency
- Federal Energy Regulatory Commission
- Federal Highway Administration
- Advisory Council on Historic Preservation
- U.S. Department of Energy
- U.S. Department of the Interior, Bureau of Indian Affairs
- U.S. Department of the Interior, Bureau of Land Management
- U.S. Department of the Interior, Office of Environmental Policy and Compliance
- U.S. Geological Survey

### Tribal Governments and Agencies

- Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana
- Cheyenne and Arapaho Tribes, Oklahoma
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
- Northern Arapaho Tribe
- Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
- Oglala Sioux Tribe
- Omaha Tribe of Nebraska
- Pawnee Nation of Oklahoma
- Ponca Tribe of Nebraska
- Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota

- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Nation of Oklahoma
- Sac and Fox Tribe of the Mississippi in Iowa
- Santee Sioux Nation, Nebraska
- Standing Rock Sioux Tribe of North and South Dakota
- Winnebago Tribe of Nebraska
- Yankton Sioux Tribe of South Dakota

**Nebraska State Agencies**

- Nebraska Game and Parks Commission
- Nebraska Department of Environmental Quality
- Nebraska Power Review Board
- Nebraska State Historical Society
- Nebraska Board of Educational Lands and Funds
- Nebraska Department of Roads

**Local Units of Government**

- North Platte/Lincoln County Visitors Bureau
- Lincoln County
- Logan County
- McPherson County
- Hooker County
- Thomas County
- Cherry County
- Brown County
- Blaine County
- Rock County
- Loup County
- Garfield County
- Holt County
- Wheeler County
- Antelope County
- Village of Brewster

- Village of Chambers
- Village of Ewing
- Village of Hershey
- Village of Mullen
- Village of Stapleton
- Village of Sutherland
- Village of Thedford

### Nebraska Natural Resources Districts

- Twin Platte Natural Resources District
- Upper Loup Natural Resources District
- Lower Loup Natural Resources District
- Upper Elkhorn Natural Resources District

### Local Libraries

- North Platte Public Library
- Logan County Library
- Hooker County Library
- Garfield County Library
- Ewing Township Library
- Ainsworth Public Library

### Interested Organizations

- National Preservation Officer
- Oregon-California Trails Association
- Ducks Unlimited
- Nebraska Wildlife Federation
- Sierra Club, Nebraska Chapter
- Audubon Nebraska

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# 10.0 LIST OF PREPARERS

| Name | Agency/Firm | Title | Education | Years of Experience | EIS Responsibility |
|---|---|---|---|---|---|
| **U.S. Fish and Wildlife Service** | | | | | |
| Eliza Hines | U.S. Fish and Wildlife Service | Nebraska Field Supervisor | M.S., Environmental Management; B.S., Geology | 14 | Project Manager/ Agency Coordination/Quality Review |
| Bob Harms | U.S. Fish and Wildlife Service | Fish and Wildlife Biologist | M.S., Wildlife Biology; B.S., Biology | 22 | USFWS Technical Lead/Agency Coordination/Quality Review |
| **Louis Berger Team** | | | | | |
| Berenika Byszewski | Parametrix | Senior Cultural Resource Specialist | M.A., American Studies; B.A, Anthropology | 19 | Cultural Resources |
| Joe Dalrymple | Louis Berger | Biologist/ Environmental Scientist | M.S., Marine Science; B.S., Environmental Science/Marine Biology | 8 | Deputy Project Manager; Wildlife; Special Status Species; Comparison of Alternatives |
| Mike Hall | Parametrix | Environmental Scientist | B.A., Music History | 27 | Land Use; Transportation; Recreation |
| Coreen Johnson | Louis Berger | Senior Technical Editor | B.A., English Education Post-graduate Work, Technical Communication | 21 | Technical Editor; Document Preparation and Editorial Review |
| Linda Green | Louis Berger | GIS Analyst | B.A., Environmental Studies | 4 | Alternative Routing Study/GIS support/ Map Preparation |
| Jay Puckett | Louis Berger | Manager, Geospatial Analysis and Cartography | M.A. Geography; M.P.A. Public Administration | 10 | Lead for Alternative Routing Study |
| Derrick Rosenbach | Louis Berger | Environmental Scientist | M.S., Terrestrial Ecology; M.S., Environmental Policy and Planning; B.S., Political Science; B.S., Philosophy | 7 | Air Quality |
| Joe Rubino | Stanley Consultants | Principal Environmental Scientist | M.S., Meteorology; B.S., Meteorology | 30 | Noise |

| Name | Agency/Firm | Title | Education | Years of Experience | EIS Responsibility |
|---|---|---|---|---|---|
| Suni Shrestha | Louis Berger | Senior Environmental Planner | B.S., Environmental Analysis and Planning | 18 | Hazardous Materials |
| Spence Smith | Louis Berger | Senior Environmental Scientist | M.A., Biology BS, Zoology | 19 | Cumulative Effects |
| Margaret Spence | Parametrix | Senior Environmental Scientist | M.S., Applied Statistics; B.S., Mathematical Sciences | 27 | Socioeconomics; Environmental Justice |
| Tom St Clair | Louis Berger | Principal Scientist | Ph.D., Resource Development; M.S., Environmental Health; B.S., Biology | 43 | Project Manager; Executive Summary; Purpose and Need; Alternatives; Cumulative Impacts; Public Health and Safety; Alternative Routing Study |
| Laura Totten | Louis Berger | Senior Ecologist | M.S., Biological Sciences; B.S., Biological Sciences | 21 | Geology and Soils; Water Resources; Vegetation; Wetlands; Special Status Species; Cumulative Impacts |
| Curt Warber | Parametrix | Senior Environmental Scientist | M.L.A., Architecture; B.A., Biology | 31 | Visual Resources and Aesthetics |

# APPENDIX A:

# SCOPING SUMMARY REPORT

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# Final

# Scoping Summary Report

## Environmental Impact Statement (EIS) on Incidental Take Permit (ITP) and Associated Habitat Conservation Plan (HCP) for Nebraska Public Power District (NPPD) R-Project Transmission Line

June 2015

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**Appendices**

# 1 R-Project Background

Nebraska Public Power District (NPPD) plans to construct a 345,000 volt transmission line from NPPD's Gerald Gentleman Station near Sutherland, Nebraska, to a new substation to be sited adjacent to NPPD's existing substation east of Thedford, Nebraska. The new line will then proceed east and connect to a second substation to be sited in the Holt/Antelope/Wheeler County area.

Referred to as the R-Project, the approximately 225-mile-long line will help enhance reliability of NPPD's electric transmission system, relieve congestion from existing lines within the transmission system, and provide additional opportunities for development of renewable energy projects. The area traversed by the R-Project Transmission Line includes Nebraska Sandhills grassland.

NPPD is applying for an Endangered Species Act (ESA) Section 10(a)(1)(B) Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) to address the incidental take of the federally listed endangered American burying beetle (ABB; *Nicrophorus americanus*) during construction, operation, and maintenance of the R-Project in the Sandhills of north-central Nebraska. Although the transmission line is to be constructed mostly on private land, the NPPD is seeking the ITP under provisions of the ESA, which would meet regulatory obligations associated with the NPPD's proposed R-Project. The application for an ITP and development of a Habitat Conservation Plan (HCP) are voluntary steps that have been undertaken by NPPD to obtain authorization for incidental take resulting from otherwise lawful construction and operation of the R-Project within the Permit Area (see Figure 1). The HCP will outline actions to avoid, minimize, and mitigate to the maximum extent possible potential impacts to the ABB from covered activities within the Permit Area.

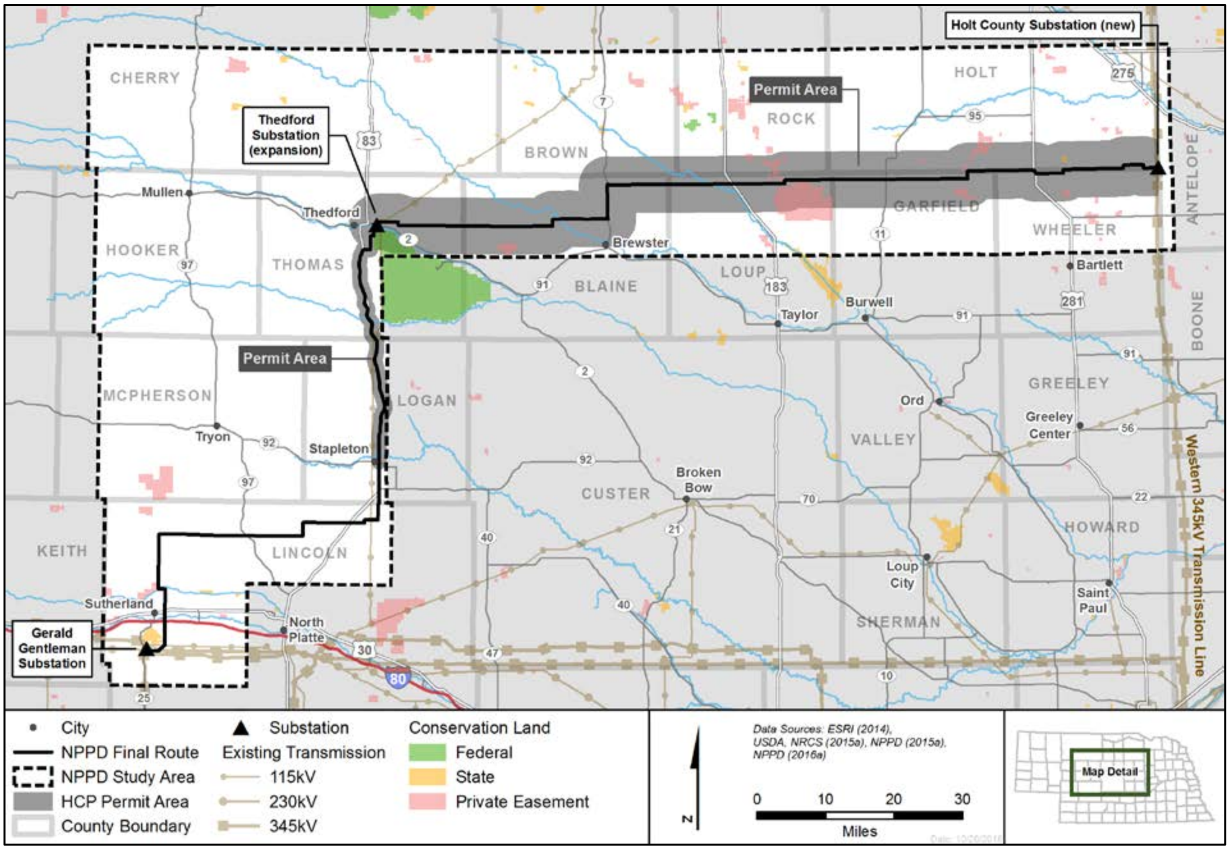


**Figure 1. Proposed Habitat Conservation Plan Permit Area**

# 2 Purpose and Need for Agency Action

NPPD anticipates that its proposed construction, operation, and maintenance of the R-Project may harass, harm, or kill (i.e., "take") species listed by the USFWS as threatened or endangered under the ESA. Such take is unlawful, except as provided by Section 10 of the ESA (Section 10). NPPD has applied for an ITP pursuant to Section 10 to allow for incidental take as it implements the otherwise lawful construction, maintenance, and operation of the R-Project. The original Study Area identified early in the project development phase for the R-Project includes portions of the ABB estimated range and complete avoidance of the species is not possible (Figure 2). Therefore, NPPD is seeking a permit pursuant to Section 10 of the ESA for the take of ABB during construction, operation, and maintenance of the R-Project.

An HCP is a required component of a Section 10 ITP application. The overall purpose of an HCP is to develop and implement a conservation plan that would avoid, minimize, and mitigate for the incidental take of federally listed species and the incidental take of species that could become listed during implementation of an HCP. NPPD is currently preparing the HCP as part of its R-Project ITP application.

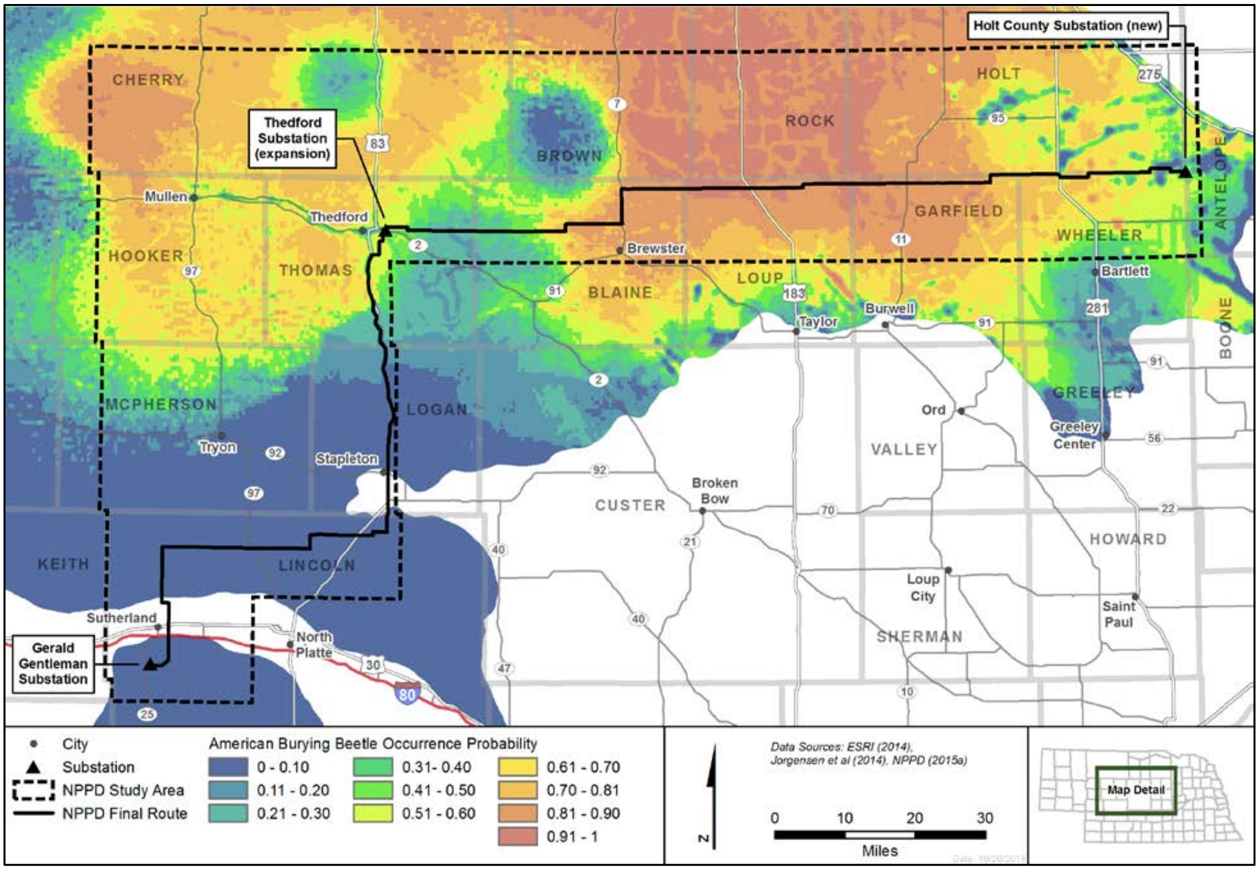


**Figure 2.** **American Burying Beetle Predicted Probability of Occurrence in Nebraska Sandhills Ecoregion**

## 2.1 Purpose

The ESA tasks USFWS with protecting and conserving endangered and threatened species throughout their ranges. To do so, USFWS must minimize the unavoidable incidental take of the listed species and ensure that any such take is mitigated to the extent practicable. The purpose of USFWS's action of issuing an ITP is to provide for protection and conservation of the Covered Species while enabling NPPD to construct, operate, and maintain the R-Project. USFWS aims to achieve this purpose by providing a means for NPPD to conserve endangered and threatened species and the ecosystems upon which they depend through implementation of a HCP and issuance of an ITP for the R-Project.

The National Environmental Policy Act (NEPA) requires that federal agencies conduct an environmental analysis of their proposed actions to determine if the actions may significantly affect the human environment. Under NEPA, a reasonable range of alternatives to a proposed action is developed and considered in the USFWS's environmental review. The purpose of the EIS is to analyze the impacts of the proposed action and other alternatives, in response to an application for an ITP related to activities that have the potential to result in take, pursuant to Section 10(1)(a)(B) of the ESA and its implementing regulations and policies. USFWS has a duty to respond to this application. The decision whether to issue an ITP will be based on the USFWS's NEPA and ESA compliance determinations.

## 2.2 Need

Under Section 9 of the ESA, unauthorized impacts to listed species (threatened or endangered) may constitute "take" and are prohibited. The need for the proposed action is based on the potential that otherwise lawful activities conducted by NPPD could result in the take of listed species, thus providing the impetus for an ITP. Take of a listed species, that is incidental to otherwise lawful activities, can be authorized under Section 10 of the ESA with preparation of an HCP and issuance of an ITP. The proposed HCP will describe the anticipated amount of incidental take of the ABB that may occur as the unintended result of NPPD's proposed covered activities, will identify conservation measures and demonstrate that NPPD covered activities will not appreciably reduce the likelihood of survival or recovery of the ABB in the wild, and will minimize and mitigate the impacts to the ABB to the maximum extent practicable.

## 2.3 Proposed Federal Action

The proposed federal action is the issuance of an ITP pursuant to Section 10(1)(a)(B) of the ESA for take of the federally listed ABB as described in NPPD's HCP. The proposed construction, operation, and maintenance of the R-Project may affect the ABB directly, and possibly indirectly, through habitat fragmentation and temporary and permanent loss of habitat as a result of ground disturbance and soil compaction. As required for ITP application, NPPD is developing a HCP that will outline actions to avoid, minimize, and mitigate potential impacts to the ABB. In coordination with NPPD, the USFWS will determine the duration of the HCP and ITP, which would depend on the anticipated life of the project, time needed to realize benefits of the HCP's conservation measures, and the timeframe in which adverse effects to ABB can be reliably predicted.

## 2.4 Resources Summary

In addition to the ABB, the DEIS will address the following resource categories addressed in a USFWS EIS:

- Soils and Geology
- Mineral Resources
- Water Resources
- Biological Resources
  - Wildlife
  - Vegetation
  - Wetlands
  - Special-Status Species
- Cultural, Historic, Archaeological and Paleontological Resources
- Land Use and Land Ownership
- Recreation
- Visual Resources
- Transportation

- Air Quality and Climate Change
- Noise
- Hazardous Materials
- Public Health and Safety
- Socioeconomics
- Environmental Justice

# 3 Summary of Scoping Process

The primary purposes of the scoping process are for the public to assist the USFWS by identifying important issues and alternatives related to the proposed incidental take permit and draft HCP to be analyzed in the draft EIS; to provide the public with a general understanding of the background of the proposed HCP and activities and species it would cover; and to provide the public with an overview of the NEPA process.

## 3.1 Notice of Intent

On October 30, 2014, USFWS published a Notice of Intent (NOI) to prepare an EIS that will assess the natural and human effects of issuing a permit to authorize the take of the federally endangered American burying beetle (Appendix A). The NOI initiated a 60-day comment period for the public to review and comment on any of the topics to be addressed in the DEIS. Comments were received electronically until the end of the comment period (December 29, 2014).

Beyond analyzing the impacts on the ABB, the NOI informed members of the public that the EIS will also consider the effects on a broad range of other resources (Section 2.4). As mentioned in the NOI, information from the public was sought on the following topics:

1. The direct, indirect, and cumulative effects that implementation of any reasonable alternative to the proposed action could have on endangered or threatened species and other unlisted species, including migratory birds and their habitats;
2. Other reasonable alternatives to the proposed action (permit issuance) that should be considered;
3. Relevant biological data and additional information concerning the ABB;
4. Current or planned activities in the subject area and their possible impacts on the ABB;
5. The presence of archaeological sites, buildings and structures, historic sites, sacred and traditional areas, and other historic preservation concerns;
6. The scope of covered activities, including potential avoidance, minimization, and mitigation measures for incidental take of the ABB;
7. Appropriate monitoring and adaptive management provisions that should be included in the HCP; and
8. Identification of any other environmental issues that should be considered regarding the proposed project and permit action.

## 3.2 Internal Scoping

USFWS and its NEPA consultant (Louis Berger) convened teleconferences and a face-to-face meeting for the purpose of identifying preliminary significant issues that would be of concern to stakeholders and the general public. These internal discussions were used to guide the public meeting format, develop public meeting hand-out materials, and identify the staff resources best suited to address potential concerns/issues raised by attendees.

## 3.3 Public Scoping Meetings

The Louis Berger team coordinated and facilitated the public scoping meetings for the EIS. The team researched public involvement processes used in recent years for high-profile projects to identify successful approaches. Based on that research, the team recommended use of an open house public meeting format for the scoping process. An open house format was suggested for several reasons:

- Open houses facilitate and encourage two-way communication;
- Participants have the opportunity to gain a better understanding of the issues through dialogue with the agencies and organizations involved;
- Every attendee has the opportunity to ask questions and provide written comments;
- Participants can attend anytime during the open house period at their convenience; and
- Participants who are uncomfortable speaking in a large group or who hold viewpoints they perceive to be different than the majority are more likely to engage in one-on-one discussions than speak in front of a large group in a public hearing-type setting.

USFWS reviewed the recommendation and elected to adopt the open house meeting format approach, and directed the Louis Berger team to implement the processes.

### 3.3.1 Meeting Facilities

Arrangements were made for three public meetings held in Burwell, Sutherland, and Thedford, Nebraska, between November 18 and November 20, 2014. Criteria for the selected facilities included Americans with Disabilities Act (ADA) accessibility, as well as accommodations for up to 50 participants at each location.

| Date | Time | Location | Attendance* |
|---|---|---|---|
| November 18, 2014 | 4 p.m. to 7 p.m. | American Legion, 657 G St., Burwell, NE 68823 | 23 |
| November 19, 2014 | 4 p.m. to 7 p.m. | Village Municipal Offices, 1200 First St., Sutherland, NE 69165 | 28 |
| November 20, 2014 | 4 p.m. to 7 p.m. | Thomas County Fairgrounds, 83861 Hwy. 83 Thedford, NE 69166 | 16 |

*Note: The attendance only represents the number of attendees who signed in. In all locations, the actual attendance exceeded the “official recorded” attendance.

### 3.3.2 Publicity

In addition to the NOI, which was published in the Federal Register on October 30, 2014, the USFWS also published a news release on October 29, 2014, announcing the public scoping process and encouraging interested parties to submit comments (Appendix B). The USFWS Regional Office issued the news release to radio stations and newspapers throughout the 14-county Study Area.

### 3.3.3 Meeting Materials

USFWS and the Louis Berger team developed handouts for each of the informational stations: one on the HCP, one on the ABB, and one on the EIS. Handouts contained supplemental information and allowed participants to take the key information home for future reference. Using text developed for the handouts, three informational panels were also prepared, one on each of the topics, for display at each station. These included biological and life history information about the ABB, as well as information about the HCP, EIS, and the public input process. Comment cards were also prepared for submitting written comments. All public scoping meeting materials were thoroughly reviewed by the USFWS and NPPD staff prior to publication. Copies of the informational handouts and displays are located in Appendices C and D, respectively.

### 3.3.4 Meeting Process

In order to ensure consistency across all meetings, a facilitator from the Louis Berger team provided training to agency representatives prior to the meetings. At each meeting, the facilitator greeted participants, explained the meeting format, invited participants to sign up for further communications from the USFWS, and gave each participant a comment card, encouraging them to provide written comments during the comment period ending December 29, 2014.

Three informational panels (3' x 6') with supplemental handouts relating to the HCP, ABB, and the EIS process were displayed around the room at each meeting. Comment cards and a computer also were available onsite, which participants could use to submit written comments for the public record at *www.regulations.gov* (www.regulations.gov/#!documentDetail;D=FWS-R6-ES-2014-0048-0001).

The open house format gave attendees the opportunity to talk one-on-one with subject matter experts from the USFWS, NPPD and consultants, and Louis Berger Team who staffed the three stations (HCP, ABB, and EIS). Participants and experts were able to engage in dialogue; participants could ask questions of the representatives, as well as express their ideas and concerns. This kind of interaction is invaluable in helping the USFWS identify the full range of potential issues and concerns regarding the ABB, which is the primary purpose of the scoping process.

In order to ensure participants' comments were captured in the public record, staff encouraged participants to submit written comments after they were finished discussing the issues. The Louis Berger team developed comment cards (Appendix E) for this purpose. Participants were advised that the interaction with subject matter experts would not be recorded, and only written comments would become part of the public record. The facilitator collected all written comments at the meetings, and participants were told they could also submit comments online, via mail, fax, or e-mail prior to the close of the comment period on December 29, 2014.

## 3.4 Agency Communication

Letters to pertinent federal and state agencies were prepared and submitted during the spring of 2016 (after this report was finalized). A template of the agency letter is included as Appendix F. The agencies contacted are listed below:

**Federal Agencies**

U.S. Army Corps of Engineers
National Park Service (Midwest Regional Office)
U.S. Forest Service
Environmental Protection Agency
Natural Resources Conservation Service
Bureau of Indian Affairs

**State Agencies**

Nebraska Game and Parks Commission
Nebraska State Historic Preservation Officer
Nebraska Department of Environmental Quality
Nebraska Department of Natural Resources

# 4 Summary of Public Scoping Comments

Following completion of the three public meetings and the public comment period, the Louis Berger team was responsible for collating, organizing, and summarizing all public comments received. The Louis Berger team downloaded all 53 comments received on *www.regulations.gov* (Appendix G). Handwritten comments were manually entered into the spreadsheet so the USFWS would be able to sort/query the entire body of public comments at any time during the project. Each comment was uniquely numbered and categorized by topic. In many cases the comment letters were of significant length as to not allow the entire comment to be placed in the table, so the most relevant portions were excerpted and entered into the spreadsheet. All attachments (comment letters/forms, other studies, and photos) were noted in the spreadsheet and saved to the SharePoint site under Public Scoping.

Presented below is a summary of the public comments received for each topic category identified during the public scoping period for the R-Project HCP/EIS. Comment categories are presented in order of the frequency those topics were referenced in individual comments. Though a total of 28 categories of comments were received, the majority related to transmission line routing and alternatives; the uniqueness/sensitivity of the landscape; whooping cranes; and migratory birds.

## 4.1 Transmission Line Routing and Alternatives

- It is not prudent to route through the Sandhills unique landscape; an alternative route should be found
- If NPPD refuses to propose or accept alternative routes, USFWS must inquire and provide a valid rationale for why such alternatives are not being utilized
- The transmission line should be placed underground in ecologically sensitive areas
- Other acceptable routes exist that would avoid the take of ABB
- Sensitive ecological habitat used by migratory birds should be avoided in the routing of the R-Project Transmission Line
- USFWS should consider alternatives that utilize existing corridors
- USFWS should consider all reasonable alternative routes; define in DEIS the criteria for determining reasonable
- USFWS appears to be limiting the scope of the DEIS to NPPD's proposed project alignment and is not considering alternative routes as a viable alternative for the HCP
- Putting the transmission line close to existing roads would be more logical for maintenance and less loss of native grasslands
- The power company can re-route the line across public lands; don't believe they should be allowed to have access to private lands
- USFWS has a voice to say that the proposed route is not adequate and that NPPD needs to find the least destructive route DEIS needs to fully address the purpose and need for the R-Project Transmission Line

## 4.2 Uniqueness/Sensitivity of Landscape

- Impact of project activities, such as access roads, on virgin native grassland and the length of time it will take to restore those grasses
- Lasting and detrimental effects on an unspoiled and fragile ecosystem, through increased pollution, disruptive earth work, and facility maintenance
- R-Project will change or scar the landscape forever, creating irreversible damage to the natural environment, including wildlife and habitat fragmentation
- Need to preserve one of the last remaining intact temperate grasslands in the world, and one of the most unique biological landscapes in the United States
- Questions about why the Sandhills were avoided in routing the Keystone XL pipeline, but those same concerns are not being applied to the R-Project

## 4.3 Whooping Cranes

- Potential increase in mortality due to collision with transmission lines, especially in the areas of Birdwood Creek and North Platte River
- Bird surveys should be undertaken to document the occurrences of Whooping Cranes in the immediate vicinity of the R-Project transmission line route

- Confirmed sightings of Whooping Cranes near Birdwood Creek; less than 300 left in the wild
- R-Project Transmission Line route will impact critical nesting habitat for Whooping Crane
- Collision of fledged cranes with transmission lines is the greatest source of mortality for Whooping Crane

## 4.4 Migratory Birds

- Habitat fragmentation as a result of transmission line construction
- Potential increase in bird mortality due to collision with R-Project transmission line; high concentrations of migratory birds in the areas of Birdwood Creek and North Platte River
- A migratory bird conservation plan should be required with issuance of the ITP
- Bird surveys should be undertaken to document occurrences of migratory birds in the vicinity of the R-Project Transmission Line
- First 20 miles out of Gerald Gentleman substation have high migratory bird densities
- R-Project Transmission Line routing occurs in the greatest concentration of migratory birds in the United States
- Harmful electromagnetic effects to migratory birds as a result of transmission line construction and operation
- Scope of the HCP should be expanded to address Whooping Cranes, Least Tern, and Piping Plover

## 4.5 American Burying Beetle

- Impacts to the land and the ABB would disrupt the delicate ecosystem of the grasslands
- ABBs are already killed through other means (e.g., mowing)
- Impacts of known threats, such as magnetic fields, ground disturbance, perpetual noise, and artificial lighting, on beetles and their habitat, as well as the introduction of other unknown threats.
- Need to conduct surveys for ABB to determine the full extent of project impacts

## 4.6 Soil Erosion

- Concern about soil compaction and creating “blowouts” as vegetation is removed in using heavy equipment to create access roads, construct towers, and perform future maintenance. These blowouts, which cause a loss of native grass and animal habitat (e.g., for the ABB), are difficult to heal and are likely to spread unless the grass is quickly restored.
- Potential for ongoing challenges related to revegetation to prevent soil erosion, and repair the ecosystem
- Disturbances to the soil can remain for generations, such as deep ruts from the Mormon Trail still visible north of Sutherland
- Need to develop enhanced requirements to prevent erosion and soil deposition into waterways
- Increased risk of erosion from the removal of windbreaks/shelterbelts

## 4.7 Other Protected Species

- Transmission line will lead to increased predation of other protected species as a result of increased raptor perching on transmission line towers
- Increased take of other protected species caused by habitat loss/fragmentation and collision with transmission lines, both as a result of direct impact and cumulative impacts
- State listed species should be considered in the DEIS, HCP, and ITP
- Impacts to grassland birds, particularly the Greater prairie chicken, due to habitat fragmentation and loss, collisions with power lines, and increased predation; need additional wildlife surveys and detailed measures to avoid impacts to these species and their habitats

## 4.8 Wetlands

- Loss and/or degradation of wetland habitat along the route of the R-Project transmission line as a consequence of construction
- Potential disturbance of wet meadows used to cultivate hay as a cash crop

## 4.9 Future Wind Power Generation

- Need to refine the "action" under NEPA review to include the number, spatial distribution, height, and rotor area (windswept area) of wind turbines.
- Concern about adverse impacts of noise from future wind turbines.

## 4.10 Visual Intrusion

- Aesthetics of natural Sandhills formation would be greatly damaged by high tower structures; would obstruct view from landowners' homes
- Construction of transmission line would disturb an undeveloped viewshed and the pristine solitude of the region
- Visual intrusion will negatively impact tourism dollars, and will erode environmental appeal for tourists, hunters, fisherman, and general public
- R-Project Transmission Line represents a visual intrusion on the undeveloped and unique ecosystem of the Sandhills

## 4.11 Historical/Cultural Resources

- Impacts on historic sites, including O'Fallon's Bluff (an important site on the Oregon Trail), the Sutherland State-Aid Bridge, remnants of the Mormon Trail, Gracie Creek Ranch, Arrowhead Lake, the Swift House, Indian artifacts on the Brush Creek Ranch, and the first sod schoolhouse
- Concern that Gracie Creek Ranch, Arrowhead Lake, and other historical sites may be desecrated and it will be too late to restore them

- Need to consult all tribes known to live in the area to give them the opportunity to provide recognition and protection over sacred areas and burial grounds (e.g., those in northern Loup County)

## 4.12 Cumulative Impacts

- Concern that the transmission line could open up the Sandhills for development (e.g., “beginning of things to come”), such as more lines for wind energy, and the impacts that would have on the ecosystem.
- Questions about the indirect and cumulative impacts on threatened and endangered species, migratory birds, wetlands, water quality, noise, and economics
- Need for a thorough and detailed discussion of cumulative impacts on the environment, including protected species, in the affected region
- Need to know the proposed location and number of wind turbines that will connect to this transmission line in order to analyze cumulative impacts
- Cumulative impacts must include those to: listed species, migratory bird species, Bald and Golden Eagles, the ecological integrity of the Sandhills biome related to these species’ persistence, additional impacts to the natural and human environment as a result of addition construction activities associated with new energy development facilities (e.g., wind), as well as the cultural impact this and potential energy development activities will have on the ranching communities and tourist industry associated with the relatively unaltered landscape of the Sandhills

## 4.13 Other Topics

A number of other topics were raised in comments, including those pertaining to noise; climate change; geology; invasive species; fire; impacts on ranchers; groundwater; electromagnetic field; infrastructure; human health; air quality, hunting; ecotourism; and access roads.

# 5 Issues Emerging from Scoping Process to be Addressed in DEIS

NEPA requires development and analysis of a reasonable range of alternatives, including the proposed action. These alternatives present different approaches for meeting the purpose and need of the project. The range of issues identified during the scoping process helps determine the selection of feasible and reasonable alternatives for the project. Issues identified in the Scoping Report will be used to assist in developing a full range of reasonable alternatives for the DEIS. While all scoping comments were determined to be within the scope of the DEIS and will be considered during its development, this section describes the primary issues raised by commenters to be addressed in each DEIS chapter.

## 5.1 Issues to be Addressed in Chapter 1: Project Overview and Background

Only a few comments related to the purpose and need for the project. Those commenters requested a clearly articulated purpose and justification for the project be stated in the DEIS.

## 5.2 Issues to be Addressed in Chapter 2: Proposed Action and Alternatives

One of the resonating themes of the comments received during the public scoping process was the need for consideration of alternative routes for the R-Project. Commenters questioned the prudence of placing a transmission line in the undeveloped Sandhills landscape. Commenters were concerned that the DEIS would not adequately discuss alternative transmission line routes and the process for selecting the final route, but rather would merely present the preferred route as the proposed action without any explanation Several commenters suggested the transmission line should utilize existing linear corridors or parallel existing roadways to minimize impact. Commenters also wanted ecologically sensitive habitats avoided to the extent possible in the delineation of the final transmission route. It should be noted many of these comments were received from affected landowners.

## 5.3 Issues to be Addressed in Chapter 3: Affected Environment

While a majority of the public comments submitted during the scoping process were from landowners directly impacted by the proposed routing, a number of comments concerned issues that should be addressed in the affected environment chapter of the DEIS. These issues cover a wide range of topics from protected species, to protection of cultural heritage sites during transmission line construction, to concerns regarding whooping crane and migratory bird collision with transmission lines.

A commonly expressed concern needing to be documented in the DEIS is that the Sandhills represent one of the last remaining intact temperate grasslands in the world. One commenter labeled the Sandhills a “virgin native grassland,” and one of the most unique and fragile ecosystems in the United States. Commenters communicated the uniqueness of the Sandhills ecosystem and the potential for detrimental impacts resulting from soil disturbance. Commenters expressed concern that disturbances to the soil can remain for generations, such as the deep ruts from the Mormon Trail still visible north of Sutherland.

Commenters stated that the R-Project Study Area traverses some of the highest density migratory bird pathways in the United States, and also includes whooping crane nesting habitat (however, no nesting whooping cranes have been documented within the study area). Commenters stated the DEIS should describe the occurrences of wetland habitat along the preferred route and within the Study Area, as well as their importance to ranching operations. Commenters stressed the historical significance of a number of sites within the Study Area, including O’Fallon’s Bluff (an important site on the Oregon Trail), the Sutherland State-Aid Bridge, remnants of the Mormon Trail, Gracie Creek Ranch, Arrowhead Lake, the Swift House, Indian artifacts on the Brush Creek Ranch, and the first sod schoolhouse.

A few commenters also stated the presence of protected species within the R-Project Study Area, including the ABB, greater prairie chicken, western prairie fringed orchid, and several others, should be acknowledged and documented.

## 5.4 Issues to be Addressed in Chapter 4: Environmental Consequences

Of greatest concern to commenters, based on the number of comments received, was the potential for increased mortality of whooping cranes and other migratory birds due to collision with the R-Project

Transmission Line, particularly in and around the Birdwood Creek watershed. Commenters also expressed concern about potential interaction between migratory birds and future wind power projects. One commenter suggested a migratory bird conservation plan should be prepared to support the NEPA analysis. Other areas of concern included the potential for increased soil erosion and disruption of farm operations. Commenters expressed concern about negative impacts to the aesthetics of the Sandhills from the high towers of the R-Project Transmission Line. Furthermore, commenters noted the potential for the transmission line to erode appeal for tourists and sportsman and the effect that could have on tourism dollars. Concern was also expressed about impacts to the ABB and other protected species as a result of habitat fragmentation, as well as the potential loss of wetland habitat.

## 5.5 Issues to be Addressed in Chapter 5: Cumulative Impacts

Several commenters expressed concern about the potential for the R-Project to open the unspoiled Sandhills landscape to future wind power generation and other development. Commenters requested the cumulative impact analysis undertaken for the DEIS identify the proposed location and number of wind turbines that the R-Project could accommodate. Commenters stated the cumulative impact analysis should include an assessment of the consequences of reasonably foreseeable development within the Study Area on protected species. One commenter stated the proposed location and number of wind turbines that would be connected to the transmission line should be identified before cumulative impacts are assessed.

## 5.6 Issues Outside the Scope of Action and Not Analyzed

All public comments received during the public scoping process were determined to be within scope and thus were analyzed to identify issues to be addressed in the EIS.

# 6 Preliminary Alternatives

Presented below are preliminary descriptions of the alternatives to be evaluated in the HCP EIS that will be expanded during preparation of Chapter 2 of the DEIS. Issues raised during the scoping process will be integrated into the final iteration of alternatives.

### Transmission Line Routing

The Southwest Power Pool (SPP) prescribed the constraints to meet the purpose and need for the R-Project as follows: begin at Gerald Gentleman Station near Sutherland, Nebraska, extend north to Cherry County, and then run east to connect to the Western Area Power Administration line that runs from Fort Thompson, South Dakota, to Grand Island, Nebraska, in Holt County. Based on this information, NPPD developed the Study Area, corridors, and preferred and alternative line routes. The Nebraska Power Review Board approved a 3-mile-wide corridor, within which screening criteria were applied to select the preferred route for the R-Project. NPPD applied screening criteria to select a preferred route (Figure 1). The DEIS will describe the route selection process and constraints.

## Proposed Action

The proposed Federal action is the USFWS issuance of an ITP, under Section 10(a)(1)(B) of the ES), to NPPD that would authorize a specified amount and type of incidental take of ABB during construction, operation, and maintenance of a 225-mile, 345-kV transmission line and substations in the Sandhills of north-central Nebraska. The proposed construction, operation, and maintenance of the R-Project may affect the ABB, a federally listed endangered species, directly, and possibly indirectly, through habitat fragmentation and temporary and permanent loss of habitat as a result of ground disturbance and soil compaction. As required for application for the permit, NPPD is developing a HCP that will outline actions to avoid, minimize, and mitigate potential impacts to the ABB. The HCP describes the counties covered and the covered activities, or those activities associated with the construction, operation, and maintenance of the R-Project, for which NPPD is requesting coverage under the ITP. In coordination with NPPD, the USFWS will determine the duration of the HCP and ITP, which would depend on the anticipated life of the project, time needed to realize benefits of the HCP's conservation measures, and the timeframe in which adverse effects to ABB can be reliably predicted.

## No-action Alternative

The No-action Alternative is the future condition of the HCP Study Area if the proposed Section 10(a)(1)(B) ITP is not issued by the USFWS, an HCP is not implemented, and the construction and operation of the R-Project Transmission Line does not proceed. Under the No-action Alternative, the purpose and need for the R-Project (i.e., enhancing reliability, relieving congestion, and providing opportunities for renewable energy projects) would remain unmet and needs may become increasingly worse over the next 50 years. However, it is likely that the SPP would require NPPD or another electrical utility to design another project in the Study Area to meet the purpose and need. Identifying another solution to meet the prescribed purpose and need would require NPPD or another electrical utility to initiate a new project planning process; however, future projects that do not include construction of an R-Project Transmission Line are too speculative to predict and adequately describe in the no-action condition. Therefore, the No-action Alternative assumes that no project would be constructed.

## Conservation Measures

Proposed ABB conservation measures being considered for possible inclusion in the HCP and EIS include: (1) adjustment in timing of certain construction activities to avoid ABB active periods; (2) avoidance of high quality habitat areas; (3) reduction in habitat disturbance by prioritizing use of existing disturbed areas for laydown and structure placement; (4) reduction in direct disturbance by modifying construction techniques; (5) reclamation of temporarily disturbed areas; (6) compensation for habitat loss; and (7) removal of carrion. While many of these conservation measures are directly tied to proposed construction and maintenance activities and thus fixed, the one measure that is flexible and lends itself to alternative approaches to implementation is compensation. While not yet specified, compensation alternatives (e.g., land parcels to be acquired and land management options) will be explored in the DEIS.

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**Appendix A: Notice of Intent**

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- Kretschmarr Cave mold beetle (*Texamaurops reddelli*).
- Madla Cave meshweaver (*Cicurina madla*).
- Peck's Cave amphipod (*Stygobromus* (=*stygonectes*) *pecki*).
- Robber Baron Cave meshweaver (*Cicurina baronia*).
- Texas blind salamander (*Eurycea rathbuni*).
- Tooth Cave ground beetle (*Rhadine persephone*).
- Tooth Cave pseudoscorpion (*Tartarocreagris texana*).
- Tooth Cave spider (*Neoleptoneta* (=*Leptoneta*) *myopica*).

*Permit TE—082496*

*Applicant:* Joint Base San Antonio, San Antonio, Texas.

Applicant requests a renewal to a current permit for research and recovery purposes to conduct presence/absence surveys of the following species within Texas:

- Bee Creek Cave harvestman (*Texella reddelli*).
- Black-capped vireo (*Vireo atricapilla*).
- Bone Cave harvestman (*Texella reyesi*).
- Braken Bat Cave meshweaver (*Cicurina venii*).
- Coffin Cave mold beetle (*Batrisodes texanus*).
- Cokendolpher Cave harvestman (*Texella cokendolpheri*).
- Golden-cheeked warbler (*Dendroica chrysoparia*).
- Government Canyon Bat Cave meshweaver (*Cicurina vespera*).
- Government Canyon Bat Cave spider (*Neoleptoneta microps*).
- Ground beetle (Unnamed) (*Rhadine exilis*).
- Ground beetle (Unnamed) (*Rhadine infernalis*).
- Helotes mold beetle (*Batrisodes venyivi*).
- Kretschmarr Cave mold beetle (*Texamaurops reddelli*).
- Madla Cave meshweaver (*Cicurina madla*).
- Robber Baron Cave meshweaver (*Cicurina baronia*).
- Texas blind salamander (*Eurycea rathbuni*).
- Tooth Cave ground beetle (*Rhadine persephone*).
- Tooth Cave pseudoscorpion (*Tartarocreagris texana*).
- Tooth Cave spider (*Neoleptoneta* (=*Leptoneta*) *myopica*).

*Permit TE—004439*

*Applicant:* Albuquerque BioPark, Albuquerque, New Mexico.

Applicant requests an amendment current permit for research and recovery purposes to conduct husbandry and holding of Zuni bluehead sucker (*Catostomus discobolus yarrowi*) at the BioPark in New Mexico.

*Permit TE—209033*

*Applicant:* Gene Wilde, Lubbock, Texas.

Applicant requests an amendment to a current permit for research and recovery purposes to collect 7,500 smalleye (*Notropis buccula*) and 7,500 sharpnose (*Notropis oxyrhynchus*) shiners from the wild each year for the life of the permit for genetic research within Texas.

*Permit TE—676811*

Applicant: U.S. Fish and Wildlife Service – mdash; Region 2, Albuquerque, New Mexico.

Applicant requests an amendment to a current permit for research and recovery purposes to conduct presence/absence surveys of smalleye shiner (*Notropis buccula*), sharpnose shiner (*Notropis oxyrhynchus*), and Zuni bluehead sucker (*Catostomus discobolus yarrowi*); and to capture, radio collar, draw blood, and release Gray wolf (*Canis lupus*) within Region 2 of the U.S. Fish and Wildlife Service.

*Permit TE—43777A*

Applicant: Sea Life U.S., LLC., Grapevine, Texas.

Applicant requests a renewal to a current permit for research and recovery purposes to conduct husbandry and holding of green (*Chelonia mydas*), Kemps ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles within the facility in Texas.

*Permit TE—053085*

*Applicant:* U.S. Bureau of Reclamation, Boulder City, Nevada.

Applicant requests a renewal to a current permit for research and recovery purposes to conduct presence/absence surveys of the following species within Arizona, California, and Nevada:

- Bonytail chub (*Gila elegans*).
- Razorback sucker (*Xyrauchen texanus*).
- Southwestern willow flycatcher (*Empidonax traillii extimus*).
- Yuma clapper rail (*Rallus longirostris yumanensis*).

**National Environmental Policy Act (NEPA)**

In compliance with NEPA (42 U.S.C. 4321 *et seq.*), we have made an initial determination that the proposed activities in these permits are categorically excluded from the requirement to prepare an environmental assessment or environmental impact statement (516 DM 6 Appendix 1, 1.4C(1)).

**Public Availability of Comments**

All comments and materials we receive in response to this request will be available for public inspection, by appointment, during normal business hours at the address listed in the **ADDRESSES** section of this notice.

Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

**Authority**

We provide this notice under section 10 of the Act (16 U.S.C. 1531 *et seq.*)

Dated: October 22, 2014.

**Joy E. Nicholopoulos,**

*Acting Regional Director, Southwest Region, U.S. Fish and Wildlife Service.*

[FR Doc. 2014–25835 Filed 10–29–14; 8:45 am]

BILLING CODE 4310–55–P

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**DEPARTMENT OF THE INTERIOR**

**Fish and Wildlife Service**

**[FWS–R6–ES–2014–0048; FF06E22000–145–FXES11130600000]**

## Endangered and Threatened Wildlife and Plants; Permits; Draft Environmental Impact Statement and Habitat Conservation Plan for the R-Project Transmission Line in Nebraska

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Notice of intent; announcement of public scoping meetings; request for public comments.

**SUMMARY:** We, the U.S. Fish and Wildlife Service, intend to prepare a draft environmental impact statement (DEIS) under the National Environmental Policy Act (NEPA) to consider potential impacts on the human environment from the proposed issuance of an incidental take permit (permit) and required implementation of a Habitat Conservation Plan (HCP). The Nebraska Public Power District (NPPD) is proposing to apply for the permit for take of the American burying beetle associated with the construction, operation, and maintenance of the R-Project Transmission Line in north-central Nebraska. The American burying

beetle is federally listed as an endangered species.

We provide this notice to (1) describe the proposed action; (2) advise other Federal and State agencies, potentially affected tribes, and the public of our intent to prepare an DEIS; (3) announce the initiation of a 60-day public scoping period; and (4) obtain suggestions and information on the scope of issues and possible alternatives to be included in the DEIS. The intended effect of this notice is to gather information from the public for consideration when developing alternatives to the proposed action that will avoid, minimize, and mitigate the effects of incidental take to the maximum extent practicable and to address other potential impacts to the human environment.

**DATES:** To ensure consideration, we must receive your written comments on or before December 29, 2014. Three scoping meetings will be held, from 4 p.m. until 7 p.m. on the following dates, at the following locations:

American Legion—November 18, 2014, 4 p.m. to 7 p.m., 657 G Street, Burwell, NE 68823;

Village Municipal Offices (Village of Sutherland Community Building)—November 19, 2014, 4 p.m. to 7 p.m., 1200 First Street, Sutherland, NE 69165; and

Thomas County Fairgrounds—November 20, 2014, 4 p.m. to 7 p.m., 83861 Highway 83, Thedford, NE 69166.

**ADDRESSES:** Send your comments regarding the proposed action and the proposed DEIS by any one of the following methods:

*Electronically: www.regulations.gov.* Follow the instructions for submitting comments on Docket No. FWS–R6–ES–2014–0048.

*U.S. Mail:* Public Comments Processing, Attn: FWS–R6–ES–2014–0048; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; MS: BPHC; 5275 Leesburg Pike; Falls Church, VA 22041–3803.

*In-Person Drop-off, Viewing, or Pickup:* Written comments will also be accepted at the public meetings (see **DATES**).

We request that you send comments only by the methods described above. We will post all comments on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see the **Public Availability of Comments** section below for more information).

**FOR FURTHER INFORMATION CONTACT:** Eliza Hines, Acting Field Supervisor, by phone at (308) 382–6468, and by U.S. mail at U.S. Fish and Wildlife Service, 9325 South Alda Road, Wood River, NE 68883. Individuals who are hearing or speech impaired may call the Federal Relay Service at (800) 877–8337 for TTY assistance.

*Reasonable Accommodations:* Persons needing reasonable accommodations to attend and participate in the public meetings should contact Eliza Hines. To allow sufficient time to accommodate requests, please call no later than one week before the meeting. Information regarding the proposed action is available in alternative formats upon request.

**SUPPLEMENTARY INFORMATION:** We intend to prepare a DEIS under NEPA (42 U.S.C. 4321 *et seq.*) to consider potential impacts on the human environment from the proposed issuance of an incidental take permit (permit) and required implementation of a Habitat Conservation Plan (HCP). The Nebraska Public Power District (NPPD) is proposing to apply for the permit for take of the American burying beetle (*Nicrophorous americanus*) associated with the construction, operation, and maintenance of the R-Project Transmission Line in north-central Nebraska. The American burying beetle is federally listed as an endangered species.

The NPPD is preparing a draft HCP as part of its application for the permit. The HCP must include measures to avoid, minimize, and mitigate the impacts of the take of covered species within the plan area during project construction, operation, and maintenance activities. We provide this notice to (1) describe the proposed action; (2) advise other Federal and State agencies, potentially affected tribes, and the public of our intent to prepare an DEIS; (3) announce the initiation of a 60-day public scoping period; and (4) obtain suggestions and information on the scope of issues and possible alternatives to be included in the DEIS. The intended effect of this notice is to gather information from the public for consideration when developing alternatives to the proposed action that will avoid, minimize, and mitigate the effects of incidental take to the maximum extent practicable and to address other potential impacts to the human environment.

## Background

Section 9 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.;* ESA), and its implementing regulations (50 CFR part 17), prohibit "take" of threatened and endangered fish or wildlife species. Take is defined under the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct (16 U.S.C. 1532(19)). We further define "harm" as an act, including significant habitat modification or degradation, that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). We further define "harass" as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt behavioral patterns such as breeding, feeding, and sheltering.

Under certain circumstances, we may issue permits to take listed species if such taking is incidental to, and not the purpose of, otherwise lawful activities. Regulations governing permits for threatened or endangered species incidental take are found at 50 CFR 17.32 and 50 CFR 17.22, respectively.

NEPA requires that Federal agencies conduct an environmental analysis of their proposed actions to determine if the actions may significantly affect the human environment. Under NEPA, a reasonable range of alternatives to a proposed project is developed and considered in the Service's environmental review. Alternatives considered for analysis in a DEIS for an HCP may include, but are not limited to: Variations in the scope of covered activities; variations in the location, amount, and type of conservation activities; variations in permit duration; or a combination of these elements.

## Proposed Action

The proposed Federal action is our issuance of a permit to NPPD that would authorize a specified amount and type of incidental take of American burying beetles during construction, operation, and maintenance of a 220-mile, 345-kilovolt (kV) transmission line and substations in the Sandhills of north-central Nebraska. The purpose of the R-Project is to enhance reliability of NPPD's electric transmission system, relieve congestion from existing lines within the transmission system, and provide additional opportunities for development of renewable energy projects. The proposed construction, operation, and maintenance of the NPPD R-Project may affect the American burying beetle directly, and possibly indirectly, through habitat fragmentation and temporary and permanent loss of habitat as a result of ground disturbance and soil compaction. As required for application for the permit, NPPD is developing a

HCP that will outline actions to avoid, minimize, and mitigate potential impacts to the American burying beetle. In coordination with NPPD, we will determine the duration of the HCP and permit, which would depend on the anticipated life of the project, time needed to realize benefits of the HCP's conservation measures, and the timeframe in which adverse effects to American burying beetles can be reliably predicted.

Proposed American burying beetle conservation measures that may be considered for the HCP to adopt include: (1) Adjustment in timing of certain construction activities to avoid American burying beetle active periods; (2) avoidance of high-quality habitat areas; (3) reduction in habitat disturbance by prioritizing use of existing disturbed areas for laydown and structure placement; (4) reduction in direct disturbance by modifying construction techniques; (5) reclamation of temporarily disturbed areas; (6) compensation for habitat loss; and (7) removal of carrion. The HCP will also include monitoring and adaptive management features. Monitoring would help determine compliance with and effectiveness of the HCP; validate assumptions, information, and models used to develop the HCP; and provide information to support revisions, if necessary, to the conservation measures over the life of the HCP.

**Public Scoping**

The primary purpose of the scoping process is for the public to assist the Service in developing a DEIS for the proposed permit action by identifying important issues and alternatives related to NPPD's proposed project, to provide the public with a general understanding of the background of the proposed HCP and activities it would cover, and an overview of the NEPA process. To ensure that we identify a range of issues and alternatives related to the proposed permit action, we invite comments and suggestions from all interested parties.

The scoping meetings will consist of an open house format from 4 p.m. to 7 p.m. about the proposed action and NEPA process. The open house format will provide interested members of the public an opportunity to learn about the proposed action, permit area, and the covered species. We will accept oral and written comments throughout the public meeting. A court reporter and an interpreter will be present if deemed necessary. You may also submit your comments and materials by one of the methods listed in the ADDRESSES section.

**Public Comments**

We request data, comments, new information, or suggestions from the public, other concerned governmental agencies; the scientific community; tribes; industry; or any other interested party on this notice. We and NPPD will consider these comments in developing the DEIS and the draft HCP related to the proposed project. We particularly seek comments on the following:

1. The direct, indirect, and cumulative effects that implementation of any reasonable alternative to the proposed project could have on endangered or threatened species and other unlisted species, including migratory birds and their habitats;
2. Other reasonable alternatives to the proposed project and permit issuance that should be considered;
3. Relevant biological data and additional information concerning the American burying beetle;
4. Current or planned activities in the subject area and their possible impacts on the American burying beetle;
5. The presence of archaeological sites, buildings and structures, historic sites, sacred and traditional areas, and other historic preservation concerns;
6. The scope of covered activities, including potential avoidance, minimization, and mitigation measures for incidental take of the American burying beetle;
7. Appropriate monitoring and adaptive management provisions that should be included in the HCP; and
8. Identification of any other environmental issues that should be considered regarding the proposed project and permit action.

**Public Availability of Comments**

Comments and materials we receive in response to this notice and at the public meeting, as well as supporting documentation we use in preparing the DEIS, will become part of the public record and will be available for public inspection at *www.regulations.gov* (see ADDRESSES). Before including your address, phone number, email address, or other personal identifying information in your comments, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

**Environmental Review and Next Steps**

The DEIS will include analyses of potential impacts on the American burying beetle from the HCP and the permit and from each identified alternative to the action. The DEIS will provide biological descriptions of affected species and habitats, as well as the effects of the alternatives on other resources, such as vegetation, wetlands, wildlife, geology and soils, air quality, water resources, water quality, cultural resources, land use, recreation, water use, the local economy, and environmental justice. Following completion of the environmental review, we will publish a notice of availability and request for public comments on the DEIS, NPPD's permit application, and the draft HCP. The DEIS and draft HCP are expected to be completed and available for the public review during the first three months of the 2016 calendar year.

**Authority**

Our environmental review of this project will be conducted in accordance with the requirements of NEPA (42 U.S.C. 4321 *et seq.*), Council of Environmental Quality regulations (40 CFR parts 1500–1508), other applicable Federal laws and regulations, and the Service's applicable policies and procedures. This notice is being furnished in accordance with 40 CFR 1501.7 of the NEPA regulations to obtain suggestions and information from other agencies and the public on the scope of issues and alternatives to be addressed in the DEIS.

Dated: October 8, 2014.

**Nicole Alt,**

*Acting Assistant Regional Director—Ecological Services, Mountain-Prairie Region, Denver, CO.*

[FR Doc. 2014–25796 Filed 10–29–14; 8:45 am]

BILLING CODE 4310–55–P

**DEPARTMENT OF THE INTERIOR**

**Bureau of Land Management**

**[LLCAC06900 L17110000.AL0000 15XL1109AF]**

**Notice of Public Meeting of the Carrizo Plain National Monument Advisory Committee**

**AGENCY:** Bureau of Land Management, Interior.

**ACTION:** Notice of public meeting.

**SUMMARY:** In accordance with the Federal Land Policy and Management Act and the Federal Advisory Committee Act of 1972, the U.S. Department of the Interior, Bureau of Land Management (BLM) Carrizo Plain National Monument Advisory

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**Appendix B: News Release**

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U.S. Fish and Wildlife Service

# News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release

October 29, 2014

## U.S. Fish and Wildlife Service Seeks Public Comment on Environmental Impacts of Proposed Transmission Line in Nebraska

**Contacts:**

Robert Harms, 308.382.6468, ext. 17; Robert_Harms@fws.gov
Steve Segin, 303.236.4578; Robert_segin@fws.gov

**GRAND ISLAND, NE –** Tomorrow, the U.S. Fish and Wildlife Service (Service) is publishing a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) that will assess the natural and human effects of issuing a permit to authorize the take of the federally endangered American burying beetle. The NOI initiates a 60-day comment period for the public to review and comment on any of the topics to be addressed in the EIS. Comments can be provided electronically by accessing http://www.regulations.gov/. The comment period will end December 29, 2014.

The Nebraska Public Power District (NPPD) has requested that the Service issue this permit because the construction, operation, and maintenance of its proposed 220-mile long, 345 kV transmission line is likely to impact the American burying beetle. As a requirement of permit application, NPPD is preparing a Habitat Conservation Plan (HCP) to identify avoidance, minimization, and mitigation measures for the American burying beetle.

Beyond analyzing the impacts on the American burying beetle, the EIS will also consider the effects on a broad range of other resources. These include other fish and wildlife species, geology and mineral resources, soil and water resources, air quality, land ownership and use, recreation, transportation, socioeconomics, visual resources, noise, cultural and paleontological resources, hazardous materials, and public health and safety. The Service is also interested in learning about the presence of archaeological sites, buildings and structures, historic sites, sacred and traditional areas, and other historic preservation concerns in the proposed project area. The Service also seeks information about the direct, indirect, or cumulative effects that implementation of the HCP could have on any of these resources, as well as the beetle. The Service is also seeking information about other reasonable alternatives to the proposed HCP and permit issuance that should be considered and their potential effects.

The Service is holding three public scoping meetings where information about the EIS, HCP and American burying beetle will be provided. Any interested party or organization is welcome to provide comments at the meetings. The public scoping meetings will be held at the following locations:

- American Legion—November 18, 2014, 4 p.m. to 7 p.m., 657 G Street, Burwell, NE 68823;
- Village Municipal Offices—November 19, 2014, 4 p.m. to 7 p.m., 1200 First Street, Sutherland, NE 69165; and
- Thomas County Fairgrounds—November 20, 2014, 4 p.m. to 7 p.m., 83861 Highway 83, Thedford, NE 69166.

A copy of the draft NOI can be found at http://www.regulations.gov/, http://www.fws.gov/mountain-prairie/ne.html, or by contacting:

U.S. Fish and Wildlife Service
Nebraska Ecological Services Field Office
9325 South Alda Road
Wood River, Nebraska 68883

Alternatively, copies can be requested by phone: 308–382–6468.

Comments on the NOI can be provided electronically by accessing http://www.regulations.gov/.

Public domain photos of the American burying beetle can be found here: http://bit.ly/1oWYUiB.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/

- FWS –

## Appendix C: Public Scoping Meeting Handouts

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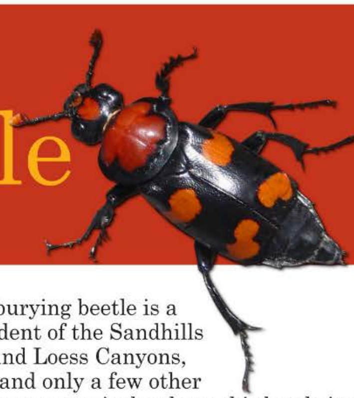
# American Burying Beetle

## *Nicrophorus americanus*



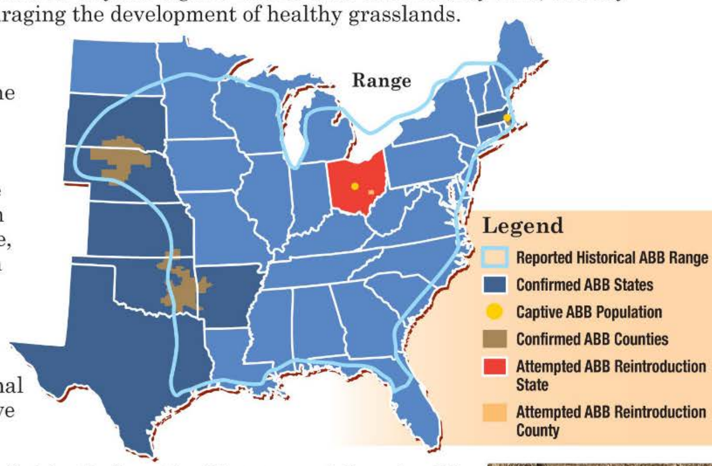
The endangered American burying beetle is a unique and fascinating resident of the Sandhills of north-central Nebraska and Loess Canyons, southeast of North Platte—and only a few other places in the world. Growing up to two inches long, this beetle is the largest member of the carrion beetle family *(Silphidae)* in North America.

As its name implies, these beetles have the unique behavior of finding and burying dead things (carrion). Active mostly at night, they spend much of their time searching for carrion. The American burying beetle can cover several miles in a single flight. They can detect a dead mouse only hours after it died and can find carrion from up to two miles away. After finding a dead animal, the beetles immediately begin burying the carcass, which they then eat and use to feed their larvae.

The American burying beetle plays an important role in the Nebraska Sandhills. It recycles organic nutrients to enrich sandy soils, thereby encouraging the development of healthy grasslands.

### Reasons for Decline

There are several likely causes of the decline in American burying beetle populations. As human populations have grown, the formerly vast expanses of undisturbed areas have decreased. This habitat fragmentation results in more areas of habitat edge, and thus an increase in competition with scavenger species including raccoons, opossums, foxes, skunks, and crows. Biologists also suspect that an increase in light pollution may have some effect on this nocturnal species, although specific impacts have not yet been discovered.




Originally found in 35 states and Canada, this beetle is now found only in Nebraska and five other states. It was officially listed as endangered in the U.S. in August 1989.

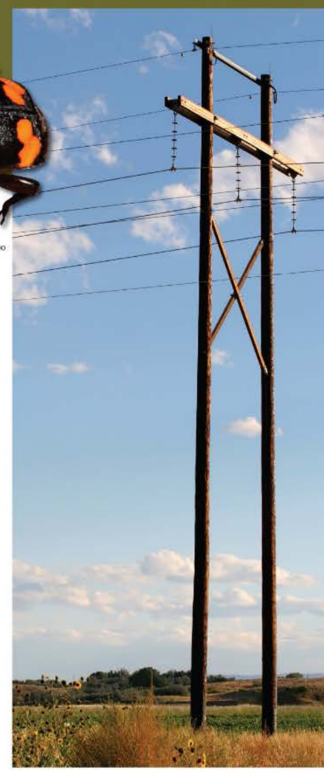
The American burying beetle requires large habitats with little or no human disturbance. In Nebraska, they can be found in prairies, open woodlands, scrubland and forest edge. The Sandhills Region is an important stronghold, as is a small area located in the Loess Canyons southeast of North Platte.

# Environmental Impact Statement

on

## Incidental Take Permit and Associated Habitat Conservation Plan for NPPD R-Project Transmission Line

Photo by Dan Kirk/Saint Louis Zoo



The U.S. Fish and Wildlife Service (Service) intends to prepare an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA) to consider potential impacts on the human environment from:

- the proposed issuance of an incidental take permit (permit); and
- required implementation of a habitat conservation plan (HCP) associated with the construction, operation, and maintenance of the R-Project Transmission Line in north-central Nebraska.

### Incidental Take Permit

The Nebraska Public Power District (NPPD) is planning to apply for a permit for the incidental take of the federally endangered American burying beetle associated with the R-Project.

### Habitat Conservation Plan

NPPD is preparing an HCP as a required part of its application for the incidental take permit. The HCP must include measures to avoid, minimize, and mitigate the impacts of the take of covered species within the plan area during project construction, operation, and maintenance activities. The HCP will also include monitoring and adaptive management features to help determine compliance with and effectiveness of the HCP.

Photo by Cindy Maynard/FWS

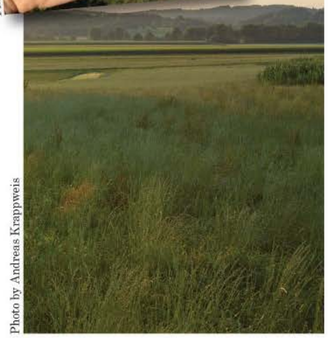


Photo by Andreas Krappweis

### Why is the Service preparing this Environmental Impact Statement?

Because the Federal government must assess the effects of its actions on the human and natural environment. Section 9 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.; ESA), and its implementing regulations (50 CFR part 17) prohibit "take" of threatened and endangered fish or wildlife species. Take is defined under the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct (16 U.S.C. 1532(19)). The Service defines "harm" as an act, including significant habitat modification or degradation, that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Because the R-Project may result in incidental take of a federally endangered species, NPPD has elected to apply for an incidental take permit under Section 10 of the ESA. NPPD must submit an HCP as part of its application for an incidental take permit.

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# Habitat Conservation Plan (HCP)

Supporting the

## Incidental Take Permit for NPPD's R-Project Transmission Line

Photo by FWS

Photo by NPPD

Photo by Fernando Weberich

The Nebraska Public Power District (NPPD) is preparing a habitat conservation plan (HCP) for the American burying beetle to support NPPD's application for an incidental take permit associated with its R-Project Transmission Line Project in north-central Nebraska. The R-Project Transmission Line corridor runs from Sutherland, Nebraska to Thedford and across the Sandhills to Clearwater, Nebraska.

Photo by FWS

### Why is NPPD preparing a habitat conservation plan?

Because NPPD is planning to apply for an incidental take permit from the U.S. Fish & Wildlife Service (Service) for take of the American burying beetle *(Nicrophorous americanus)* associated with the construction, operation, and maintenance of the R-Project Transmission Line in north-central Nebraska. The American burying beetle is federally listed as an endangered species, and NPPD is preparing the draft HCP as part of its application for the permit. The HCP must include measures to avoid, minimize, and mitigate the impacts to American burying beetles during the project construction, operation, and maintenance activities over the next 30-50 years.

Photo by Dan Kirk/Saint Louis Zoo

Photo by Brett Cortesi, FWS

### Why does the law require a habitat conservation plan?

Section 9 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; ESA), and its implementing regulations (50 CFR part 17), prohibit "take" of threatened and endangered fish or wildlife species. Take is defined under the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct (16 U.S.C. 1532(19)). The Service further defines "harm" as an act, including significant habitat modification or degradation, that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). The Service further defines "harass" as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt behavioral patterns such as breeding, feeding, and sheltering.

Printed on 100% recycled paper.

Photo by K.S. Vignette

Photo by Christoph van der Bij

## How might American burying beetles be impacted?

The planned construction, operation, and maintenance of the NPPD R-Project may affect the American burying beetle directly, and possibly indirectly, through habitat fragmentation and temporary and permanent loss of habitat as a result of ground disturbance and soil compaction. As required for application for the permit, NPPD is developing an HCP that will outline actions to avoid, minimize, and mitigate potential impacts to the American burying beetle. In coordination with NPPD, the Service will determine the duration of the HCP and permit, which would depend on the anticipated life of the project, time needed to realize benefits of the HCP's conservation measures, and the timeframe in which adverse effects to American burying beetles can be reliably predicted.

## What would the habitat conservation plan do?

Proposed American burying beetle conservation measures that may be considered for the HCP to adopt may include but are not limited to: **(1)** adjustment in timing of certain construction activities to avoid American burying beetle active periods; **(2)** avoidance of high-quality habitat areas; **(3)** reduction in habitat disturbance by prioritizing use of existing disturbed areas for laydown and structure placement; **(4)** reduction in direct disturbance by modifying construction techniques; **(5)** reclamation of temporarily disturbed areas; **(6)** compensation for habitat loss; and **(7)** removal of carrion. The HCP will also include monitoring and adaptive management features. Ecological monitoring will help determine compliance with and effectiveness of the HCP; validate assumptions, information, and models used to develop the HCP; and provide information to support revisions, if necessary, to the conservation measures over the life of the HCP.

## What are the next steps?

NPPD is currently preparing the draft HCP, which will undergo review by the Service and then be made available for public review and comment prior to finalization. The intent of the Service is to conduct public review of the draft HCP in parallel with the draft R-Project incidental take permit and associated HCP environmental impact statement.

**Appendix D: Public Scoping Meeting Banners**

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# Environmental Impact Statement

on

## Incidental Take Permit and Habitat Conservation Plan for NPPD R-Project Transmission Line

**Who:** U.S. Fish and Wildlife Service (Service)

**What:** Preparation of an environmental impact statement (EIS)

**Why:** The Nebraska Public Power District (NPPD) is planning to apply for a permit for the incidental take of the endangered American burying beetle associated with the construction, operation, and maintenance of the R-Project Transmission Line. The planned project may affect the American burying beetle through habitat fragmentation and temporary and permanent loss of habitat as the result of ground disturbance and soil compaction.

**Where:** The R-Project Transmission Line corridor in north-central Nebraska from Sutherland, Nebraska to Thedford and across the Sandhills to Clearwater, Nebraska.

### Other information

NPPD is preparing a habitat conservation plan (HCP) as a part of its application for an incidental take permit. The HCP must include measures to avoid, minimize, and mitigate the potential impacts of the take of American burying beetles within the plan area during project construction, operation, and maintenance activities over the next 30-50 years.

The Service will consider a range of possible alternatives to the proposed action, which is the Service's approval of the HCP and issuance of an incidental take permit, possibly including variations in the scope of covered activities; variations in the location, amount, and type of conservation activities; variations in permit duration; or a combination of these elements. The EIS will include analyses of potential impacts on the American burying beetle from the HCP and the permit and from each identified alternative to the action. Alternatives in the EIS will not include transmission line routing alternatives.

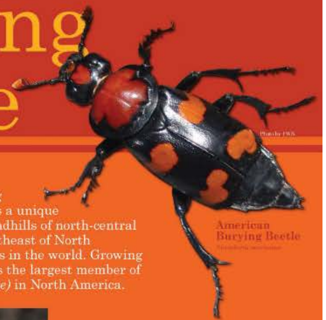
### How you can help

The primary purpose of this meeting is for the public to assist the Service by identifying important issues and alternatives to the proposed incidental take permit and draft HCP to be analyzed in the draft EIS. Please talk with Service staff at this meeting and provide comments and suggestions.

**When:** Public comments are due by December 29, 2014.


Habitat Conservation Plan (HCP)
Supporting the
Incidental Take Permit for NPPD's R-Project Transmission Line
The Nebraska Public Power District (NPPD) is preparing a habitat conservation plan (HCP) for the American burying beetle to support NPPD's application for an incidental take permit (ITP) associated with its R-Project Transmission Line Project in north-central Nebraska.
Why is NPPD preparing a habitat conservation plan?
NPPD is planning to apply for an ITP from the U.S. Fish & Wildlife Service (Service) because construction, operation, and maintenance of the R-Project Transmission Line may result in incidental take of the federally endangered American burying beetle. An HCP is required to apply for an ITP.
How might American burying beetles be impacted?
The planned project may affect the American burying beetle through habitat fragmentation and temporary and permanent loss of habitat as a result of ground disturbance and soil compaction.
What would the habitat conservation plan do?
The draft HCP is currently being developed by NPPD in cooperation with the Service. While the final avoidance, mitigation, and minimization measures are not known at this time, they may include but are not limited to: (1) adjustment in timing of construction activities; (2) avoidance of high quality habitats; (3) reduction in habitat disturbance; (4) reduction in direct disturbance by modifying construction techniques; (5) reclamation of temporarily disturbed areas; (6) compensation for habitat loss; and (7) removal of carrion. The HCP will also include monitoring and adaptive management features to help determine compliance with and effectiveness of the HCP.
What are the next steps?
NPPD is currently preparing a draft HCP, which will undergo review by the Service and then be made available for public review and comment prior to finalization.

# American Burying Beetle




The endangered American burying beetle *(Nicrophorus americanus)* is a unique and fascinating resident of the Sandhills of north-central Nebraska and Loess Canyons, southeast of North Platte—and only a few other places in the world. Growing up to two inches long, this beetle is the largest member of the carrion beetle family *(Silphidae)* in North America.

As its name implies, these beetles find and bury dead things (carrion). Active mostly at night, they spend much of their time searching for carrion. The American burying beetle can cover several miles in a single flight and can find carrion from up to two miles away. After finding carrion, the beetles immediately begin burying the carcass, which they then eat and use to feed their larvae.

The American burying beetle plays an important role in the Nebraska Sandhills. It recycles organic nutrients to enrich sandy soils, thereby encouraging the development of healthy grasslands.

## Range


Originally found in 35 states and Canada, this beetle is now found only in Nebraska and five other states. It was officially listed as endangered in the U.S. in August 1989.

The American burying beetle requires large habitats with little or no human disturbance. In Nebraska, they can be found in prairies, open woodlands, scrubland and forest edge. The Sandhills Region is an important stronghold, as is a small area located in the Loess Canyons southeast of North Platte.

## Reasons for decline

There are several likely causes for the decline in American burying beetle populations. As human populations have grown, the formerly vast expanses of undisturbed areas have decreased. This habitat fragmentation results in more areas of habitat edge, and thus an increase in competition with scavenger species including raccoons, opossums, foxes, skunks, and crows. Biologists also suspect that an increase in light pollution may have some effect on this nocturnal species, although specific impacts have not yet been discovered.

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**Appendix E: Comment Card**

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## Comment Form

**Environmental Impacts of the Proposed Issuance of an Incidental Take Permit and Implementation of a Habitat Conservation Plan for the R-Project Transmission Line**

Welcome to this public meeting about the proposed issuance of an incidental take permit (ITP) and implementation of a habitat conservation plan (HCP) for the federally endangered American burying beetle (*Nicrophorus americanus*). The Nebraska Public Power District (NPPD) is preparing to apply for an ITP from the U.S. Fish and Wildlife Service (Service), because the construction, operation, and maintenance of its planned 220-mile long, 345-kV transmission line is likely to impact the American burying beetle. The Service is analyzing potential environmental impacts of issuing this proposed incidental take permit through the preparation of an environmental impact statement (EIS) as required by the National Environmental Policy Act (NEPA).

The purpose of the public scoping process is to inform the public of the Service's proposed action, identify relevant issues and potential alternatives, and support the process for developing an environmental impact statement and related compliance efforts. The range of reasonable alternatives to be analyzed in the EIS will be determined with careful consideration of the public comments received during this process. Beyond measuring the impacts on the American burying beetle, the EIS will also consider the effects of the proposed issuance of this ITP on a broad range of other resources, including (but not necessarily limited to) other fish and wildlife species, geology and mineral resources, soil and water resources, air quality, land ownership and use, recreation, transportation, socioeconomics, visual resources, noise, cultural and paleontological resources, hazardous materials, and public health and safety. The Service is also interested in learning about the presence of archaeological sites, buildings and structures, historic sites, sacred and traditional areas, and other historic preservation concerns in the proposed project area.

Please review the materials provided, talk with staff from the Service and NPPD who are here tonight, and submit your written comments on the incidental take permit and habitat conservation plan.

To submit your comments, you can complete this form and drop it off in the box by the main door, or mail it to the following address:

U.S. Fish and Wildlife Service
Nebraska Ecological Services Field Office
9325 South Alda Road
Wood River, Nebraska 68883

You can submit comments electronically at **http://www.regulations.gov/**.

To ensure consideration of written comments, they must be submitted on or before December 29, 2014.

U.S. Fish and Wildlife Service
Nebraska Ecological Services Field Office
9325 South Alda Road
Wood River, Nebraska 68883

Environmental Impacts of the Proposed Issuance of an Incidental Take Permit and Implementation of a Habitat Conservation Plan for the R-Project Transmission Line


Public Comment Form

Name: ______________________________________________

Street Address: ______________________________________

City:________________________ State:_____ Zip Code:______

E-mail:______________________________________________

Organization/Tribe You Represent: ___________________________

______________________________________________

Which Public Scoping meeting did you attend, if any?

Location: _____________________________________________

If you do not want your name and address to be available to the public, check here [ ] (Be aware the Service cannot guarantee anonymity.)

Please write neatly so your comments can be recorded completely and accurately. Complete and drop this form in the box provided (or fold, tape, stamp and mail).

We are conducting this scoping process, including public meetings, so the public can assist us in identifying important issues and alternatives to the proposed incidental take permit and the habitat conservation plan to be analyzed in the environmental impact statement. To ensure that the full range of issues and alternatives related to the proposed permit action are identified, we invite comments and suggestions from all interested parties.

We particularly seek comments on the following:

1. The direct, indirect, and cumulative effects that implementation of any reasonable alternative to the proposed ITP and HCP could have on endangered or threatened species and other unlisted species, including migratory birds and their habitats:

2. Other reasonable alternatives to the proposed issuance of an ITP and HCP that should be considered:

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3. Relevant biological data and additional information concerning the American burying beetle:

4. Current or planned activities in the project area and their possible impacts on the American burying beetle:

5. The presence of archaeological sites, buildings and structures, historic sites, sacred and traditional areas, and other historic preservation concerns:

6. The scope of covered activities, including potential avoidance, minimization, and mitigation measures for incidental take of the American burying beetle:

7. Appropriate monitoring and adaptive management provisions that should be included in the HCP:

8. Identification of any other environmental issues that should be considered regarding the proposed ITP and HCP:

9. Other Comments:

All written comments become part of the public record associated with this action. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that the entire comment–including your personal identifying information–may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public disclosure in their entirety.

**Appendix F: Letters to State and Federal Agencies (Representative)**

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# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Nebraska Field Office
9325 South Alda Road
Wood River, Nebraska 68883

Date 2016

Mr/Ms. John Doe/Jane Doe
Agency
Field Office
Any Street
Anywheres, NE

**SUBJECT: Agency Coordination, Draft Environmental Impact Statement, Nebraska Public Power District, R-Project Transmission Line**

Dear Mr/Ms. Doe:

The Nebraska Public Power District (NPPD) is applying for a Federal Incidental Take Permit (Permit) to authorize the take of the federally endangered American burying beetle (ABB) resulting from the construction, operation, and maintenance of a 225-mile-long, 345-kilovolt transmission line and associated infrastructure (R-Project) in Nebraska. In response, the U.S. Fish and Wildlife Service (Service) is drafting an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act, to inform our decision on whether to issue the Permit (proposed action) and disclose to the public the potential impacts of doing so on the ABB and the natural and human environment. As part of the Permit application, NPPD is also required to prepare a Habitat Conservation Plan, which outlines actions to avoid, minimize, and mitigate for potential impacts to the ABB.

The purpose of the R-Project is three-fold: (1) reduce electrical congestion within the existing transmission system; (2) enhance system reliability; and (3) encourage development of renewable resources (i.e., wind projects). The R-Project starts at NPPD's Gerald Gentleman Station near Sutherland, Nebraska and extends northward crossing the North and South Platte Rivers and Birdwood Creek. From Birdwood Creek, the project runs eastward to Highway 83, then north to a substation east of Thedford, Nebraska. From the Thedford substation, the R-Project extends 125 miles east across the Sandhills to Clearwater, Nebraska, and terminates at a substation where it interconnects to a Western Area Power Administration (WAPA) transmission line (see attached map). A considerable amount of the 225-mile-long project extends across remote areas of the Nebraska Sandhills. Additional information about the R-Project is also available on NPPD's website at http://www.nppd.com/rproject/.

The Service previously published a Notice of Intent to prepare an EIS in the Federal Register on October 30, 2014, and held three public scoping meetings at Sutherland, Thedford, and Burwell, Nebraska from November 18–20, 2014. A total of 54 public comments were

received and these can be accessed online at
http://www.regulations.gov/#!documentDetail;D=FWS-R6-ES-2014-0048-0001.

A significant number of the public comments received suggested the development of an alternative R-Project route that would be located along existing road right-of-ways (ROWs) and other disturbed areas to avoid disturbance to the Sandhills and impacts to migratory birds. In response, we are including several additional alternative routes (northern, southern, and central alternative routes), for comparison with the final route selected by NPPD (see attached map). Each of these routes crosses portions of the Sandhills but many extend across disturbed areas and follow existing road ROWs. Additional route alternatives are also suggested in the area near Gerald Gentleman Station; these alternative routes avoid large concentrations of migratory birds at the North and South Platte Rivers and Birdwood Creek (see attached map). These alternative routes may be evaluated in the EIS. Other alternatives under consideration in the EIS include NPPD's final R-Project route and the no action alternative (i.e., non-issuance of a Permit).

The Service is now in the process of developing the Draft EIS (DEIS). We request your input including data, comments, new information, or suggestions that will help inform the DEIS, particularly concerning the following: (1) direct, indirect, and cumulative effects of the proposed action on endangered, threatened, or other species (e.g., migratory birds and bald and golden eagles); (2) potential impacts that the NPPD-final route may have on sensitive resources under your jurisdiction; (3) other reasonable routing alternatives to the proposed action that may have less impact on sensitive resources; (4) relevant biological data and information concerning the ABB; (5) current or planned activities in the area and possible impacts on the ABB; (6) presence of historical/cultural sites in the R-Project area including potential impacts to the viewshed; (7) sensitive areas including wetlands, native grasslands, and streams; (8) scope of covered activities, including potential avoidance, minimization, and mitigation measures for incidental take of the ABB; (9) monitoring and adaptive management provisions that should be included as part of the DEIS, and (10) any other environmental issues that should be considered regarding the proposed action.

Your participation in this process will help us fully evaluate the potential impacts of the proposed action and any alternatives to it. Additionally, you may request that your agency be a cooperating agency in the preparation of the EIS. Should you have any questions or comments and/or wish to be a cooperating agency, please respond in writing by March 30, 2016, to Mr. Robert Harms. Mr. Harms can be reached via mail at the address above, by phone (308.382.6468 ext. 208) or by e-mail Robert_Harms@fws.gov.

Sincerely,

Eliza Hines
Nebraska Field Supervisor

Enclosure

**Appendix G: Comment Summary Table**

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| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| 1—FWS-R6-ES-2014-0048-0005 | Anonymous | I am a graduate student working in the NE Sandhills. This is a very sensitive and unique landscape. I think it would not be prudent to put this transmission line through the Sandhills. An alternative route should be found. There are not many places left in the world that are relatively free from major development, and this transmission line could open the Sandhills up for development. This would not be good for the ecosystem, and possibly not good for the aquifer either. | Uniqueness/ Sensitivity of Landscape; Routing | None |
| 2—FWS-R6-ES-2014-0048-0046 | Jared Margolis, Center for Biological Diversity | Key comments excerpted from full comment:<br>- The Center urges FWS to consider in the DEIS the potential impacts that the Project would have on whooping cranes and other migratory birds from inevitable collisions with power lines.<br>- Similarly, power lines pose a high risk of collision for the many migratory bird species that move through the Project area; however, it is not clear whether FWS will require a migratory bird conservation plan for the Project. Given the high concentrations of migratory birds in the area, and the proposed construction of the Project over various rivers, streams, and wetlands that provide habitat for these migratory birds, collisions and resulting mortality of these species is likely, and FWS should include an analysis of these impacts, and measures to minimize and mitigate these impacts, in its review of the Project. | American Burying Beetle; Migratory Birds; Other Protected Species; Wetlands; Cumulative Impacts; Soil Erosion; Future Wind Power Generation; Routing | None |

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| | | | - Power lines increase the potential for predation of certain protected species, such as plovers and migratory birds, by increasing the opportunity for raptor perching. These impacts should be analyzed in the DEIS. Moreover, FWS should not allow for the Project to rely on the use of pole top raptor guards to prevent this predation.<br><br>- The Center is concerned that the Project will lead to the loss and/or degradation of essential habitat in the area, including wetlands and other waterbodies that would be impacted directly from construction, as well as through sediment loading from erosion. The potential degradation to these important habitat areas must be fully assessed in the DEIS.<br><br>- The Center further urges FWS to require conservation measures that would avoid and minimize the loss of habitat associated with the proposed Project, including avoidance of water features through routing and/or the use of horizontal directional drilling for all water crossings, temporal limitations on construction to prevent disturbance during certain times of the year, and enhanced requirements to prevent erosion and soil deposition into waterways.<br><br>- The Center therefore requests that FWS consider all reasonable alternative routes for the Project, and locations for the proposed power line that would fulfill the Project's purpose and need (i.e., providing electrical transmission to the region), but that would mitigate the impacts associated with construction of this infrastructure across undisturbed portions of the sensitive Sand Hills, as well as areas that are essential for migratory birds and listed species.<br><br>- To the degree that NPPD has refused to propose or accept alternate routes, FWS must inquire and provide a valid rationale for why such alternatives are not being utilized.<br><br>- The Center therefore expects that the analysis of impacts related to this Project will include a thorough and detailed discussion of the cumulative impacts it will have on the environment, including protected species, in the affected region. | | |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | - Surveys for ABB must be undertaken to determine the full extent of impacts that the project would have on these endangered species.<br>- The Center further urges FWS to undertake surveys for whooping cranes, interior least terns, piping plovers, and migratory birds in the area, as well as for western prairie fringed orchid. | | |
| 3—FWS-R6-ES-2014-0048-0040 | Bonnie E. Tadej | Please do NOT grant the Incidental Take Permit to NPPD. Building a 345,000 volt lattice tower transmission line on Sandhills is NOT logical. Please concider RE-ROUTING this project along existing roads for easy access. The Sandhills are virgin native grassland once it is distorted it will take centuries to restore those grasses.<br>Again, Please do NOT grant the Incidental Take Permit to NPPD. This line will affect the livelihood of the ranchers who live here and has a very likely possibility of creating "blowouts" because of there use of heavy equipment.<br>Please do NOT grant the Incidental Take Permit to NPPD. The American Burying Beetle thrives on the Sandhills on the ranches. The Burying Beetle are an important part of the decomposition of dead animals. | Uniqueness/Sensitivity of Landscape; Soil Erosion; American Burying Beetle; Routing and Impacts on Ranchers | None |
| 4—FWS-R6-ES-2014-0048-0016 | James R. Fleecs | I don't understand why the option to bypass the Birdwood Creek all together is not being looked at harder as the heart of the Birdwood flows in the North to South direction. The alternate routes that have been proposed to NPPD could easily bypass this highly sensitive area and it would make great environmentally sense. NPPD's current Proposed Route will not be able to maintain compliance with Migratory Bird Treaty Act (MBTA) in crossing the Birdwood and I am 100 percent positive that this crossing will be doing a lot of annual taking of migratory and local birds. I believe the Environmental Impact Statement will look just as bad on the migratory bird side of things as even the endangered burying beetle with the huge numbers of birds that are known to use | Migratory Birds; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | this area. The impact being for one this years confirmed siting of three collared endangered Whooping Cranes on the Birdwood just down from where the proposed route crosses. Also the thousands of Sandhill Cranes, approximately 20 percent of the High Plains Flock of Trumpeter Swans that Winter on the Birdwood and an abundance of other migratory birds that use the always open spring feed waters, vast wetlands and wide open meadows to winter and as a stopover place in there migratory routes. I have 3 pictures I would like to present with this statement all taken from the same location and the Proposed Route would be running East and West about a 100 yards North of the Pond. The Birdwood Creek is running adjacent to the Pond flowing North and South. The main point I am making with these pictures is with the picture of the fog that is a very common occurrence on most mornings on the Birdwood with all the warm water springs that supply the Creek. The use of Bird Flight Diverter to address these collisions in these kind of areas will not be very effective, but will likely be what is used in this area. The only way to somewhat lessen the effects of the lines in this type of sensitive area would be to run them underground. NPPD is aware that the first 20 miles of the R-Project proposed route out of Gerald Gentlemen Station will be going through very high densities of migratory birds. Other routes were presented to NPPD and said to have less of an impact on migratory birds by the USFWS and NGPC and the main reason for not following through with the alternate routes were Reliability and Money? It's a one time cost to go around, but a life time cost environmentally to go through the heart of Birdwood Creek. | | |
| 5—FWS-R6-ES-2014-0048-0038 | James R. Fleecs | [Supplement to previous comment. Contains data on whooping cranes at Birdwood Creek, collected by Crane Trust in April 2014, as well as copy of larger study being conducted.] | Migratory Birds | |
| 6—FWS-R6-ES-2014-0048-0049 | Tiffany Ballagh | Key comments excerpted from full comment: | Uniqueness/Sensitivity of Landscape; | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | - Please listen to the public and protect the delicate Sandhills ecosystem from being ravaged by a transmission line that could be re-routed on already disturbed, existing easements. For generations, the Sandhills have provided a safe, natural habitat for many endangered and rare species. The R-Project would severely alter that ecosystem, and ultimately destroy the habitat for these creatures.<br><br>- As ranchers, we are very careful where we drive and how often. Simply driving over the same trail more than once could start causing erosion and a blowout. These blowouts are difficult to heal. Once they get started they are very likely to spread unless ranchers move quickly to restore the grass. The R-Project transmission line will be a conduit for the blowouts to occur. The use of large equipment and erosion-causing helicopter propellers required for the R-Project would be devastating on our fragile hills.<br><br>- More roads mean greater risk of erosion/blowouts and less grazing area for cattle.<br><br>- The R-Project would increase soil erosion by requiring the removal of windbreaks that were planted strategically by ranchers, some generations ago. Shelterbelts also create critical protection for cattle. It can mean the difference between a live calf and a dead calf. | Soil Erosion; Impacts on Ranchers | |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| 7—FWS-R6-ES-2014-0048-0034 | Anonymous | The Sandhills has some of the best water in the world. It tastes so pure and clean, but the ground water above the aquifer is extremely corrosive to metals. On our tanks and windmill pumps, we are lucky if they last 10 years before they are eaten away by the bacteria in our water. This was brought up to the engineers at a Public Hearing in Chambers, NE. The engineer stated that they would treat the poles with chemicals to keep them from disintegrating. When a rancher informed them that he also treats his metal to no avail, a different NPPD engineer stated that they could make the helical piers (used on the lattice towers) thicker so that they could compensate for the disintegration of the metal. Poor, uneducated planning if you ask me.<br><br>NPPD needs to reroute the R-Project away from this corrosive water, otherwise they will be continually accessing the easement (with their access roads in the fragile soil) to treat or replace the towers' foundation systems and could potentially result in even more destructive outcomes if the towers' foundations fail.<br><br>Please watch this video from the NPPD Public Hearing in Chamber, NE. starting at 3min:50sec (if you don't want to watch the whole thing): https://www.youtube.com/watch?v=RtsW3iwgPzs | Water resources; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| 8—FWS-R6-ES-2014-0048-0022 | Richard Edwards | Key comments excerpted from full comment:<br>- The proposal should be rejected on the narrow, techical grounds of its negative impact on the American burying beetle, a federally-list endangered species. Given that perfectly acceptable alternative routes for the transmission line exist which would not require the taking of American burying beetles nor destruction of their habitat, there is no persuasive reason to overturn the charge of the law and approve the proposal.<br>- NPPD proposes to intrude a destructive and highly impactful power line through a nearly pristine area of great environmental importance and fragility. As noted, convenient and acceptable alternative routes for the line exist.<br>- So where does NPPD propose to locate its R-Project transmission line? Right through the heart of the Gracie Creek watershed! This proposal is in the same league as if one proposed to construct a freeway through Yosemite or a pipeline through Yellowstone; the fact that the nearly pristine Gracie Creek watershed is unprotected by National Park designation does not mean its environmental destruction would be any less tragic. | American Burying Beetle; Uniqueness/Sensitivity of Landscape; Routing | None |
| 9—FWS-R6-ES-2014-0048-0018 | Brad Welch | Key comments excerpted from full comment:<br>- First, there are many negative environmental consequences that will result due to this project. This route is a migratory pattern for many birds including the Sand hill crane, bald eagle, golden eagle, Canadian geese, and many more. There are endangered and protected species that include insects, minnows, birds, and mammals that live directly in this route. There are several endangered species that exist within the Sand hills. One or more resides directly in this proposed route, that was thought to be extinct has been found in the Sand hills. | Migratory Birds; Other Protected Species; Soil Erosion; Visual Intrusion on the Sandhill Landscape; Uniqueness/Sensitivity of Landscape; Routing. Electromagnetic Fields | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | - Due to the landscape and sensitive soil composition, this project will cause an ongoing wind and rain erosion problem that will be left for the land owners to deal with. These man made blowouts will cause a loss of native grass, animal habitat, and production for grazing animals.<br><br>- There are well document studies on the negative effects that the electromagnetic field produced by these projects have on animals and humans. This is particularly important because the main use of this land is grazing. Animals will be constantly exposed to these damages as they are fenced within close proximity of this project. These fields also drive insects, birds, and mammals from these areas. Effect migratory routes that have been used for thousands of years. This could pose a problem to the existence the sensitive animals that rely on the natural environment and these patterns.<br><br>- Having a visible power line monstrosity that follows this route will negatively effect the number of tourism dollars that can be realized in the area. This revenue directly helps fund many of our State agencies. Having a north south route that is dominated by a power line structure, combined with the highway 2 east west route that is dominated by a rail road view, strongly erodes the true environmental appeal for tourists, hunters, fishermen, and the general public that exists within the Sand hills. | | |
| 10—FWS-R6-ES-2014-0048-0035 | Frank Utter | The Sandhills of Nebraska are one of the last great unspoiled grasslands in the world. While managing the Horn land and cattle ranch on a daily basis I see bald eagles perching on the cottonwoods near the river, hear Sandhill cranes calling from the wetlands, and watch Sharp tail grouse and Prairie chickens dash across our pastures. It is no wonder The American Bird Conservancy has described the Nebraska Sandhills as the “best grassland bird place in the United States.” For the past two decades I have been fortunate to call this place my home, ranching, raising my family and caring for the land. I take my role as steward of this land very | Uniqueness/Sensitivity of Landscape; Soil Erosion; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | seriously, and now am faced with the prospect of years of hard work in environmental management being undone. The N.P.P.D.s R- project will undoubtedly have a long lasting and detrimental effect on what is an already fragile ecosystem. Building the necessary infrastructure to support the project will not only increase pollution, require disruptive earth work, and facility maintenance (think roads, towers, truck traffic), but also create ongoing challenges as revegetation efforts will be needed prevent soil erosion and repair this delicate ecosystem. While the NPPD says they are committed to healing the land after project completion, it is hard to see how this makes economic and environmental sense in the long run. Why not choose an alternative route, with existing infrastructure, that would require less long-term maintenance and environmental disruption? I am not opposed to a transmission line if it is truly needed but I am adamantly opposed to the proposed route. The Sandhills are a great treasure. Anything that is built in the area runs the risk of changing the landscape forever and should be thoughtfully and carefully looked at not only from the necessity of the project but the lasting effects it will have on this ecosystem. | | |
| 11—FWS-R6-ES-2014-0048-0004 | Anonymous | I am concerned about the wind and traffic erosion the most. We are located in some very fragile soil. I am also concerned about the migratory water foul that is very prevalent in the area. It will have a big impact on them. | Soil Erosion; Migratory Birds | |
| 12—FWS-R6-ES-2014-0048-0047 | James A. Haugland | I am James A. Haugland, President of Haugland Ranch Inc. I own land the high voltage power lines are proposed to go through on the way north to Thedford and then east. It is my hope that the Fish and Wildlife will join me in objection to the route that is being proposed for the following reasons. First, it goes right through a duck sanctuary that I started in the late 60's. This sanctuary holds between two to five thousand ducks all winter. During the spring migration it will hold up to ten thousand for a couple of weeks. Also the land just to the north of this area that is owned by Neal Hansen has also been made into a reserve by Ducks Unlimited. The reason | Migratory Birds; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | this is such a good retreat for ducks is that it is a warm water slew that does not freeze. It is unimaginable to think how many ducks would be killed by the power lines in foggy conditions or bad weather. I have previously submitted two proposals that would go around these very special spots and would leave very minimal damage. I am enclosing a few pictures that show what I am talking about. For further information would you please call me at 308-386-8110. Thank you for your consideration in this matter. | | |
| 13—FWS-R6-ES-2014-0048-0041 | Al Fugate, Hanging H. Real Estate Co. LLC | Key comments excerpted from full comment:<br><br>- The proposed route of the transmission line will cut through critical riparian habitat protected by the Conservation Easement on the Hansen Real Estate for migratory waterfowl and other wildlife function.<br><br>- The proposed route will result in near certain non-compliance with the take prohibitions of the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. There are large concentrations of migratory birds in the spring and fall on or around the Hansen Real Estate. The proposed route of the line is a great risk to migratory birds primarily through the risk of avian collisions with the R-Project power lines. The Migratory Bird Treaty Act prohibits intentional and unintentional direct take of migratory birds.<br><br>- As it relates to migratory birds, the proposed route also proposes to cross the Birdwood Creek immediately downstream of a large sandhill crane roost north of the Hansen Real Estate. At a Site visit by NPPD to the Hansen Real Estate on December 12, 2014, two bald eagles were observed on the Hansen Real Estate. Again, there is a risk of avian collisions with the R-Project power lines. The Bald and Golden Eagle Protection Act prohibits the taking of bald or golden eagles.<br><br>- The NOI notes that the project may directly and indirectly impact the American burying beetle, but additional analysis of | Migratory Birds; Future Wind Power Generation; American Burying Beetle; Cumulative Impacts; Routing; Underground Construction of Transmission Line; Purpose and Need for Project. | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | direct mortality and harm to the federally endangered whooping crane is also warranted. The proposed route is near an area where a federally endangered whooping crane was confirmed in the spring of 2014. The proposed line is in the whooping crane migration corridor.<br><br>- The highest source of mortality to fledged cranes is from striking power lines.<br><br>- Also associated with this aspect of the draft EIS, USFWS needs to clearly define the "action" under NEPA review. This proposed transmission line will bring with it unknown numbers of wind turbines which most likely will be in the thousands. The number, spatial distribution, height and rotor area (wind swept area) needs to be included the "action" under NEPA review by USFWS. Until the number of wind turbines is known, it is impossible to know the total area of the whooping crane migration corridor that will be impacted by this project.<br><br>- The "action" under NEPA review needs to be refined to include wind turbine siting and activities. The direct, indirect and cumulative impacts of the entire project need to be analyzed in the alternatives analysis. The end result of the Project must be considered. In order to do that one must know the proposed location and number of wind turbines that will connect to this transmission line. At a minimum, a survey of the proposed route and wind turbine locations must be conducted to determine the presence of the American burying beetle.<br><br>- Finally, USFWS should consider build alternatives that utilize existing disturbance corridors. USFWS and other federal action agencies have historically recognized the significance of utilizing or paralleling existing transmission corridors when siting new facilities. The direct, indirect and cumulative impacts to the natural environment are regularly diminished by following existing transmission corridors. | | |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| 14—FWS-R6-ES-2014-0048-0011 | Anonymous | I am opposed to the US Fish and Wildlife granting an incidental permit to NPPD. The Sandhills are one of a limited amount of natural grasslands that exist in our world and granting NPPD access to this area will produce devastating effects to the natural environment and wildlife that inhabit this area. | Uniqueness/Sensitivity of Landscape | None |
| 15—FWS-R6-ES-2014-0048-0048 | Ann Warren | We are very concerned with the proposed transmission line route "they" are wanting to take through our beloved Sandhills!! We are along the migratory route of the Sandhill and Whooping crane and on any given day spring or fall---- they come through very high or very low! Last spring I was dragging chips and happened to look up and see a group of about 15 whooping cranes circling---flying just over head---on their track North! One morning this fall I went out to the sound of hundreds and thousands of the cranes who had overnighted right down river from our place!! The proposed route of the E W line is only S of us about 14 miles!! The birds would have to cross above, below or "through" this line coming and going!! I am also concerned that it would be just the beginning of "things to come"!! As in more lines to more wind towers of which we are also opposed and which do NOT serve this area!! We are a very fragile eco system here and we want it preserved as is!! Please side with us to stop this bully pulpit from coming in here and telling us what we need to do when we the land owners are the greatest envirmentalists!! WE know what is right for our area and this is NOT!! We still do things with a hand shake here and there are no hand shakes!! We do NOT want that line here!! The cranes and other wildlife don't want that line here!! Thank you Ann Warren | Migratory Birds; Future Wind Power Generation; Uniqueness/Sensitivity of Landscape | None |
| 16—FWS-R6-ES-2014-0048-0050 | George Cunningham | Key comments excerpted from full comment:<br>- I am deeply concerned that the Project as proposed would have significant adverse impacts not only on the ABB, but on other species that are protected under the ESA, as well as migratory birds protected under the Migratory Bird Treaty Act | American Burying Beetle; Other Protected Species; Migratory Birds; Future Wind | None |

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| | | (MBTA). The construction and operation of a high capacity transmission line through the Sandhills region of Nebraska will lead to take of protected species through power line collisions, as well as habitat loss from the direct, indirect and cumulative impacts associated with this Project and future energy development in the Sandhills linked to this Project. | Power Generation; Wetlands; Scope of HCP/EIS; Cumulative Impacts; Routing; Need for Project | |
| | | - I encourage the FWS to consider all reasonable alternative routes for the Project, to define within the DEIS “reasonable” and the criteria used to determine reasonableness. I urge the FWS to ensure that appropriate alternatives are considered and analyzed in detail. This should include an analysis of alternative routes that would follow existing infrastructure, such as roads or power line right-of-ways. It should also include detail measures to avoid impacts to wetlands, sub-irrigated meadows, and sensitive habitat areas such as Prairie Grouse species leks, mud flats for used by shorebird species, and migration corridors used by a myriad number of migratory bird species in the western hemisphere.<br><br>- Given the scope of this Project, along with the cumulative impacts that would follow the completion and operation the Project, take of several federally protected species will no doubt occur. However, the FWS notice suggests that only a HCP for the ABB is necessary; but given the migration patterns of the Whooping Crane, Piping Plover, and numerous other migratory bird species, a high probability of harm to these species will occur as a result of this Project. Thus, I believe the FWS needs to prudently determine through a robust decision making process the need for a multi-species HCP for this Project. As currently portrayed, the FWS appears to be limiting the scope of the DEIS to NPPD’s proposed Project alignment route and is not considering alternative routes as a viable alternative to a HCP.<br><br>- Nonetheless, the opportunity for development of renewable energy projects as a result of this Project warrants a comprehensive cumulative impact analysis of future energy development in the Sandhills. This must include cumulative | | |

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| | | impacts to listed species, migratory bird species, Bald and Golden Eagles, the ecological integrity of the Sandhills biome related to these species' persistence, addition impacts to the natural and human environment as a result of addition construction activities associated with new energy development facilities, as well as the cultural impact this and potential energy development activities will have on the ranching communities and tourist industry associated with the relatively unaltered landscape of the Sandhills.<br><br>- This DEIS decision document needs to fully address the purpose and need of this Project in the context as a single project and the cumulative impacts this Project will have in the foreseeable future. I believe a full accounting of using less environmentally damaging locations for this proposed Project is necessary and the FWS needs to be cognizant that its assessment of the environmental impacts of the proposed action needs to be analyzed across a range of alternatives rather than justifying the predetermined conclusions promoted by the Project's proponent. | | |
| 17—FWS-R6-ES-2014-0048-0023 | Anonymous | What will the indirect and cumulative impacts from the R-Project Transmission Line in Nebraska be with regards to threatened and endangered species, migratory birds, wetlands, water quality, noise, and economics? | Cumulative Impacts | None |
| 18—FWS-R6-ES-2014-0048-0028 | Anonymous | Please do not grant the incidental take permit to NPPD for the following reasons:<br><br>1. Inroads into land that provides food for America is becoming alarming. Loss of food-providing land to a burgeoning population can put us all at risk.<br><br>2. Putting the transmission lines close to existing roads would be more logical for maintenance and less loss of the native grasslands and less destruction of soil.<br><br>3. This line will effect the livelihood of the ranchers who currently live in the area and future generations who provide food for America. | Migratory Birds; Visual Intrusion on the Sandhills Landscape; Soil Erosion; Uniqueness/Sensitivity of Landscape; American Burying Beetle; Routing; Impacts on Ranchers | None |

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| | | 4. The wild grasslands of Nebraska are the resting grounds of the Whooping Crane as they migrate south. They are the largest bird in North America and there are less than 300 in the wild!<br>5. The visual beauty of the land will be forever marred.<br>6. The Nebraska Sandhills are part of the Northern Great Plains - one of four remaining intact temperate grasslands in the world. If the grass coverage is removed from the sand dunes, blowout occurs, expands and the grassland is hard to bring back. Remember the dust bowls?<br>7. The American burying beetle lives in the grasslands and is an integral part of the decomposition of dead animals. Destruction of the land and the beetle would disrupt the delicate ecosystem of the grasslands.<br>A suggestion would be to locate the transmission lines close to existing roads where there is the least amount of ingress into the grasslands, ease of access for maintenance and the least amount of incursion into the ranchers' range land thus avoiding disruption of the fragile ecosystem, critical food production and the livelihoods of the local ranchers and preserving the same for future generations. | | |
| 19—FWS-R6-ES-2014-0048-0024 | Anonymous, representing NRA and Nebraska Entomologist Club, LLC | In response to comment form questions:<br>1. What will birds, skunks, badgers, etc. eat without beetles? If the beetles eat all the dead carcasses, what will crows [illegible text].<br>2. Transplant them all to the Platte Valley or South<br>3. Never saw or heard of one.<br>4. Cattle grazing step on and kill thousands per year. Mowing hay and grass cause thousands of deaths per year.<br>5. Nothing of interest<br>6. They will survive | American Burying Beetle | None |

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| | | 7. Volunteer weekly monitoring by teams of three women and three men<br><br>8. Lots of coyote hunters tear up a lot of habitat. Grouse and prairie chicken cause lots of beetle loss through being stepped on; however, the dead birds from wounding shots are mitigators.<br><br>9. What would we prefer in our homes? Beetles or light and heat? | | |
| 20—FWS-R6-ES-2014-0048-0013 | Alexious Ferrante | The Sandhills of Nebraska need to be left alone. Please understand the wildlife and the people who will be affected by this. Please re-route. | Routing | None |
| 21—FWS-R6-ES-2014-0048-0053 | Aaron Price | Key comments excerpted from full comment:<br><br>- Since the project is running through critical resting habitat for the whooping crane, NPPD should not be granted a take permit and associated permits needed to move forward as the project is currently presented, because the potential loss to whoopers and other birds protected under the migratory act will result in significant takes.<br><br>- Further the project needs to be accessed for impacts on the piping plover and other migratory birds in the area. The Calamus Dam is a large staging a rea for the American Bald Eagle and other raptor birds during the spring, and I have photographs with over 20 eagles in just one small section of the viewing horizon, while hundreds populate the area outside the lens.<br><br>- As a 4th generation rancher who's family's operation is a conservation award winning ranch along with the largest privately held easement in the state of Nebraska, I have great concerns that the R-Project will lead to irreversiable loss of essential and critical habitat areas including wetlands that are prevalent on the eastern s ide of my ranch and especially beyond us to the northeast where there project wants to pass. We have increased wetland production on the ranch by | Migratory Birds; Other Protected Species; Wetlands; Future Wind Power Generation; Climate Change; Historical/Cultural Resources; Routing | None |

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| | | placing weirs throughout the ranch and migrating birds and endangered species rely on these critical wetland areas for their survival, thus the construction and presence of a powerline close to our weirs (approximately 1.5 to 2 miles away) would greatly increase the likelihood of collision and death.<br><br>- I strong suggest and want supporting documents if denied, that USFW consider all reasonable alternative routes for the R-Project and other locations that will still fulfill the project's claimed needs. Areas with a high degree of disturbance characterized by cropland, roads, and highways is most certainly a more reasonable means of constructing the project in a way that will have the least amount of impacts, and it make it much easier to mitigate the many sensitive endangered species issues the projects will face.<br><br>- USFW needs to determine not only what impacts the power line will have on endangered species, but all the impacts that could occur from increased wind energy development in the area.<br><br>- The impacts of climate change due to the increasing C02 from Gerald Gentleman's use of this line should be considered for all of the known endangered species in the state of Nebraska and the migratory birds, because impacts on wetlands due to drier conditions will have adverse impacts on the species' survival.<br><br>- Additionally, the line will be crossing and bordering known American Indian Burial Grounds in northern Loup County. All tribes known to have lived in the area should be consulted and given the opportunity to provide recognition and projection over sacred areas and burial grounds. The graves have been documented here:<br><br>http: //genealogytrails.com/neb /loup/cemeteries neloup.htm<br><br>- Finally, additional wildlife surveys need to be done to document the critical resting habitat of the American | | |

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| | | Whooping Crane and other ESA listed species in the area, including threatened species that could be potential candidates in the future due to decreasing habitat and climate change impacts (like the Greater Prairie Chicken). | | |
| 22—FWS-R6-ES-2014-0048-0019 | Dan Welch | There is a lot more here than the surface shows, this is a lifelong evasion and will scar our sand hills forever. We work outside every day and take care of our land and livestock and wild life, we are the ones that have to live here under the power lines our cattle have to graze around them, and we are concerned about the effects they will have on our future health. We are stewards of the land we have survived droughts, hail storms and fires, we understand how fragile these sand hills are. Grading the sand hills would be an environmental disaster 250 miles long. We must keep these power lines out of our environment. Please consider this comment. | Uniqueness/Sensitivity of Landscape; Impacts to Human Health | None |
| 23—FWS-R6-ES-2014-0048-0030 | Rod Palmer, on behalf of Dan Welch and Brush Creek Ranch, LLC | Key comments excerpted from full comment:<br><br>- There is concern that, not only will the building during the construction period, but the noise and commotion relative to the building and the continued maintenance thereafter will disrupt the cattle's habitat and habits, thereby causing a loss in conception rates and ultimately a loss in production of their cash crop.<br><br>- Additionally, my clients are concerned that the proposed line will produce an electromagnetic field that will affect not only the health of my clients, who live upon the land, but also will create a health hazard to the cattle that would be directly under it and around it at all times.<br><br>- Potential impacts to several other species and their habitats were mentioned in comments, including: white tail and mule deer, ring-neck pheasants, mourning doves, grouse, prairie chicken and antelope, prairie dog towns, Western Burrowing Owl, black tailed prairie dog, blowout penstemon, Western | Other Protected Species; American Burying Beetle; Uniqueness/Sensitivity of Landscape; Visual Intrusion on the Sandhill Landscape; Historical/Cultural Resources; Noise; Air Quality; Soil Erosion; Geology; Routing. Impacts to Ranchers; Electromagnetic Field; Recreation | None |

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| | | Prairie Fringed Orchid, box turtles, Whooping Crane, Piping Plover, Least Tern, Mountain Plover, etc.<br><br>- The American burying beetle is common to this ranch and has been listed as endangered species by the U.S. Department of Interior since 1989. Given the fragile nature of the Sandhills ground in that once disturbed becomes nature's way of creating a sandy blowout from the winds that occur and will do damage not only to the land from the construction and maintenance equipment but also to the American burying beetle and its habitat. It is not a species that can merely be removed and relocated because once this occurs additional species move into the area vacated, and it will be impossible to disturb any of the ground without disturbing both the habitat and likely endangering the beetle through construction and 1naintenance through roads and the disturbing of the soil.<br><br>- The aesthetics of the land as natural Sandhills formations would be greatly damaged although the erection of tall towers and electrical lines. In addition, my clients live in a home on the ranch and the transmission line would obstruct their view of the Sandhills and greatly impair their scenery and views.<br><br>- This ranch contains a historical house which is called the Swift House. The historical heritage associated with this land should be preserved. It would very difficult to preserve this with the power lines and towers within visual distance of this home and, of course, the scenery and aesthetics from the home would be impaired.<br><br>- The noise that will be associated with this project and the turning of the soil would cause dust and air quality issues.<br><br>- This ranch has been known to have Indian artifacts found upon it and was an area in which the Native American Indians traveled, camped and left these artifacts.<br><br>- The geological formation and fossils in the area would seem to justify some sort of scientific assessment as to the affect it will have upon these, which would have to be detrimental. | | |

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| | | - Any disruption of this very fragile sandy ground can cause a blowout to occur. | | |
| 24—FWS-R6-ES-2014-0048-0045 | Amy Bones | I live in Nebraska. I am imploring the Fish and Wildlife Service to save the Sandhills, and protect the ecosystem by rejecting the route proposed by Nebraska Public Power District (NPPD).<br>I am opposed to the route of a high-capacity transmission power line project that has been proposed by NPPD.<br>This line would negatively impact the fragile Sandhills and the ecosystem in Nebraska, as well as the abundant wildlife that live in this region.<br>NPPD should find an alternate route that would take advantage of existing infrastructure such as highways and other power line corridors.<br>The proposed water crossings of the transmission project will also have a negative impact on bird and waterfowl habitat in the area. A western alternative route that has been proposed would avoid crossing sensitive areas of the Platte River. I understand that this alternative is supported by staff members of the U.S. Fish and Wildlife Service as well as the Nebraska Game and Parks Commission.<br>Existing infrastructure should be utilized whenever possible. NPPDs preferred route, has very few, if any access roads. This is not be the correct location for such a large project and NPPD should be required to re-route the project.<br>Thank you for being thoughtful about this project.<br>Amy Bones<br>Omaha, Nebraska | Uniqueness/Sensitivity of Landscape; Wetlands; Routing | None |
| 25—FWS-R6-ES-2014-0048-0043 | Amy Ballagh | Key comments excerpted from full comment:<br>- I urge the FWS to deny the issuance of an 'incidental take permit' for the American Burying Beetle, and request that | Uniqueness/Sensitivity of Landscape; Soil Erosion; | None |

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| | | NPPD look to existing corridors as they plan for the route of the R-Project.<br><br>- Anyone who works on the land, or works to protect the environment, can clearly see that a project involving the construction of a high-voltage transmission line through this virgin, extremely fragile soil, will create irreversible damage to an ecosystem that has been recognized as a region unlike any other in the Western Hemisphere.<br><br>- Anyone who knows the Sandhills knows that you must not carelessly disturb the fragile sand or you will create erosion that will not easily be restored.<br><br>- Without any roads along the proposed line in this area, there would be a considerable amount of native land that would be traversed by the heavy construction equipment, as well as the continued trail of traffic involved in the construction and future maintenance of this line. If the United States truly wants to protect the endangered American Burying Beetle, then I think leaving the healthy environment that is already established and working for them would be the first choice in every instance.<br><br>- With the EMF's that are emitted from a 345kV line over the water, this has the potential of discouraging the wildlife from these regions…..surely there wouldn't be enough stray voltage to actually cause electrocution to fragile species! ?<br><br>- "Shifting sand" has long been recognized as 'unstable'. Choosing this sort of soil, without substantial bases of cement, will likely be a poor choice for the lattice towers.<br><br>- The Greater Prairie Chicken is known for its status as an 'umbrella species'. We have incredibly healthy and long-established flocks on our land, and several other states have appreciated their opportunity to trap the healthy birds from our leks to transfer to places in their states where 'disturbing the land' has reduced their populations to near 'endangered' levels. | Wetlands; American Burying Beetle; Visual Intrusion on Sandhill Landscape; Routing; Electromagnetic Fields; Ecotourism Impacts on Ranchers | |

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| | | - There will be a high certainty that some of these [noxious] weeds will be transferred from county to county via the travel of so much equipment during construction and maintenance procedures.<br><br>- The proposed transmission line will require destruction of long-established windbreaks.<br><br>- Welding during construction, lightning, machinery, or other vehicles could be sources of fire. Fire in the Sandhills not only puts a huge stress on the restoration of the grazing acres, but also is extremely difficult to get under control when it is in the big hills.<br><br>- One more time, I sincerely urge the U. S. Fish and Wildlife Service to boldly tell NPPD that, although the 'need' for their project may well exist, there is NO need to sacrifice the majestic beauty and heritage of the Nebraska Sandhills when there are existing corridors that could be used to accomplish their stated purposes. | | |
| 26—FWS-R6-ES-2014-0048-0014 | Levi Hertzler | I think there is somewhere that they could run that line(if its such a must have thing ) but there's got to be a better an less destructive place to put it its crazy to run it thru good ranch land | Routing | None |
| 27—FWS-R6-ES-2014-0048-0009 | Anonymous | The Sandhills of Nebraska consist of resting grounds for the Whooping Cranes that travel through from Canada. There are less than 300 Whooping Cranes in the wild. These are the largest bird in North America and their habitat should not be disturbed by a transmission line that can be routed in areas that are not harmful to the Whooping Crane. The pristine environment provided by the Sandhills for the cranes needs to be preserved. Please include the Whooping Cranes in the Incidental Take Permit.<br><br>I urge Fish & Wildlife Service to NOT grant the incidental take permit for NPPD's R-Project. | Migratory Birds | None |

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| | | I've attached a photo taken by Alan Bartles of Whooping Cranes over Burwell (see the water tower). | | |
| 28—FWS-R6-ES-2014-0048-0037 | Anonymous | I am against this because of the negative effect it will have on the environment and landscape. | Uniqueness/Sensitivity of Landscape | None |
| 29—FWS-R6-ES-2014-0048-0036 | Sarah Sortum | Key comments excerpted from full comment:<br><br>First, I encourage the U.S. F. W. Service to deny the issuance of an incidental take permit and recommend NPPD re-route the R-project through pre-existing corridors where disturbance has already taken place. All measures to reduce or eliminate further fragmentation of the Sandhills should be required of NPPO.<br><br>- Secondly, if the R-project proceeds along the currently proposed route I plead that U.S. F. W. require NPPD to employ monitoring and adaptive management provisions in the HCP in the following areas:<br><br>1. The latest and best methods, structures and technology should be used to reduce or eliminate bird mortality from collisions with towers and/or lines. The R-project will be placed in part of the "bottleneck" of the central flyway. Many, many bird species, including Sandhills Cranes, Whooping Cranes, Trumpeter Swans and other waterfowl and shorebirds frequent Sandhills lakes, ponds and streams during their migration. Effective measures must be employed to reduce bird mortality due to collisions.<br><br>2. The threat to the health of grassland birds needs to be addressed. While all grassland birds in the area may be negatively affected by habitat fragmentation due to the line, access roads and the like, I am especially concerned about the resident populations of the Greater Prairie Chicken and Sharp-tailed Grouse.<br><br>4. Again, I stress that all efforts should be made to reduce or eliminate further fragmentation of native, intact Sandhills prairie. I'm confident that U.S.F.W. is fully aware that the | Uniqueness/Sensitivity of Landscape; Migratory Birds; Other Protected Species; American Burying Beetle; Routing | None |

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| | | Sandhills is one of the very few intact grassland systems left on the planet and serves as a last stronghold to many species. The majority of species that use this fragile eco-system are threatened by habitat fragmentation. Please employ all of the U.S.F.W. Service's domain and power to protect the environment of the Sandhills. | | |
| 30—FWS-R6-ES-2014-0048-0042 | James Ducey | The R-project should not be allowed to ruin distinct sandhills' habitats. Specific places of concern, especially regarding birds include the Birdwood Creek area (where whooping cranes and trumpeter swans occur). The proposed route would also bisect the Carson Lake wetland complex and the Chain Lake complex. Both places have unique habitat where a great variety of migratory wild birds occur.<br>Refer to<br>http://wildbirdsbroadcasting.blogspot.com/2014/05/industrial-powerline-threatens-carson.html<br>http://wildbirdsbroadcasting.blogspot.com/2014/11/chain-lake-and-wetlands-threatened-by.html<br>It is the responsibility of the FWS to conserve species and thus everything possible needs to be done by this agency to address concerns regarding flora and fauna of the hills. | Wetlands; Routing | None |
| 31—FWS-R6-ES-2014-0048-0015 | Jeff King | I do not support the transmission line. The access is way too limited into the fragile landscape of the dunes. Please do re-route the lines along an already accessible path. Thank you. | Routing | None |
| 32—FWS-R6-ES-2014-0048-0017 | Barbara Welch | Key comments excerpted from full comment:<br>- The Curlew, as my friend Clair Hanna once told me, is our harbinger of spring, when you see them arrive Spring is here too. We have them and the burrowing owl and they among others on our premises are on the tier one at risk species. The American Bird Conservatory has described the sand hills as THE BEST GRASSLAND BIRD PLACE in the United States. | Uniqueness/Sensitivity of Landscape; Other Protected Species; Soil Erosion; Electromagnetic Fields | None |

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| | | - The deer and antelope, the badger and the kangaroo mouse live in perfect harmony in these hills, what do you think will happen when trucks, back hoes and gravel trucks arrive, not to mention the helicopters, do you think they will look up and then go back to their lives NO they will run from these hills, and be shot, and hit by vehicles, and this property will be empty of the life that has made it one of the most unique places in the united states.<br><br>- We will have to drive through the sand storms these lines will cause, and even NPPD admitted it may take several growing seasons to get plants started again. We in this room know from experience, it may take many, many years and even then it will never be the same. | | |
| 33—FWS-R6-ES-2014-0048-0033 | Muriel Clark | From start to finish, the proposed route for the Nebraska Public Power District's R-Project power line is an environmental disaster. Skirting the east side of the Sutherland Reservoir, the project will impact migratory water fowl and shore birds, including large numbers of White Pelicans. It will also endanger the numerous Bald Eagles that overwinter there.<br><br>It will also impact several historic sites, including O'Fallons Bluff (On the National Register), an important site on the Oregon Trail, the historic Sutherland State-Aid Bridge (Also on the National Register) and some of the best preserved remnants of the Mormon Trail.<br><br>Crossing the North and South Platte Rivers brings even more hazards to native and migratory water fowl and shore birds, but the biggest impact on this southern portion of the route is the crossing of the Birdwood Creek, and important habitat for Sandhill Cranes, Whooping Cranes and Trumpeter Swans.<br><br>Further to the north, the construction of this power line is going to have a dreadful impact on the fragile Nebraska Sandhills, one of the largest configurations of intact grasslands in the world. These amazing grasslands, while | Migratory Birds; Other Protected Species; Historical/Cultural Resources; Wetlands; Uniqueness/Sensitivity of Landscape; Soil Erosion; Visual Intrusion to Sandhill Landscape; Ecotourism; Routing | None |

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| | | looking very rugged, are extremely fragile, and disturbances to the root-stabilized sand can remain for generations. A perfect example of this are the deep ruts of the Mormon Trail, made in 1847 that are still visible north of Sutherland.<br><br>Officials of NPPD have admitted that they have never traversed the route they are proposing, instead relying on satellite imagery. This lack of due diligence is completely inexcusable. They refuse to listen to landowners who have been protecting the environment for five and six generations, who have tried time and time again to tell them the consequences of the project they are proposing.<br><br>In addition to the environmental aspects, this project will have a devastating effect on the region's tourism, which is Nebraska's third largest industry. Tourism in the Platte River Valley and the Sandhills relies on the vast, undisturbed viewsheds and the pristine solitude of the region.<br><br>There are other routes available for this project. Please do NOT grant NPPD your acquiescence to move forward with the proposed route. | | |
| 34—FWS-R6-ES-2014-0048-0008 | Kirk Hohenberger | I am against running the R-Project line through the Nebraska Sandhills. To much impact to one of the last intact Prairie ecosystems. Run the line south of the hills along a already ruined area. The interstate. | Uniqueness/Sensitivity of Landscape; Routing | None |
| 35—FWS-R6-ES-2014-0048-0012 | Mary Long | I am against the US Fish & Wildlife granting the incidental take permit to NPPD. The lack of access will create destruction of soil when they have to make roads just to GET TO their transmission line. Any future maintenance will harm the fragile soil.<br><br>The Sandhills of Nebraska are part of the Northern Great Plains They are one of only four remaining intact temperate grasslands in the world. We need to allow the ranchers to preserve them! They are a national treasure. | Soil Erosion; Uniqueness/Sensitivity of Landscape; American Burying Beetle; Migratory Birds | None |

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| | | I am also concerned about the American Burying Beetle which is on that land. And also the Whooping Crane. There are less than 300 Whooping Crane in the wild and the Sandhills of Nebraska is part of their resting grounds as they migrate south. Please take this into account in the "Incidental Take Permit".<br><br>Thank you! | | |
| 36—FWS-R6-ES-2014-0048-0006 | Vaughn Meeks | R-Project Transmission Line Project. I have concerns about the impact of the transmission line's route over the Birdwood Creek involving migratory waterfowl. I do not live in the area but help ranchers with their day to day operations throughout the year. In the spring numerous Sandhill Crane visit the area feeding in the fields during their stop over during migration. I have heard of confirmed sitings of Whooping Crane also. My greatest concern are for the swan that spend the winter on the Birdwood. A group of 30 -50 spend mid November through January- mid February on the creek. This area is the same location as the proposed crossing of the new transmission line. The creek runs generally north and south in this area. The power line will run east and west when it crosses the creek. The line will be in the direct path of the flight pattern when the swans fly up and down the creek for possibly everyday for up to 3 months. This is a spring fed river that remains mostly ice free in the winter. Many cold mornings fog develops when the cold air hits the relatively warm air of the creek. How are the swans going to fly past and through the many power lines without contact???". How many will be killed?? Also the crane??Thanks | Migratory Birds | None |
| 37—FWS-R6-ES-2014-0048-0010 | Micah Mills | As I review some information concerning the possible transmission power line that the power company is intending to pursue I have issue with a few areas.<br><br>1.Native species....specifically the beetle in the area and the reason to kill the beetle in order to gain access. | American Burying Beetle; Uniqueness/Sensitivity of Landscape; Routing; Impacts to Ranchers | None |

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| | | 2. Ranchers that are impacted. I found that in four counties the power company has access to three miles..therefore more roads would have to cut which i find inexcusable across private land.<br><br>3. Sandhills and the native grass. Once native grass is lost it won't come back. That is again inexcusable.<br><br>4. There is no reason to put the powerline across native sandhills. The power company can re-route the line across public lands but i don't believe that should be allowed to have access to private land.<br><br>I live in Caldwell, Idaho but understand ecosystems and the impact that powerlines can have. I find it difficult to understand why the powercompany should have access to private lands when they can re-route the powerlines through a less delicate ecosystem. | | |
| 38—FWS-R6-ES-2014-0048-0052 | Stuart Scranton | Please accept these comments for the proposed R-project transmission Line in Nebraska. I have concerns about visual Intrusion and reduction in natural beauty the R-project will cause to our Sandhills landscape (see sunrise photo). I also have concerns about the potential for soil erosion and compaction as demonstrated In the attached photos of wooden pole structures (see attached photos). large power lines can have a negative impact on wildlife including migratory birds and bald eagles. A picture of a bald eagle that was taken at my home is attached-there may be a bald eagle nest in the area. Birds can collide with power lines in low-visibility conditions (e.g., snowstorms). Power lines may impact the abundance of prairie grouse that use our property as booming grounds, because the power lines will be in very close proximity of the booming grounds. Box turtles may be crushed by large pieces of equipment used to Install the power line. low frequency humming from the constructed power line may affect wildlife as they move between habitats. The electromagnetic field originating from the constructed | Visual Intrusion on the Sandhill Landscape; Soil Erosion; Migratory Birds; Other Protected Species; Electromagnetic Fields | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | power lines may affect migratory birds that use this area as a migratory path, through altered behavior, physiology, gland secretion, immune system, and reproductive processes. The power line may interfere with audio and radio frequencies and fiber optic transmissions. Therefore the use of our two-way radios may be affected. My home and the home where my parents resided include livestock corrals that are extremely close to the proposed power line. We are concerned about all of these above factors. | | |
| 39—FWS-R6-ES-2014-0048-0032 | Anonymous | The EPA came out with a map of the Ecoregions of Nebraska and Kansas that the Keystone XL Pipeline had to avoid. Why is this same consideration not being taken for the R-Project, an equally harmful project that will not only be a detriment to the ecosystem of the Sandhills during the construction phase, but also during the ongoing maintenance that will continue throughout the life of the R-Project. The R-Project should not be allowed to disturb what the EPA calls the, "fragile, sandy rangeland."<br><br>Here is an excerpt out of the EPA's Ecoregions of Nebraska and Kansas poster: "The Nebraska Sand Hills comprises one of the most distinct and homogeneous ecoregions in North America. One of the largest areas of grass stabilized sand dunes in the world, this region is generally devoid of cropland agriculture, and except for some riparian areas in the north and east, the region is treeless. The area is very sparsely populated; however, cattle ranching is a tradition, and large ranches are found throughout the region. The fragile, sandy rangeland must be managed cautiously; wind erosion on denuded sand dunes can be a problem, and care must be taken to prevent overgrazing and vegetation loss. Numerous lakes and wetlands dot the region and parts of the region are without streams."<br><br>NPPD states that it will be more expensive to go along existing roads and highways, yet, they do not calculate the extra costs they will have to incur when they would need to construct temporary roads to gain access, the use of | Uniqueness/Sensitivity of Landscape; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | helicopters and other special equipment to navigate the hills, or the extra cost of continually needing to access areas for maintenance that are very remote and dangerous for large equipment.<br><br>Please urge NPPD to use existing roads and highways to construct this route, and NOT to cut through the center of one of the largest areas of grass stabilized sand dunes in the world. Please do NOT grant the incidental take permit. | | |
| 40—FWS-R6-ES-2014-0048-0054 | Lynn Ballagh | Key comments excerpted from full comment:<br><br>- Because of the additional miles needed for access, there will be many more negative impacts on the environment, ecosystem, resources, and ultimately our livelihood as ranchers ... not for a short time, but forever!<br><br>- I have a special concern for my wet sub-irrigated meadows that I know they will rut up. It is not crop ground that can be disced and smoothed up, but the hay these meadows produce is my crop!<br><br>- I have 2 leks of chickens and 1 dancing ground of the grouse within a mile of the proposed transmission line.<br><br>By my own experience and learning from wildlife biologists, it has been established that most females nest within a mile of their mating ritual sites. How does this relate to the transmission lines? First, they put the birds in danger of injury or death in their flight patterns, and second, because the height of the lines and towers provides ample opportunity for predatory birds to perch and observe their prey, whether game birds or other birds, more readily.<br><br>- Also, the flat lowland meadows are good for migratory birds, especially Sandhill Cranes, to use for resting andfeeding. Here again the number and height of the transmission lines create a real hazard for them on landing or take-off. | Wetlands; Migratory Birds; American Burying Beetle; Other Protected Species; Historical/Cultural Resources; Uniqueness/Sensitivity of Landscape; Access | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | - Of historical significance along the proposed route is the 1st sod schoolhouse that was .established in northern Garfield county.<br>- I am also concerned about the danger of accidental fires being sta rted and the adverse effects they would have on the frag ile soil.<br>- Another concern is that of exposing the ground to more noxious weeds that may be carried in on the equ ipment they use for construction as well as the maintenance of the line. | | |
| 41—FWS-R6-ES-2014-0048-0027 | Darlene Conrad, Northern Arapaho Tribe | Our office would like to address this project with a 'No Effect" to the Cultural and Historical Properties; however the view shed had not been addressed in the report. From the view of the map sent to us we see that the project is topography is predominately flat, we feel that provided information that the view shed does not have any historical properties in the way project may proceed as planned, with of course mitigating the effects and impacts to that of the endangered species "burying beetle" be kept in mind. However with any new land project that does involve ground disturbance our office asks that if there are any inadvertent discoveries found, human remains, etc. please contact our office and provide a report. | Historical/Cultural Resources | None |
| 42—FWS-R6-ES-2014-0048-0039 | Stephanie Butler | I wanted to submit a comment in support of the opposition regarding the proposed R-project 345kV transmission project. The Nebraska Sandhills, particularly the area affected by this proposed route, is one of the most unique biological landscapes in the United States. There are animal species found in this area that are thriving like nowhere else in the world. I know you have heard statements and read comments from residents who live in the pathway of the route regarding wildlife counts and occurrences. While I do not live in the proposed pathway, I have concerns regarding this project and I provide a comment of my own. I had the opportunity to do biological research in the Nebraska Sandhills from 2009-2012 as an undergraduate research assistance and as a masters | American Burying Beetle | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | student at the University of Nebraska at Kearney. I worked under the direction of Dr. Wyatt Hoback conducting American burying beetle research. This beetle is an amazing creature that is found in only a handful of states, but thrives in the Sandhills like nowhere else. The U.S. Fish and Wildlife Service has the data regarding trap locations and the number of American burying beetles captured along the proposed route. We do not fully understand why the American burying beetle is found in some places and not in others. It could be as simple as, for example, the absence of artificial light at night, or it could be a combination of elements of which we are unaware. It would be a shame to put such an obstruction through some of the purest wildlife habitat left in our nation, especially when alternative routes exist. By placing a structure that would introduce disturbance in so many ways (electrical and magnetic fields, ground disturbance, perpetual noise and artificial lighting to name a few), we are introducing known threats to habitat and it is highly likely that we also introducing threats of which we are currently unaware. Species of carrion beetles captured in traps in both the proposed route pathway of Garfield and/or Holt counties includes Necrodes surinamensis, Necrophila americana, Nicrophorus carolinus, Nirocphorus marginatus,Nicrophorus orbicollis, Nicrophorus pustulatus, Nicrophorus tomentosus, Oiceoptoma inaequale, Oiceoptoma novaboracense, Thanatophilus lapponicus, Thanatophilus truncatus and of course the endangered Nicrophorus americanus. Each beetle trap that I checked the proposed route had not only multiple species of carrion beetles present, but also multiple species of dung beetles. Dung beetles are very beneficial to soil health and recycle nutrients. Species such as Onthophagus hecate, Onthophagus pennsylvanicus, Melanocanthon nigricornis, and Phanaeus vindex were captured both along Highway 11 north of Burwell and also in the Chambers area. I have included three pictures, one is of two American burying beetles along Highway 11near the Garfield/Holt county line, one is of a Blowout Penstemon in full bloom near Chambers | | |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | and the third shows a beetle trap with various carrion and dung beetles. | | |
| 43—FWS-R6-ES-2014-0048-0007 | Jeffrey Bertch | This is our last large intact grassland. Let's not ruin it by running a huge power line right through the middle of it. Leave the Sandhills alone. | Uniqueness/Sensitivity of Landscape | None |
| 44—FWS-R6-ES-2014-0048-0021 | Anonymous | In response to comment form questions:<br>1. We are concerned with the negative effects the transmission line and maintenance of such will have on our fragile ecosystem and our ranch and sandhills as ahole. Once damaged/altered it will never be the same!<br>2. Transmission line should follow an already open route along a highway. It is very wrong to open up the Sandhills and its very precious fragile ecosystem to another invasive route. We need your help to protect this area and ecosystem.<br>3. We haave documented burying beetles on our ranch and wetlands/Sandhills area. Why disturb this endangered species if a route along a highway is possible. Money/financial gain isn't important - what is important is to protect the Sandhills wildlife.<br>4. We know that the Fish and Wildlife Service will know the best ways to protect the American burying beetle as well as other endangered and precious wildlife that are a part of our Sandhills. Eagles, migratory birds, etc. call this home.<br>5. Gracie Creek Ranch and the Sandhills hold many historical sites that are documented in many books and other traditional Indian sites taht we feel need to be further investigated by experts in these fields. We have "Arrowhead Lake" that is a known Indian historical site on our ranch. Once these areas are desecrated it will be too late to recover them.<br>6. We feel that following a road or highway with the proposed transmission line would be the most protective measure to protect burying beetle and other wildlife. These highway areas | Uniqueness/Sensitivity of Landscape; American Burying Beetles; Historical/Cultural Resources; Migratory Birds; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | have already been disturbed - Why disturb more of our precious Sandhills?<br><br>7. Why should more land/animals be disturbed if not needed - Please use roadways that we already have. You can't put a price on this land/wildlife habitat. When maintenance crews come in it will be tough to control damage, invasive measures, etc.<br><br>8. We have documented whooping cranes/burying beetles/etc. on our ranch. Please help us protect these animals - Why take a chance on disturbing them - It is our responsibility to protect these wildlife species and put transmission line in more appropriate area!!<br><br>9. We are so fortunate in Nebraska to have the Sandhills and wildlife speces we do. There are alternative highway routes that will minimize disturbance to wildlife. It is not worth it to gamble on the effects caused by this line. Please help us to protect Sandhills and wildlife. | | |
| 45—FWS-R6-ES-2014-0048-0051 | Devyn Ballagh | Key comments excerpted from full comment:<br><br>- The proposed R-Project would cross one of the largest wet meadows on our ranch. I know that this meadow is a prime example of undisturbed habitat that the American Burying Beetle prefer and thrive in. This habitat cannot be recreated, and the fragmentation of Sandhills and wet meadows cannot be undone. This truly is one of the last untouched native grassland areas in the WORLD.<br><br>- Another species that I feel is being overlooked in regards to the impact this line would have to wildlife is the prairie chicken. We have several large 'booming grounds' on our ranch, one that is within a 1/2 mile of the proposed route, and the biggest one would be between 1/2 and 3/4 of a mile from the proposed line. The negative effects from this transmission line project on their nesting and breeding areas, and their habitat in general, would be huge! Not only does the line provide a perch for predators, but the lack of access roads will | Uniqueness/Sensitivity of Landscape; Wetlands; Other Protected Species; Future Wind Power Generation; Access; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | cause construction equipment to cross large portions of previously undisturbed prairie in attempts to access their 200 foot easement to build the line.<br><br>- Of the east/west portion of the proposed route, over 90 MILES of the route is not next to existing access, which means it is cutting through large portions of land that has not previously been developed or fragmented. When I am referencing the lack of access, I mean there are literally no roads for several miles in many areas of this route. Driving 3 or 4 miles across a pasture to access this line in places will have a much larger environmental impact than the 200 foot easement that NPPD references when they try to 'sell' the project as just needing a small part of your property.<br><br>- I fear that the construction of this line, done by out of state contractors with no experience with this landscape, soil type, and high water table, would do irreversible damage to our wet hay meadows.<br><br>- I agree that to take the line along existing corridors or in a less fragile environment may mean more miles of transmission lines for NPPD, but I don't believe that there would be as much environmental impact by building in previously disturbed areas...areas with existing access so that the line could be built and maintained by using existing roads, instead of fragmenting and disrupting so much of the Sandhills, and interfering with the migratory birds.<br><br>- I do not think we should disrupt the Sandhills, and the remote areas that serve as high quality habitat for the American Burying Beetle, prairie chickens, and other species of animals and birds too numerous to mention, to build high voltage transmission lines to make a way to export power out of state. If we are going to produce green energy in Nebraska (wind farms), let's keep the power here and use it ourselves. | | |
| 46—FWS-R6-ES-2014-0048-0026 | Jim Owen | In response to comment form questions: | Migratory Birds; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | 1. Any alternative location to the proposed powerline route will reduce the negative impact on and incidental take of migratory waterfowl.<br><br>2. Move the proposed powerline out of the Birdwood Creek watershed.<br><br>8. The Federally listed Whooping Crane will suffer further reduction in number from powerline collisions. All other migratory waterfowl will also become victims of incidental take. | | |
| 47—FWS-R6-ES-2014-0048-0031 | Anonymous | It is understood that the FWS does not have control over the final route, but the FWS does have a voice to say that the proposed route is not adequate and that NPPD needs to find the least destructive route.<br><br>The Sandhills is an extremely fragile ecosystem. The soil is sand through and through. It is incredibly soft. Driving equipment such as trucks or tractors on a path even twice can mash the grass down and cause erosion. The native grass is integral to keeping the sand from blowing. I have attached a photo of the soil where it is visible the deep tracks left just by cows. Large trucks and machinery with tracks would be devastating to the Sandhills.<br><br>NPPD needs to re-route this R-Project where the land is harder (north or south of the Sandhills has more clay) and where the line will be easier to access along existing highways. The harder soil would see recovery fairly quickly, whereas the Sandhills may not see it for generations.<br><br>Please do not grant the permit to NPPD. Please tell NPPD that they need to use an existing highway for their route. Please take into consideration these other harmful aspects of the R-Project. | Uniqueness/Sensitivity of Landscape; Soil Erosion; Routing | None |
| 48—FWS-R6-ES-2014-0048-0029 | Michael Kelly | Key comments excerpted from full comment: | Uniqueness/Sensitivity of Landscape; Migratory Birds; | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | - As a resident of Nebraska, I have serious concerns regarding the proposed route of the transmission line proposed by the Nebraska Public Power District (NPPD) where it crosses the Platte Valley and into the Sandhills of Nebraska. This route will cross one of the most significant roosting/wintering areas for migratory birds in North America.<br><br>- Power line collisions comprise one of the most significant mortality factors for these birds. The species of birds whose habitat will be encroached upon include a 'who's who' in any bird book related to endangered and species of concern. The Whooping Crane, the Bald Eagle, Trumpeter Swans, Sandhills Cranes, Great Blue Herons, along with ducks, geese and other migratory Sandhllls birds.<br><br>- Of specific concern is the proposed power line crossing where it intersects Birdwood Creek, northeast of Sutherland.<br><br>Up to 20% of the entire Trumpeter Swan High Plains Flock has been observed using this area during recent winters.<br><br>- Wildlife species and scenic vlewscapes will both be negatively impacted as well as the adverse impacts to cultural and historical landmarks, the associated noise from future wind turbines and long-term effects to potential tourist attractions.<br><br>- History has also shown that development of these types of large transmission lines can strongly influence where new wind energy farms will be developed, which will also have a detrimental impact on wildlife. | Visual Intrusion on Sandhills Landscape; Cultural/Historical Resources; Future Wind Power Generation; Routing; Ecotourism | |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| 49—FWS-R6-ES-2014-0048-0044 | Naoma L | Thank you for this opportunity to comment on the R-Project Transmission Line, proposed to cross over Nebraska's Sandhills. I offer a perhaps-unique perspective on the location of the R-project transmission line, as I experienced a similar environmental degradation in the Texas Hill Country outside of Austin.<br><br>In the late 1970's and early 1980's, power lines of all sorts began to march across the Texas hill country landscape; resistance from environmental champions was over-ruled with assurances to protect ecosystems via careful environmental planning. These safeguards did not occur, nor was future development forestalled as promised; rather, transmission and power lines opened the floodgates for development of a 50-mile corridor increasingly (and permanently) criss-crossed by power lines and traffic jams. If you have visited the area lately, you know that it is a vibrant, congested urban environment from Waco down to San Antonio. Sadly, natural resources are no longer a feature; the current drastic water shortage from Texas' continuing drought has caused veteran and newer residents to take a look back and question decisions that led to the degradation of the entire area, including the Edwards, Trinity, and Carrizo aquifers.<br><br>I have been a Nebraska resident for ten years and have been impressed with the quality of natural resources and refuge for human and animal species, and have been saddened indeed to learn that Nebraska's power elite are poised to make the same mistakes as in Texas referenced above!!Please avoid such foolish short-sightedness and instead make and keep a solid commitment to the integrity of a natural resource that CANNOT BE DUPLICATED!! Damage to the Sandhills ecology is not something that 21st Century technology can come in and patch up - once gone, it's gone for aeons. Why would anyone make such a foolish mistake when alternatives clearly exist???? Please reconsider and protect Nebraska's natural heritage by simply requiring transmission lines to follow already-existing roads and power routes. | Future Development; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | Thank you in advance for your consideration of this plea. | | |
| 50—FWS-R6-ES-2014-0048-0025 | Bill Vodehnal, NGPC | In response to comment form questions:<br>3. What state listed species will be evaluated in scoping process along with federal T&E species. Will they be considered in EIS, ITP, and HCP.<br>6. What steps or activities will be required during installation?<br>8. Impacts to wetlands | Other Protected Species; Wetlands | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| 51—FWS-R6-ES-2014-0048-0003 | Jean Public | DENY THIS PERMIT FOR THIS UTILLITY TO USE AMERICAN SAVED OPEN SPACE FOR THEIR PERSONAL PROFITEERING. ITS TIME TO SAY NOT TO THESE PROFITEERS. LET THEM BUY AND USE ALREADY CONTAMINATED POLLUTED LAND FOR THEIR TRANSMISSION LINES, NOT TURN MORE OPEN SPACE INTO HERBICIDED, PESTICIDES, LOGGED OF TREES AND LIFE LAND. WE ARE SICK OF THIS KOWTOWING TO THIS PROFITEER. DENY THE PERMIT<br><br>THESE ARE UTILITY PROFITEERS. THEY DONT DO ANYTHING GRAND FOR THE PEOPEL OF THIS COUNTRY, WHO ARE HELPED MORE BY HAVING THE OPEN SPACE THAN THE WAY SOME OF THESE UTILITY PROFITEERS ACT, I.E. EXCELON WHICH HELD UP THE PEOPLE IN CALIFORNIA RECENTLY. THIS LAND IS SAVED OPEN SPACE AND IT SHOULD REMAIN THAT WAY. THAT BURYING BEETLE IS WORTH $50 MILLION TO THE ECOLOGICAL ENVIRNONMENT IN TERMS OF ITS PLACE IN THE SCHEME OF ECOLOGY. ITS TIME TO SAY NO. | Uniqueness/Sensitivity of Landscape; American Burying Beetles; Routing | None |
| 52—FWS-R6-ES-2014-0048-0055 | Amber Fleecs | Key comments excerpted from full comment:<br><br>- In the last round trip of the Whooping Cranes migratory route of2014 from Canada to Texas the Whoopers would have been in very close proximity and in danger of colliding with the proposed route twice [Birdwood Creek and North Platte River].<br><br>- There are already existing transmission line corridors East out ofNPPD's Gerald Gentleman Station substation where the R-Project starts. NPPD is proposing not to follow these corridors for the reasons of reliability(line separation) and cost. The additional cost would be a very small percentage of the overall cost of the R-Project and would be a one time cost at that. It would be a small price to pay for our endangered species and all the other migratory and local birds that would | Migratory Birds; Routing | None |

| Comment # and ID | Name/ Organization | Comment | Topic(s) within Scope | Topic(s) out of Scope |
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| | | be subjected to perpetual take. This Alternate route East makes great conservational sense as one could cross 1 river(North Platte River) instead of 3(North and South Platte River and Birdwood Creek). Doing this would easily avoid these highly sensitive areas and avoid UNNECESSARY river crossings. | | |
| 53—FWS-R6-ES-2014-0048-0020 | Linda B | I would like to comment on the proposed R transmission line through the heart of the sand hills of Nebraska. There is an extreme lack of access. To create access, severe destruction of the sand hills would take place. Roads would have to be created to get to the transmission lines. The transmission lines will negatively effect the ranchers who live there. The use of heavy equipment to maintain the 3 lines could cause "blowouts" where the sand has no grass coverage. This can continue to expand, ruining grazing land for the ranchers and animal habitat. Maintenance of the transmission lines will continue to harm the fragile soil. Birds will be effected...the Whooping Crane. The nesting grounds and migration patterns will be effected. Please take this into account in the "incidental take permit." The sand hills, being part of the Northern Great Plains, is one of the four intact remaining temperate grasslands in the world. We can't invent any more new land. Please let the Nebraska ranchers preserve the sand hills of Nebraska.<br><br>Beetles will be effected, the American Burying Beetle. It helps in the decomposition of dead animals.<br><br>The electromagnetic field will bother the grazing animals, birds and insects. This could effect migratory patterns that have been used for thousands of years.<br><br>A real need for this project has not been identified and documented. Please find other alternative. This project should not follow its proposed route for all these reasons. | Soil Erosion; Migratory Birds; Uniqueness/Sensitivity of Landscape; American Burying Beetles; Access; Routing; Purpose and Need for Project | None |

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# APPENDIX B:

## U.S. FISH AND WILDLIFE SERVICE
## R-PROJECT ALTERNATIVE ROUTING STUDY

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## 1.0 PROJECT OVERVIEW

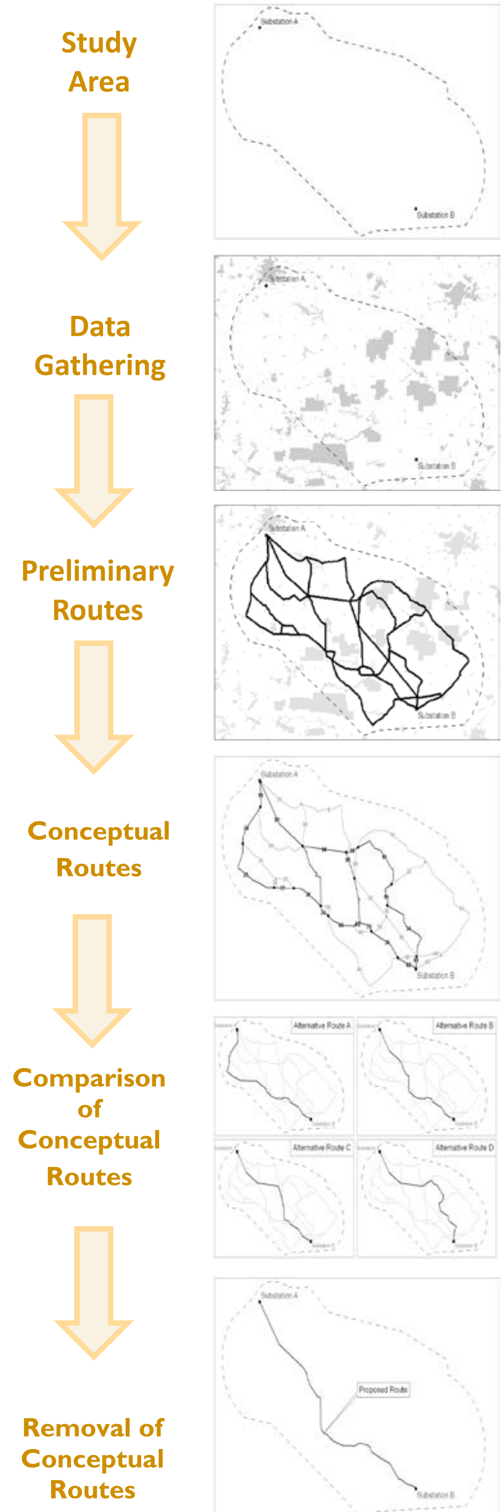
The U.S. Department of the Interior, Fish and Wildlife Service (USFWS), has received an application for an incidental take permit (ITP), pursuant to Section 10(a)(1)(B) of the Endangered Species Act, from Nebraska Public Power District (NPPD) for its proposed new transmission line and substations (known as the R-Project or Project) in central Nebraska. The ITP would authorize the incidental take of the federally endangered American burying beetle (*Nicrophorus americanus*) (ABB). In support of its application for an ITP application, NPPD has prepared a draft Habitat Conservation Plan (HCP) that outlines actions that would be taken to avoid, minimize, and mitigate impacts on the ABB. A draft environmental impact statement (EIS) is being prepared to analyze the potential impacts associated with issuance of the ITP and implementation of the HCP.

NPPD proposes to construct, operate, and maintain a new, approximately 225-mile-long, 345 kilovolt (kV) transmission line. The transmission line would extend from NPPD's Gerald Gentleman Station (GGS) Substation near Sutherland, Nebraska, to NPPD's existing substation east of Thedford, Nebraska, which would be expanded. The transmission line would then proceed east and connect to a new substation that would be sited in Holt County. The R-Project transmission line traverses a large portion of the Nebraska Sandhills grassland, which includes habitat for and supports remaining populations of the federally endangered ABB (see Map 1).

The proposed issuance of an ITP is the only way for NPPD to obtain ESA compliance for the construction, operation, and maintenance of the R-Project. The alternatives that USFWS typically analyzes in an EIS for an ITP are variations of the ITP (e.g., permit duration, level of permitted take, types of covered activities) and implementation of the HCP (including the location, amount, and type of conservation measures) or a combination of these elements. For purposes of analysis in the R-Project HCP EIS, USFWS determined that it should evaluate whether there are other ways to implement the Project that would minimize the impact on and take of the ABB and still meet the R-Project purpose and need. One way to avoid and minimize take of the ABB would be to construct the transmission line using a different route. NPPD does not agree that alternative routes outside the study area would be reasonable or would meet the R-Project proponent's purpose and need. While USFWS has no authority over routing of the R-Project, it does have jurisdiction over permitting take of the ABB. Consequently, USFWS elected to evaluate possible options to avoid and minimize take of the ABB by using different routes to construct and operate the transmission line. USFWS recognized that any alternative route(s) considered must also meet the proposed R-Project purpose and need, including electrical need.

An evaluation of alternative routes is useful for comparison purposes; the comparison between the NPPD's final route and conceptual transmission routes provides context to the impacts of the Project on the landscape and the environment, specifically impacts on the ABB. It also addresses the public scoping comments that call for an analysis of different alignments.

## 2.0 APPROACH




The Louis Berger Team conducted a programmatic level siting study to evaluate potential conceptual routes for the R-Project that avoid or minimize impacts on the ABB habitat, are reasonable and constructible, and achieve the purposed and need of the Project. This process involved several steps, including data collection, study area delineation, review of area constraint and opportunity features, and ultimately, identification of conceptual routes.

The portion of the R-Project from the Thedford Substation to the Project's eastern terminus at the Western Area Power Administration (Western) 345-kV transmission line in the Holt/Antelope/Wheeler County area crosses high probability of occurrence ABB habitat (Map 1). Therefore, the conceptual route review focused on potential alternatives to this portion of the study area.

### 2.1 Preliminary Routing Process and Terminology

The normal route development process employed by Louis Berger was abbreviated for the purpose of this study. Most notably, the process did not include the normal iterative rounds of field and engineering review, agency coordination, and public input. Instead, the process was primarily a focused desktop effort with limited field review conducted to develop reasonable route solutions that may potentially minimize impacts on ABB habitat and appeared to be suitable for overall Project feasibility. Actual impacts could not be determined based on this abbreviated analysis.

Initial conceptual route development efforts started with identifying large area constraints and opportunity features within the study area, which encompasses the endpoints of the Project and areas in between. These areas are typically identified using a combination of readily available public data sources.

The routing team used this information to develop conceptual routes adhering to a series of general routing and technical guidelines. Efforts were made to develop conceptual routes throughout the study area when practical to ensure that all reasonable alignments were considered. Alignments were approximate at this stage, but were suitable for guiding field reconnaissance and preliminary engineering reviews.

As the routing team continued to gather information and review the conceptual routes in greater detail, the alignments were revised and refined, resulting in the development of more specific alignments.

The conceptual routes were then compared through an analysis of the information gathered through desktop and limited field reconnaissance efforts. Through comparison of a range of quantitative and qualitative factors, some conceptual routes were eliminated from further consideration.

## 2.2 Routing Team

An experienced routing team performed the examination of potential alternative routes for USFWS. Members of the routing team have experience in transmission line route planning and selection, impact assessment for natural resources, and land use assessment and planning. The team's objective was to identify route options that provide a reasonable balance between impacts on local communities and the natural environment, while applying appropriate routing and technical guidelines, as addressed in detail below. The routing team worked together during the route selection process to:

- Define the study area
- Develop routing guidelines
- Collect and analyze environmental and design data
- Identify routing constraints and opportunities
- Develop and revise the conceptual routes
- Analyze and report on the evaluation of the conceptual routes

## 2.3 Data Collection

Many sources of information were employed to develop data for the alternative route study conducted for USFWS. One of the most important tools used was aerial photography. The following aerial photography sources were used:

- Imagery from the National Agricultural Inventory Project, obtained from the U.S. Department of Agriculture (dated 2014)
- Google's Google Earth color aerial photography
- Microsoft's Bing Aerial Imagery service

Extensive use was made in the study of information from existing Geographic Information System (GIS) data. This information was obtained from many sources, including federal, state, and county governments. The use of GIS data allows for the consideration and efficient use of a wide variety of information that would otherwise be unavailable or impractical to consider for a planning effort of this scope. GIS information is a highly effective tool when utilized for broad level planning studies, identifying and characterizing landscape level constraints and features, and developing environmental inventory information useful for comparisons between planning alternatives.

The presentation, analysis, and calculations derived from these data sources, however, require careful consideration when used for planning purposes. Therefore, GIS-based calculations and maps presented in this study should be considered reasonable approximations of the resource or geographic feature they represent and not absolute measures or counts. They are presented to allow for general comparisons between alternatives with the assumption that the level of any inherent errors or inaccuracies would be generally equal across all alternatives. Table 1 presents a list of the major GIS data sources gathered, used, or otherwise considered in this routing study.

**Table 1. GIS Data Sources**

| Name | Owner | Resolution | Date of Source Data |
|---|---|---|---|
| Building Locations | LB, GNIS | - | 2015 |
| Local, State, and Federal Lands | USGS Protected Areas Database | 1:24,000 | 2015 |
| USGS DEM | USGS | 10 meters | varies |
| National Wetlands Inventory | USFWS NWI | 1:24,000 | 2015 |
| National Hydrography Dataset Flowline/Waterbodies | USGS | 1:24,000 | 2015 |
| National Register of Historic Places | NPS | - | 2014 |
| Orthoimagery | USDA – NAIP | 0.5 meter | 2015 |
| Major Roads | ESRI | 1:24,000 | 2014 |
| Active Railroads | ESRI | 1:100,000 | 2014 |
| Existing Transmission Lines | LB | - | - |
| Gas Pipelines | USGS | - | - |
| Substations | LB | - | - |
| USGS Quads | USGS | 1:24,000 | varies |
| National Land Cover Database | USGS | 30 meters | 2011 |
| Parcels | County Tax Assessor | 1:5,000 | varies |
| American Burying Beetle Predicted Occurrence | FWS | 30 meters | 2014 |

## 2.4 Routing Guidelines

Routing guidelines were used to direct the development of a range of potential conceptual routes that minimized the effects of the Project on the natural, cultural, and human environment; avoided extreme costs and non-standard design requirements, which meeting the R-Project's stated purpose and need. Routing guidelines largely identify the types of study area constraints and opportunity features that should be considered for developing potential conceptual routes. The following routing guidelines were employed in the USFWS alternative route development and review:

- Minimize impacts to the natural and human environment
- Minimize route length and cost
- Avoid non-standard design requirements
- Minimize crossing of high probability of occurrence ABB habitat areas
- Maximize alignment along section or half-section lines
- Maximize the separation distances from residences, schools, cemeteries, historical resources, recreation sites, and other important cultural sites
- Minimize crossings of designated natural resource lands such as national and state forests, national and state parks, wildlife management areas, designated wildlife areas, and conservation areas
- Avoid crossing large lakes, rivers, or large wetland complex areas

Once conceptual routes were developed, each route was inventoried and evaluated with respect to a range of route selection criteria. These criteria were both (1) quantitative, such as the number of houses within 500 feet, acres of wetlands crossed, number of waterways crossed, and acres of forest land to be removed; and (2) qualitative, where considerations of regulatory concerns, permitting requirements, and design and potential operational limitations can be considered as part of the proposed route selection process.

### 2.4.1 Opportunity Features

The Louis Berger Team defined routing opportunities as locations where the proposed transmission line might be located with the least impact (Map 2). Linear corridors such as existing transmission rights-of-way, railways, highways and roads, underground bulk gas and oil pipelines, and other similar features are commonly considered opportunity features for siting new transmission. It is acknowledged that some of these features may also present constraints to design, construction, operation and maintenance due to a variety of concerns, including safety. However in general, this type of infrastructure is not present within the study area. Instead, opportunities to minimize impacts to land use were identified along existing divisions of land primarily in the form of section and half-section lines.

### 2.4.2 Routing Constraints

Constraints were identified and divided into two groups—large area constraints and small area constraints (Map 2). Large area constraints are generally identifiable from readily available sources of information, while small area constraints are typically derived from either aerial photography or route reconnaissance efforts. Louis Berger relied on existing maps, data, aerial photography, and information gathered during brief field reconnaissance efforts conducted in September 2015.

Large area constraints include: urban areas, including cities, towns, small villages, and other developed areas; national forest and wildlife management lands; state forest, parks, and wildlife management lands; areas near airports and airstrips; National Register Historic Districts large recreational sites, educational facilities, large lakes, and reservoirs that could not be spanned with the structures set well back from the shores; and large wetlands or wetland complexes.

Small area constraints include: individual residences, including houses, permanently established mobile homes, and multi-family buildings; commercial and industrial buildings; recorded sites of designated historic buildings and sites; permanent irrigation infrastructure; recorded sites of designated threatened, endangered, and other rare species or unique natural areas and the specified buffer zone around each site; small wetlands; developed recreational sites or facilities; communications towers; wind turbines; and designated scenic vista points.

The routing constraints served as the primary basis for the criteria used for development of the conceptual routes.

## 3.0 POTENTIAL ROUTE DEVELOPMENT

The following sections describe the conceptual routes that were developed for review and comparison.

### 3.1 Northern Conceptual Route Description

The northern conceptual route continues along NPPD’s final route for the R-Project for 40 miles east of the Thedford Substation before turning to the north. The northern conceptual route is primarily aligned parallel to state and U.S. highways for the majority of its length.

After diverting from NPPD’s final route, the northern conceptual route parallels State Highway 7 to the north for approximately 34 miles. This stretch of the highway is sparsely developed and would allow for a consistent parallel alignment requiring no major diversions. Near the city of Ainsworth the route turns east to parallel U.S. Highway 20. It continues to parallel U.S. Highway 20 for the remainder of its length, until reaching the Western 345 kV transmission line in Holt County about 9 miles north of the eastern terminus of NPPD’s final route for the R-Project.

The 90 miles of route parallel to U.S. Highway 20 would likely require multiple significant diversions away from the highway to avoid the towns of Ainsworth, Long Pine, Bassett, Newport, Stuart, Atkinson, Emmett, O’Neil, Inman, and Ewing. Additional minor diversions would likely be required because of residential, commercial, and industrial development directly adjacent to the highway.

## 3.2 Southern Conceptual Route Description

The southern conceptual route (Map 3) diverts from NPPD's final route for the R-Project approximately 43 miles south of the Thedford Substation to parallel State Highway 70 to the east. Highway 70 continues east through Custer and Valley counties before turning back to the north and reconnecting with NPPD's final route in Wheeler County. The conceptual route followed the highway alignment for this entire length before rejoining the R-Project route and continuing east to the Project's eastern terminus at the Western line.

To accomplish the requirements of NPPD, this alignment also included a connection into the Thedford Substation. For purposes of the conceptual route development, it was assumed that a connection to the Thedford Substation would follow NPPD's final route for the R-Project along U.S. Highway 83, and then return south parallel to this route.

Parallel alignment to State Highway 70 would not be possible in many areas because of the presence of numerous towns (Arnold, Merna, Broken Bow, Westerville, Arcadia, Ord, Ericson, and Bartlett) and other residential, commercial, and industrial development along the highway. As a result, the southern conceptual route was developed with diversions around these features but still in a roughly parallel alignment to the highway. These diversions remain along section and half-section lines to minimize impacts on existing land use. Near the village of Bartlett, the southern conceptual route diverts to the north and east away from the highway; heading east for 13 miles before rejoining NPPD's final route for the R-Project just west of the Western line.

## 3.3 Central Conceptual Route Description

The central conceptual route was intended to remain along existing divisions of land just to the south of the high probability ABB habitat areas (Map 3). The central conceptual route continues along NPPD's final route for the R-Project for 26 miles east of the Thedford Substation before turning to the south near W. North Loup Road near Goose Creek. It then continues approximately 16 miles south to the Blaine and Custer county line before turning back to the east. The central conceptual route continues on an eastern trajectory for 60 miles and includes a few modifications to avoid residences and other landscape features. Just before it reaches State Highway 70 in Valley County, the route splits into two options.

Option 1 turns north for 5 miles, crossing State Highway 91, and then turns back to the east for another 12 miles. It continues along section and half-section lines, heading toward the northeast and eventually rejoining NPPD's final route for the R-Project 2 miles west of the proposed Western Substation.

Option 2 continues east for 14 miles before turning north and running along U.S. Highway 281 for a short distance. At the intersection of State Highway 91 and U.S. 281, the route turns back to the east and continues 13 miles before terminating at the Western 345-kV transmission line, on the border of Wheeler and Boone counties.

# 4.0 ANALYSIS OF POTENTIAL ROUTES

The following analysis provides a programmatic level description, inventory, and assessment of key factors that were considered in the route development process and a rationale for the dismissal of each route. As referenced previously, the conceptual routes for each area are identified in this analysis to provide reasonable alignment solutions that could serve as the basis for inclusion in the R-Project HCP EIS alternatives analysis. They should not be considered final routes that would normally be developed during a full route selection study with associated agency coordination and consultation, public outreach, iterative engineering reviews, and detailed field reconnaissance and verification. The following sections present a summary of quantitative information compiled for the conceptual routes that were developed.

## 4.1 Northern Conceptual Route

### 4.1.1 Route Summary

The primary benefit of the northern conceptual route is to parallel the existing highway through the Sandhills region to allow for easier access during construction and maintenance, eliminate the need for a new right-of-way through previously undivided land and reduce the cumulative structure footprint area by allowing for a greater portion of the line to be constructed with monopole versus lattice towers.

As described above, the northern conceptual route study area encompasses several towns along U.S. Highway 20 and additional residential, commercial, and industrial areas along the highway (Map 4). Upon further development, several sections of the northern conceptual route are not feasible as parallel alignments given the proximity to the highway of those developed areas. Not surprisingly, known historic resources occur within several towns along this route. Nine sites on the National Register of Historic Places are located within towns along the highway in this area.

To avoid significant impacts to these areas and resources, the route would be pushed farther away from the highway in many areas. Each time the northern conceptual route diverged from the highway parallel, it would increase overall route length, add in additional heavy angle structures (increasing ground disturbance and cost), and decrease the intended benefit of paralleling the highway in the first place.

As a result of these deficiencies, the northern conceptual route was dropped from consideration prior to further revision of a potential route. Table 2 compares the northern conceptual route and the NPPD’s final route for the R-Project. If the northern conceptual route were to be carried forward for further review, the revisions would likely decrease the house counts presented below, increase the overall length and cost, increase the number of heavy angle structures, decrease the length parallel to roads and highways, and increase the length along section lines.

**Table 2. Northern Conceptual Route Inventory of Quantitative Factors**

| | NPPD's Final Route for the R-Project | Northern Conceptual Route |
|---|---|---|
| **Route Characteristics** | | |
| Route Length (miles) | 224 | 263.9[a] |
| 90-degree angles (approx.) | 26 | 14[a] |
| **Length Parallel** | | |
| Not Parallel | 2.6 | 16[b] |
| Roads | 79.3 | 166.3 |
| Section Lines | 142.2 | 81.4 |
| **Percent Parallel** | | |
| Not Parallel | 1% | 6% |
| Roads | 35% | 63% |
| Section Lines | 63% | 31% |
| **Land Use** | | |
| Cities within 0.25 mile (count) | 2 | 12[b] |
| Airports within 1 mile (count) | 1 | 4 |
| Length in Sandhills (miles) | 211.8 | 232.5 |
| Residences within 500 feet (count) | 5 | 129[b] |
| Residences within 0.25 mile (count) | 22 | 289[b] |

[a] The northern conceptual route was not modified to avoid the numerous residential impacts along the highway. As a result, accurate counts are not available in many categories, although the numbers would increase significantly from what is presented in this table.

[b] Several sections of the northern conceptual route pass directly through cities as it parallels the highway. These sections of route are not feasible and would be re-routed along section lines away from the highway and residences if the northern conceptual route merited further analysis. Because these sections of route are not feasible, they were marked "Not Parallel" for this calculation. House counts along the northern conceptual route are artificially inflated because the route has not been modified to minimize residential impacts.

## 4.2 Southern Conceptual Route

### 4.2.1 Route Summary

As described above, the southern conceptual route was intended to parallel State Highway 70 for the majority of its length. Similar to the northern conceptual route, the southern conceptual route required substantial revision because of the location of towns and cities along State Highway 70 and additional development within the highway corridor. However, unlike the northern conceptual route, revisions could be reasonably made to minimize impacts on this development. The resulting southern conceptual route loosely parallels State Highway 70 for its entire length, but is only directly parallel to the highway for a short distance (Map 5).

Although the southern conceptual route is not directly parallel to the highway for the majority of its length, the revisions necessary to make it feasible from a siting perspective were less severe than would have been necessary on the northern conceptual route. In addition, this portion of the study area is largely outside the area of known occurrences of ABB.

The Project requirement to connect to the Thedford Substation necessitates that the southern conceptual route would have two circuits sited along U.S. Highway 83—one along NPPD's final route for the R-Project from the GGS Substation to the Thedford Substation and a second one along the same corridor from Thedford to the point 43 miles south of Thedford where the route turns to the east. The configuration of the additional segment of route, whether parallel to the NPPD's final route alignment for the R-Project or as a double-circuit section, would introduce reliably concerns, would increase cost and construction and maintenance complexity, and in general increase impacts from the route along that segment due to more structures and access roads (parallel alignment) or taller structures with larger footprints (double-circuit structures).

Because of this additional 43-mile segment, the increased impacts and costs associated with the overall length of the route and decreased benefits as a result of the many diversions from State Highway 70, the southern conceptual route was dropped from further consideration. Table 3 summarizes the quantitative impacts associated with the southern conceptual route.

**Table 3. Southern Route Inventory of Quantitative Factors**

| | NPPD's Final Route for the R-Project | Southern Conceptual Route |
|---|---|---|
| **Route Characteristics** | | |
| Route Length (miles) | 224 | 315.1[a] |
| 90-degree angles (approx.) | 26 | 43 |
| **Length Parallel** | | |
| Not Parallel | 2.6 | 1.3 |
| Roads | 79.3 | 52.8 |
| Section Lines | 142.2 | 180.6 |
| **Percent Parallel** | | |
| Not Parallel | 1% | 1% |
| Roads | 35% | 23% |
| Section Lines | 63% | 77% |
| **Land Use** | | |
| Cities within 0.25 mile (count) | 2 | 1 |
| Airports within 1 mile (count) | 1 | 2 |
| Length in Sandhills (miles) | 211.8 | 170.8[a] |
| Residences within 500 feet (count) | 5 | 5 |
| Residences within 1/4 mile (count) | 22 | 35 |

[a] Includes the distance along U.S. Highway 83 north to Thedford Substation and back south along U.S. Highway 83 to the east-west route segment paralleling Route 92.

## 4.3 Central Conceptual Routes

### 4.3.1 Route Summary

The conceptual basis for the central conceptual route development was to remain along existing section or half-section boundaries, while staying south of areas of known high probability of occurrence ABB (Map 6). Development of the route therefore involved detailed review of section and half-section lines in the area along the northern edges of Custer and Valley counties and the southern portions of Garfield and Wheeler counties. In the absence of dense residential or commercial development in these areas, the primary small area routing constraints are pivot irrigation systems, individual residences and farmsteads, private airstrips, and small public conservation lands.

The resulting central conceptual route avoids affecting these features for long stretches along a single section or half-section boundary. Unlike the northern and southern conceptual routes, the central conceptual route does not parallel an existing highway and would likely present similar construction access challenges to the R-Project route through this area. A large portion of the central conceptual route is located outside of the Sandhills ecoregion, however, and is in a less ecologically sensitive landscape.

Options 1 and 2 for the central conceptual route differ only toward their eastern end, where Option 1 connects to the Western Substation at the R-Project eastern terminus and Option 2 connects to the Western line farther to the south.

### 4.3.2 Route Development

Development of the central conceptual route began with the same conceptual delineation involved in the northern and southern conceptual route development. As the route was further revised, finer-scale data were required, such as individual residence locations and the availability of individual section and half-section lines as routing options. Following development of the central conceptual route, the routing team performed field reconnaissance to ground-truth the GIS datasets and ascertain the viability of the route in the field.

Following field reconnaissance, further minor revisions were made to the central conceptual route to increase distance from residences, avoid impacts to wetland features, and reduce tree clearing along windbreaks.

### 4.3.3 Summary

Table 4 summarizes the routing criteria for central conceptual route, Options 1 and 2, in comparison to NPPD’s final route for the R-Project. Options 1 and 2 have similar levels of overall impact and are similar in many individual categories to NPPD’s final route for the R-Project. The central conceptual route options have an equal number of residences in proximity, towns and cities within 0.25 mile, and airports within 1 mile; fewer wetlands crossed; and shorter length in the Sandhills ecoregion. The primary benefit of the two central conceptual route options is that they nearly avoid crossing known areas of high probability of ABB occurrence, whereas NPPD's final route for the R-Project crosses 74.9 miles of areas with a predicted ABB occurrence greater than 70 percent. Cost estimates include only the section of the route east of where the central route diverges from NPPD's final route (east of the Thedford Substation, in the north-central part of Blaine County) and were developed for comparative purposes. Cost estimates for the central route include only the sections of route not shared with the NPPD final route. All cost estimates are based on a per-mileage calculation of spans requiring lattice towers or steel poles and do not include the base fixed costs. Any additional costs associated with potential further study of the central route (reconnaissance, public outreach, and detailed engineering) are not included in these estimates.

**Table 4. Central Route Inventory of Quantitative Factors**

| | NPPD's Final Route for the R-Project | Central Conceptual Route | |
|---|---|---|---|
| | | Option 1 | Option 2 |
| **Route Characteristics** | | | |
| Route Length (miles) | 224 | 262.3 | 241.7 |
| 90-degree angles (approx.) | 30 | 32 | 32 |
| Estimated Cost for only those new route segments) | $120,099,000 | $148,662,000–$170,866,000 | $129,348,000–$144,720,000 |
| **Length Parallel** | | | |
| Not Parallel | 1.3 | 1.3 | 2.7 |
| Roads | 79.9 | 67.6 | 59.6 |
| Section Lines | 142.9 | 172.8 | 200.0 |
| **Percent Parallel** | | | |
| Not Parallel | 1% | 1% | 1% |
| Roads | 36% | 23% | 28% |
| Section Lines | 64% | 76% | 71% |
| **Land Use** | | | |
| Cities within 0.25 mile (count) | 2 | 2 | 2 |
| Airports within 1 mile (count) | 1 | 1 | 1 |
| Length in Sandhills (miles) | 211.9 | 205.1 | 182.9 |
| Residences within 500 feet (count) | 6 | 6 | 6 |
| Residences within 0.25 mile (count) | 23 | 23 | 28 |
| **Hydrology** | | | |

| | NPPD's Final Route for the R-Project | Central Conceptual Route | |
|---|---|---|---|
| | | Option 1 | Option 2 |
| Primary River Crossings | 7 | 8 | 9 |
| NWI Wetlands (miles crossed) | 5.7 | 2.8 | 2.2 |
| **Designated Natural Lands** | | | |
| State or Federal Land Crossed | Yes | Yes | Yes |
| State Recreation Trails Crossed | Calamus River Trail | N Loup River Trail | N Loup River Trail |
| **Sensitive Species and Habitat (miles crossed)** | | | |
| Length in high probability (>70%) predicted ABB occurrence | 74.9 | 6.0 | 6.0 |
| **Historic Resources (within 1 mile)** | | | |
| National Register Sites | 1 | 1 | 1 |
| **NLCD Landuse 2011 (within 1 mile)** | | | |
| Barren Land | 0% | 0% | 0% |
| Cultivated Crops | 8% | 10% | 11% |
| Developed | 2% | 2% | 2% |
| Forest Cover | 0% | 2% | 2% |
| Grassland/Pasture | 85% | 82% | 82% |
| Water/Wetlands | 5% | 3% | 3% |

## 5.0 CONCLUSION

The purpose of the alternative route development process and review was to determine whether a reasonable and constructible option existed to minimize impacts on ABB habitat along the Thedford to Western Substation portion of NPPD's final route for the R-Project. The review focused on three conceptual route areas—a northern conceptual route (along State Highway 7 and U.S. 20), a southern conceptual route (along State Highway 70), and a central conceptual route (south of the known high probability areas of ABB occurrence habitat). For reasons described above, the northern and southern conceptual routes were considered but eliminated because of a variety of factors. Although each conceptual route would likely achieve the aim of reducing impacts on ABB habitat, both routes failed to provide reasonable and constructible alternatives that did not trade off impacts on ABB habitat for greater impacts on other human and environmental factors.

A central conceptual route was developed that would minimize impacts on predicted occurrence of ABB habitat, while avoiding adding significant additional impacts to key human and environmental resources. A refinement of the conceptual route was undertaken and from this exercise two options emerged. Analysis of the two central route options determined that both were feasible from a technical and economic perspective. Ground-truthing also revealed it was possible from a technical perspective to build either of the two central route options; but Option 2 was preferred because it was shorter and thus more cost effective to construct. An economic analysis indicated the cost of building the central route Option 2 was in the range ($317 to $346 million) of the total cost for NPPD's final route ($326 million). Thus the central route Option 2 was recommended for further consideration.

# MAPS

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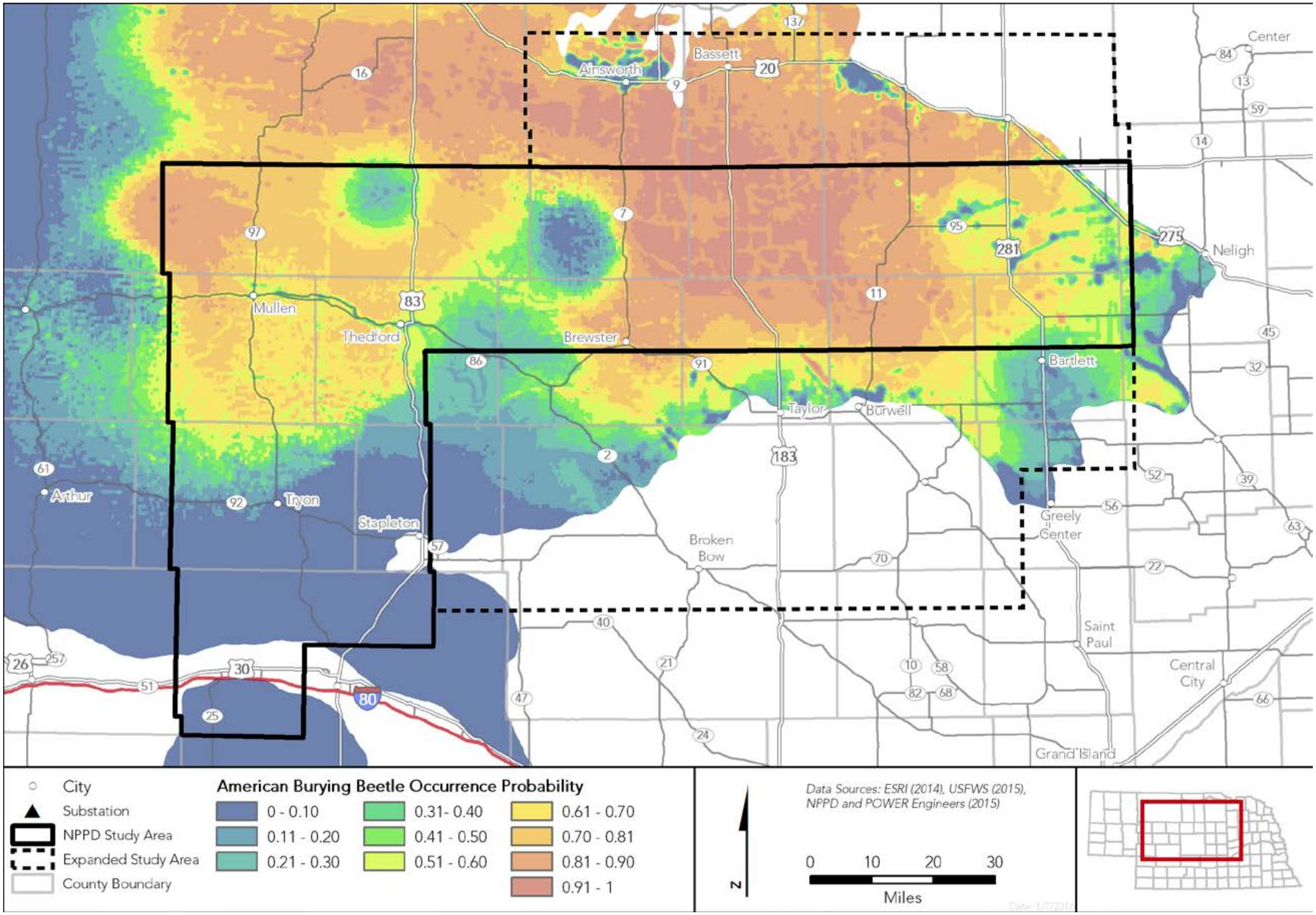
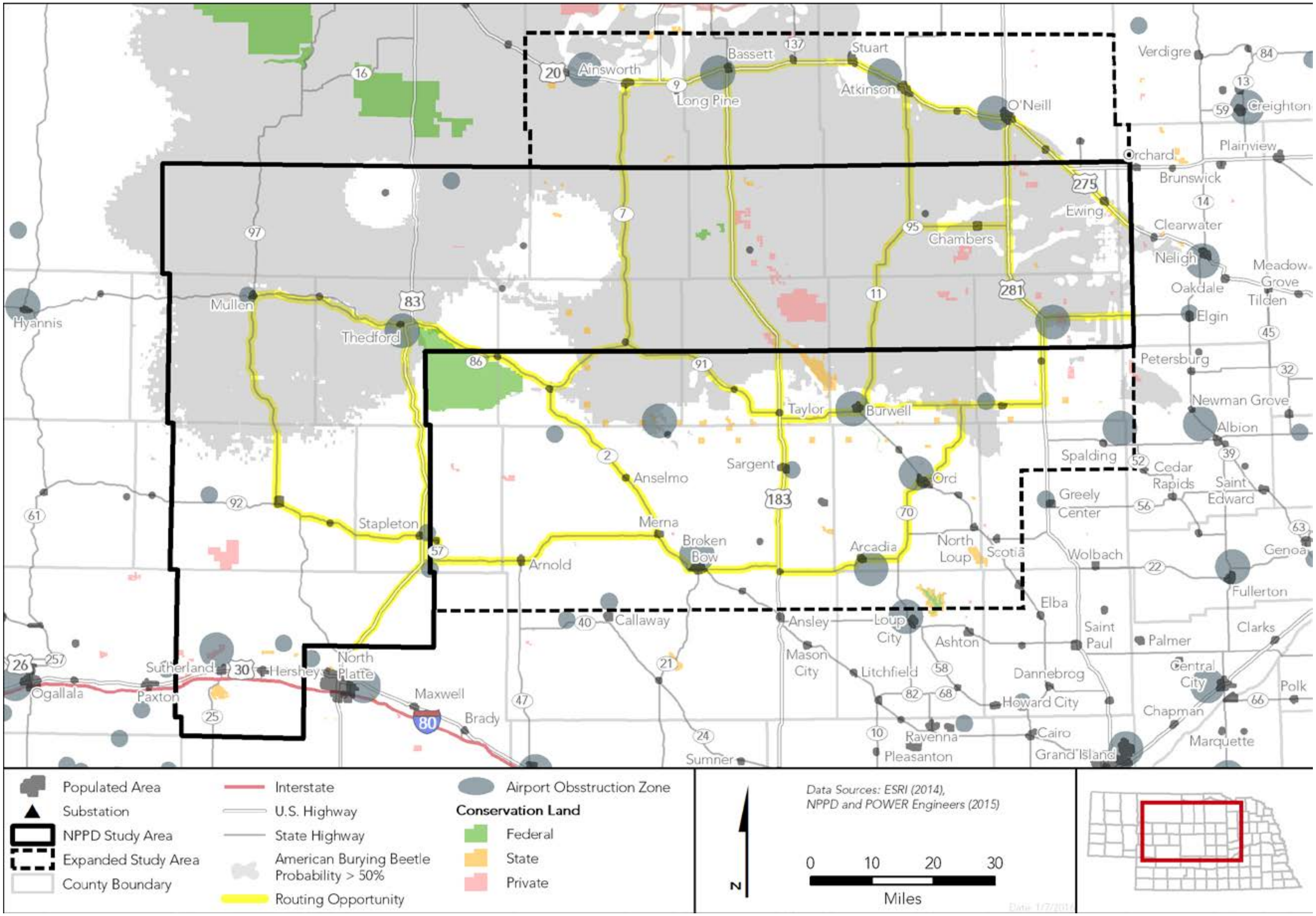
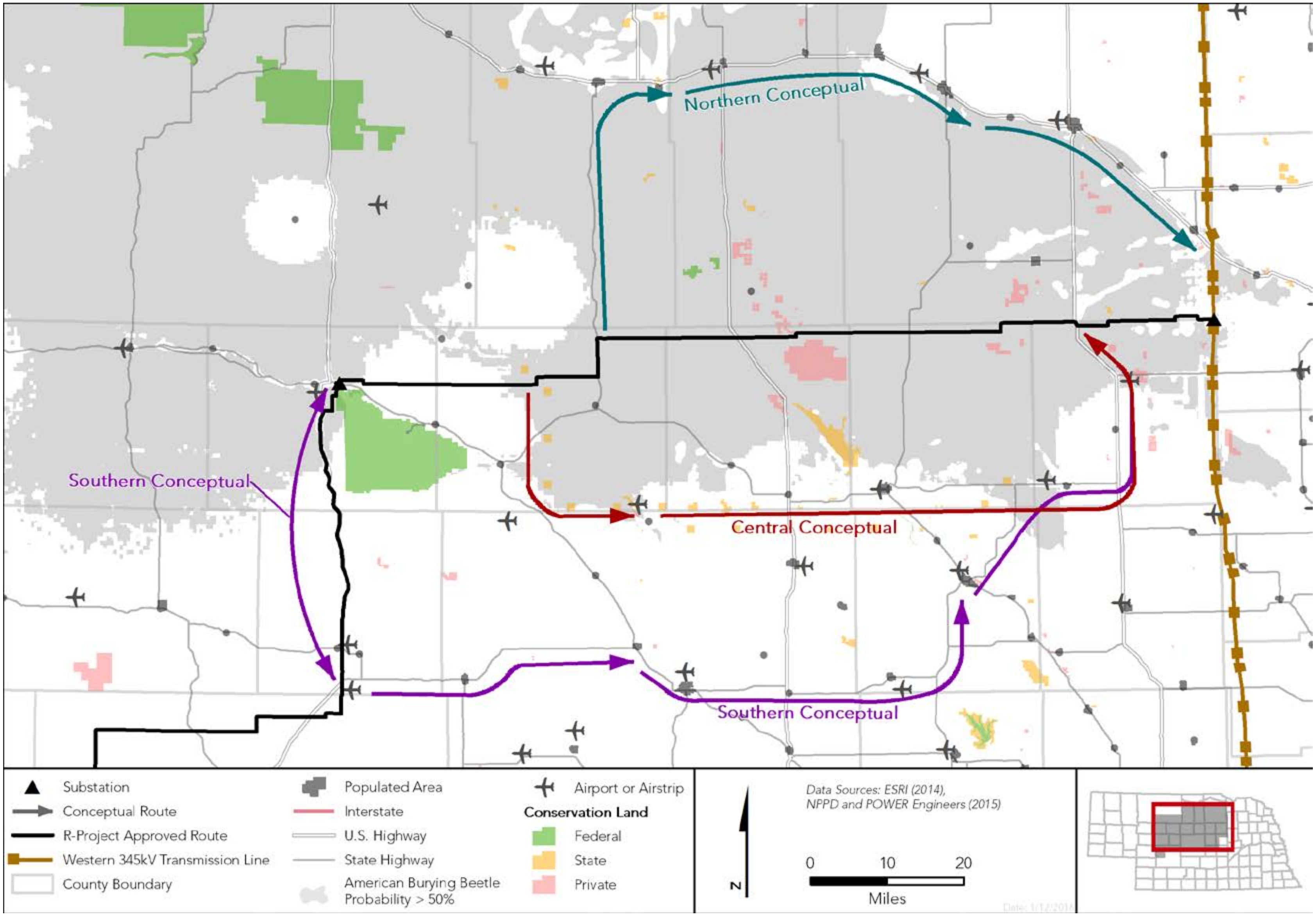


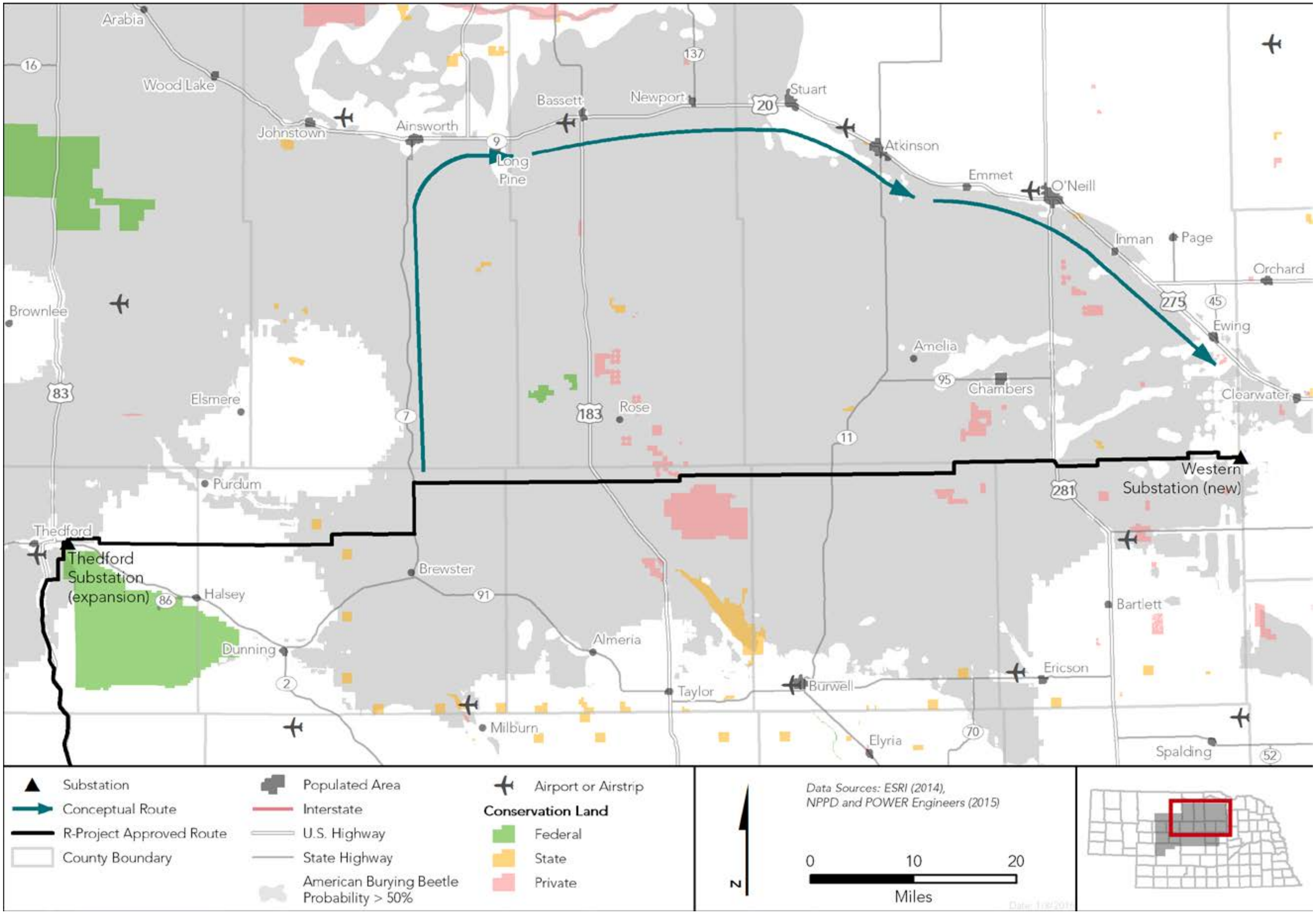

**Map 1. Expanded Study Areas and ABB Occurrence Probability**



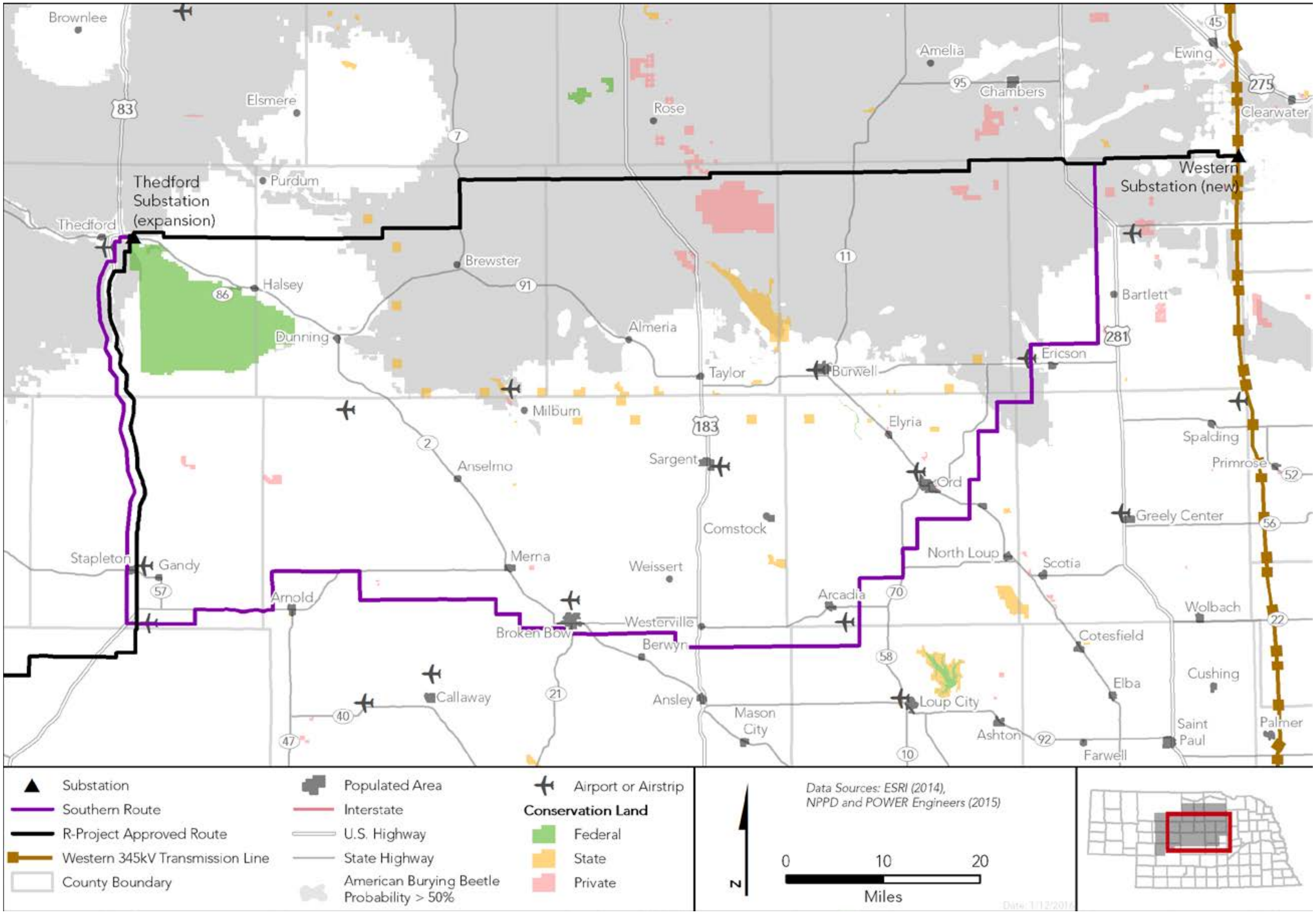

**Map 2. Routing Opportunities and Constraints**



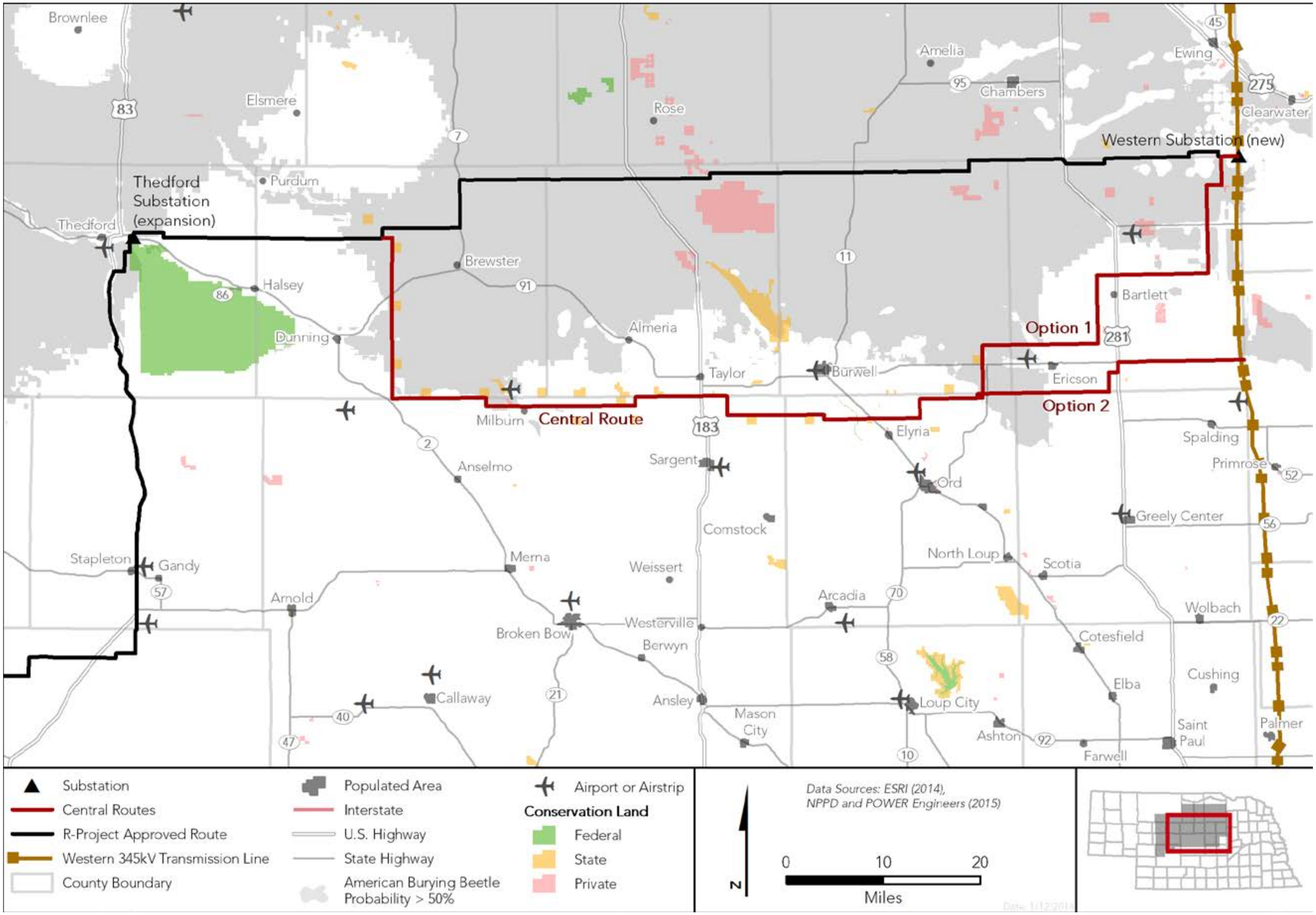

**Map 3. Conceptual Route Development**




**Map 4. Northern Conceptual Route Overview**




**Map 5. Southern Conceptual Route Overview**




**Map 6. Central Conceptual Routes Overview**

# APPENDIX C:

# ACTIVITIES COVERED UNDER THE INCIDENTAL TAKE PERMIT

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## Activities Covered under the Incidental Take Permit

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| **Access—Departure from Existing Hard Surface Roads** | | | | | | |
| Scenario 1—Overland travel access (including Greenfield and existing two-tracks) | Drive and crush, no improvements (i.e., no blading or fill material) | Access location and distance to be identified in Access Plan at preliminary and final design (field verified).<br>Access for ATVs, light vehicles, and low-ground-pressure equipment.<br>Stream and wetland crossings will be avoided to the greatest extent practicable. No disturbance, grading, or fill of stream banks. | NA | Minimal level of occupied habitat disturbance unlikely to result in effects on the beetle. | No | No |
| Scenario 2—Temporary access routes | Temporary access routes include improvements, such as blading, and placement of fill material on geofabric where required | Access location and distance to be identified in Access Plan at preliminary and final design (field verified).<br>Access required for large, heavy equipment that may require improvement for | Bulldozers, front-end loaders, dump trucks, backhoes, excavators (both tracked and rubber-tired), graders, roller compactor, water trucks, crane trucks, and light vehicles used to construct | Temporary disturbance to occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | | access.<br>Temporary bridges and/or culverts installed for stream or wetland crossings will be removed upon completion of construction. Culverts will be installed to maintain the existing hydrology of the drainage.<br>Vegetation in areas of temporary disturbance will be restored following completion of construction activities. | temporary access routes. | | | |
| Scenario 3—Permanent access roads | Permanent access roads – blade, fill, surface<br>Predominantly used at substations or left at landowner's request. | Access location and distance to be identified in Access Plan at preliminary and final design (field verified).<br>Bridges and/or culverts installed for stream or wetland crossings will remain in place upon completion of construction. Culverts will be installed to maintain the existing | Bulldozers, front-end loaders, dump trucks, backhoes, excavators (both tracked and rubber-tired), graders, roller compactor, water trucks, crane trucks, and light vehicles used to construct permanent access roads. | Permanent loss of occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | | hydrology of the drainage. | | | | |
| **ROW Preparation** | | | | | | |
| ROW clearing | Complete removal of trees and tall brush.<br>No ground disturbance within grassland areas.<br>Potential to cut stump to grade unless removed at landowner's request. | Location and acres to be determined upon final route selection and field verified prior to construction.<br>Removal methods will employ standard NPPD tree-removal methods.<br>Avoid migratory bird nesting season, if possible. If not possible, pre-construction surveys will identify migratory bird nests for avoidance. | ATV, brush mower/ shredder, light vehicles, mechanized feller/buncher, and grapple skidder or similar equipment. | Permanent alteration of occupied habitat from tree removal. Will be calculated using the same method as that for temporary habitat removal. | Yes | Yes |
| **Temporary Work Areas** | | | | | | |
| Fly yards/assembly areas | Locate in previously disturbed areas, where possible.<br>Grade pad and fill with gravel or geotextile and gravel where required. | Approximately 10 acres each.<br>Located approximately every 5–10 miles<br>Vegetation in areas of temporary disturbance will be restored following | Earthmoving equipment required to prepare area. Heavy crane, helicopter, support vehicles. | Temporary disturbance to occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | | completion of construction activities. | | | | |
| Construction yards/staging areas | Locate along existing hard surface access roads and in previously disturbed areas, where possible.<br>Grade pad and fill with gravel or geotextile and gravel, where required. | Approximately 20 acres each.<br>Located approximately every 50 miles.<br>Vegetation in areas of temporary disturbance will be restored following completion of construction activities. | Earthmoving equipment required to prepare area. Heavy crane, support vehicles. | Temporary disturbance to occupied habitat. | Yes | Yes |
| Borrow areas | Likely use previously existing pits. Any borrow pits created for R-Project will not be located in environmentally sensitive areas, including threatened and endangered species habitat, wetlands, or cultural resource areas. | NA | NA | No effect. Borrow pit not located in beetle habitat or other environmentally sensitive area. | No | No |
| Batch plant | Use existing batch plants and/or previous disturbed locations. Any batch plants created for R-Project will not be located in environmentally sensitive areas, including threatened | NA | Generators, concrete trucks, front-end loaders, Bobcat loaders, dump trucks, transport trucks and trailers, water tanks, concrete | No effect. Batch plant not located in beetle habitat or other environmentally sensitive area. | No | No |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | and endangered species habitat, wetlands, or cultural resource areas. | | storage tanks, scales, and job site trailers. Rubber-tired trucks and flatbed trailers will be used to assist in relocating the portable plant along the ROW. | | | |
| **Structures** | | | | | | |
| Structure staking | Drive stake(s) at structure locations | Number of stakes required depends upon structure type. Stakes consist of wood lathe or rebar. | ATV, light vehicle. | Minimal level of occupied habitat disturbance unlikely to result in effects on the beetle. | No | No |
| **Helical Piers—Lattice Tower** | | | | | | |
| Structure work areas | Work areas for screw-in helical pier foundations to be used in Sandhills where existing access roads not available. | Limits of ground disturbance: 100 feet x 100 feet (0.23 acres)<br>One structure work area required at each structure.<br>Majority of structure work areas temporary disturbance. Permanent disturbance dependent on local topography. | Preparation of structure work area completed by small Bobcat-sized earthmoving equipment, if necessary. Dependent on local topography. | Temporary disturbance to occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | | Vegetation in areas of temporary disturbance will be restored following completion of construction activities. | | | | |
| Foundation installation | Screw-in helical pier foundations to be used in Sandhills where existing access roads not available.<br>Anchor bolt or stub angles to secure structure to foundation | Permanent habitat loss limited to footprint of each foundation.<br>Four helical pier foundations required per lattice structure. | Tracked or rubber tired excavator, light truck/trailer or helicopter to deliver helical piers, support vehicle, weld truck, and water truck (for fire suppression). | Temporary disturbance to occupied habitat accounted for under Structure Work Areas above.<br>Permanent loss of occupied habitat. | Yes | Yes |
| Structure erection | Install base plate and leg extensions<br>Structure assembled at fly yard/assembly area and flown to structure work area | Structures flown in two or three pieces depending on local conditions and helicopter lift capacity. | Light crane, truck/trailer, and lightweight support vehicles at structure work area. | Permanent and temporary disturbance to occupied habitat accounted for under Structure Work Areas and Foundation Installation above. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| **Standard foundation—Steel monopole** | | | | | | |
| Structure work areas | Work area for steel monopole with standard foundation to be used along major existing access roads. | Limits of ground disturbance: 200 feet x 200 feet (0.92 acre)<br>One structure work area required at each structure.<br>Vegetation in areas of temporary disturbance would be restored following completion of construction activities. | Preparation of structure work area completed by small earthmoving equipment, if necessary. | Temporary disturbance to occupied habitat. | Yes | Yes |
| Foundation excavation/ installation | Auger hole, temp casing for poured concrete. Any spoils removed will not be disposed in environmentally sensitive areas, including threatened and endangered species habitat, wetlands, or cultural resource areas.<br>Anchor bolt to secure structure to foundation. | Permanent habitat loss limited to footprint of each foundation.<br>One foundation required per steel monopole structure. | Auger rig, dump trucks (remove spoils from site), concrete trucks, truck with trailer to drop off rebar and anchor bolt cage, heavy crane, backhoe, water truck (for dewatering). | Temporary disturbance to occupied habitat accounted for under Structure Work Areas above.<br>Permanent loss of occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | Guy anchors for select dead-end structures. | | | | | |
| Structure erection | Install structure with base plate onto poured-concrete foundation. | Structures assembled at structure work area and lifted into place with heavy crane. | Heavy crane, dozer, bucket truck, support vehicles, truck to transport structure tubes. | Permanent and temporary disturbance to occupied habitat accounted for under Structure Work Areas and Foundation Installation above. | Yes | Yes |
| **Stringing, Pulling, and Tensioning** | | | | | | |
| Stringing, pulling, and tensioning | String sock line with helicopter or light vehicle.<br>Heavy equipment required for pulling and tensioning. | Necessary equipment will require Access Scenario 2 or Scenario 3 (above).<br>Monopole sites located approximately two to four miles apart. Lattice tower sites located approximately four to six miles apart.<br>Two acres of temporary disturbance at tangent sites, four acres of temporary disturbance at dead-end structures.<br>Vegetation in areas of temporary disturbance | Helicopter, semi-trailers, tensioner puller (big machine winch), heavy crane to move reels, mats to level sites and light vehicles. | Temporary disturbance to occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | | will be restored following completion of construction activities. | | | | |
| **Substations** | | | | | | |
| Substations | Expansion of existing substation at GGS Substation. | GGS Substation located outside permit area. | NA | No effect. Substation located outside the permit area in non-beetle habitat. | No | No |
| | Expansion of existing Thedford Substation. | Expansion of Thedford Substation by 13 acres. Permanent access from Highway 2 adjacent to substation. | Heavy earthmoving equipment to prepare site, dump trucks (remove spoils from site and deliver gravel), concrete trucks, truck with trailer to drop off substation equipment, heavy crane, backhoe, support vehicles. | Permanent loss of beetle habitat. | Yes | Yes |
| | Construction of new Holt County Substation at Western 345 kV transmission line. | Holt County Substation would be constructed on 12 acres of cultivated agricultural land, which does not provide beetle habitat. | NA | No effect. Substation located in non-beetle habitat. | No | No |
| **Distribution Power Line Relocation** | | | | | | |
| Distribution power line relocation | Relocation of existing overhead distribution power lines outside ROW. | Necessary equipment will require Access Scenario 1 (above). | Digger-derrick truck, tracked trencher. | Temporary disturbance to occupied habitat. | Yes | Yes |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| **Well Relocation** | | | | | | |
| Well relocation | Relocation of existing livestock and center-pivot irrigation wells outside ROW. | Necessary equipment would require Access Scenario 1 (above). | Well truck, tracked trencher. | Temporary disturbance to occupied habitat. | Yes | Yes |
| **Operation and Maintenance** | | | | | | |
| Energization and operation of line and substation | Operating transmission line and substation. | NA | NA | No effect on beetle habitat or individuals. All construction complete at this stage. No beetle habitat effected. | No | No |
| Routine Inspection | Inspection would occur twice per year—one would be aerial and be foot/light vehicle inspection. | NA | ATV or light vehicle, foot patrol, fixed-wing aircraft, helicopter. | Minimal level of occupied habitat disturbance unlikely to result in effects on the beetle. | No | No |
| Routine maintenance and repairs | Routine maintenance and repairs will use ATVs, light vehicles, and low-ground-pressure equipment where possible, will not require access improvements, and will occur during the beetle non-active period (October through April). | It is estimated that routine scheduled maintenance will not begin until 30 years after the in-service date and will occur once every 10 years after that on lines constructed on steel structures.<br>Includes normal maintenance, which can be scheduled and does | Light support vehicle, ATV, aerial truck, helicopter. | Minimal level of occupied habitat disturbance unlikely to result in effects on the beetle. | No | No |

| Activity | Description | Additional Details | Equipment List | American Burying Beetle Potential Effects | Take Likely (yes/no) | Covered Activity (yes/no) |
|---|---|---|---|---|---|---|
| | | not require immediate action. | | | | |
| Emergency repairs | Emergency repair equipment will access structures as necessary to repair line as per NPPD's Emergency Restoration Plan.<br>Emergency repairs may include repairs to isolated damages, such as single insulators or weak points on conductors, as well as large-scale repairs following severe weather events. | Unscheduled aerial patrols may be required during emergency or storm conditions. The line will be designed according to the NESC. | Equipment utilized to repair the transmission line in an emergency situation will use any means necessary to repair the line in a reasonable time frame. Equipment may include helicopter, tracked and/or rubber tire vehicles. | Temporary disturbance to occupied habitat. | Yes | Yes |

Source: NPPD (2016)

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# APPENDIX D:

# WILDLIFE SPECIES OF THE NEBRASKA SANDHILLS

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## Birds of the Nebraska Sandhills

More than 300 species of resident and migratory birds have been documented in the Nebraska Sandhills (Schneider et al. 2011). The table below shows a representative sample of avian species that occur in the Nebraska Sandhills. Special status species are discussed in Section 3.7.

| Common Name | Scientific Name |
|---|---|
| Alder Flycatcher | *Empindonax alnorum* |
| American Bittern | *Botaurus lentiginosus* |
| American Coot | *Fulica americana* |
| American Crow | *Corvus brachyrhynchus* |
| American Goldfinch | *Spinus tristis* |
| American Kestrel | *Falco sparverius* |
| American Robin | *Turdus migratorius* |
| American White Pelican | *Pelecanus erythrorhynchos* |
| American Widgeon[a] | *Anas americana* |
| Baird's Sparrow[b] | *Ammodramus bairdii* |
| Baltimore Oriole | *Icterus galbula* |
| Bank Swallow | *Riparia* |
| Barn Owl[a] | *Tyto alba* |
| Barn Swallow | *Hirundo rustica* |
| Bell's Vireo[b] | *Vireo bellii* |
| Belted Kingfisher | *Megaceryle alcyon* |
| Black Tern[a] | *Chlidonias niger* |
| Black-and-white Warbler[a] | *Mniotilta varia* |
| Black-billed Cuckoo | *Coccyzus erythropthalmus* |
| Black-billed Magpie[a] | *Pica hudsonia* |
| Black-capped Chickadee | *Poecile atricapillus* |
| Black-crowned Night Heron[a] | *Nycticorax* |
| Black-headed Grosbeak | *Pheucticus melanocephalus* |
| Black-necked Stilt[a] | *Himantopus mexicanus* |
| Blue Grosbeak | *Passerina caerulea* |
| Blue Jay | *Cyanocitta cristata* |
| Blue-winged Teal | *Anas discors* |
| Bobolink | *Dolichonyx oryzivorus* |
| Brewer's Blackbird[a] | *Euphagus cyanocephalus* |
| Brown Creeper[a] | *Certhia americana* |
| Brown Thrasher | *Toxostoma rufum* |

| Common Name | Scientific Name |
|---|---|
| Brown-headed Cowbird | *Molthrus ater* |
| Burrowing Owl[b] | *Athene cunicularia* |
| Canada Goose | *Branta canadensis* |
| Canvasback[a] | *Aythya valisineria* |
| Cattle Egret | *Bubulcus ibis* |
| Chestnut-collared Longspur[b] | *Calcarius ornatus* |
| Chimney Swift | *Chaetura pelagica* |
| Chipping Sparrow | *Spizella passerina* |
| Cinnamon Teal[a] | *Anas cyanoptera* |
| Clark's Grebe[a] | *Aechmophorus clarkii* |
| Cliff Swallow | *Petrochelidon pyrrhonota* |
| Common Grackle | *Quiscalus quiscala* |
| Common Nighthawk | *Chordeiles minor* |
| Common Yellowthroat | *Geothlypis trichas* |
| Cooper's Hawk | *Accipiter cooperii* |
| Dark-eyed Junco[a] | *Junco hyemalis* |
| Dickcissel | *Spiza americana* |
| Double-crested Cormorant | *Phalacrocrax auritus* |
| Downy Woodpecker | *Picoides pubescens* |
| Eared Grebe | *Podiceps nigricollis* |
| Eastern Bluebird | *Sialia sialis* |
| Eastern Kingbird | *Tyrannus* |
| Eastern Meadowlark | *Sturnella magna* |
| Eastern Phoebe | *Sayornis phoebe* |
| Eastern Towhee | *Pipilo erythrophthalums* |
| Eurasian Collared Dove | *Streptopelia decaocto* |
| European Starling | *Sturnus vulgaris* |
| Ferruginous Hawk[b] | *Buteo regalis* |
| Field Sparrow | *Spizella pusilla* |
| Forster's Tern[a] | *Sterna forsteri* |
| Franklin's Gull | *Leucophaeus pipixcan* |
| Gadwall | *Anas strepera* |
| Grasshopper Sparrow | *Ammodramus savannarum* |
| Gray Catbird | *Dumetella carolinensis* |

| Common Name | Scientific Name |
|---|---|
| Great Blue Heron | *Ardea herdias* |
| Great Crested Flycatcher | *Myiarchus crinitus* |
| Great Horned Owl | *Bubo virginianus* |
| Greater Prairie Chicken[b] | *Tympanuchus cupido* |
| Green-winged Teal | *Anas crecca* |
| Hairy Woodpecker | *Picoides villosus* |
| Horned lark | *Eremophilia alpestris* |
| House Finch | *Carpodacus mexicanus* |
| House Sparrow | *Passer domesticus* |
| House Wren | *Troglodytes aedon* |
| Indigo Bunting | *Passerina cyanea* |
| Killdeer | *Charadrius vociferus* |
| Lark Bunting | *Calamospiza melanocorys* |
| Lark Sparrow | *Chondestes grammacus* |
| Lesser Scaup[a] | *Aythya affinis* |
| Loggerhead Shrike[b] | *Lanius ludovicianus* |
| Long-billed Curlew[b] | *Numenius americanus* |
| Mallard | *Anas platyrhynchos* |
| Marsh Wren | *Cistothorus palustris* |
| Merlin[a] | *Falco columbarius* |
| Mourning Dove | *Zenaida macroura* |
| Northern Bobwhite | *Colinus virginianus* |
| Northern Cardinal | *Cardinalis* |
| Northern Harrier | *Circus cyaneus* |
| Northern Mockingbird | *Mimus polyglottos* |
| Northern Pintail | *Anas acuta* |
| Northern Rough-winged Swallow | *Stelgidopteryx serripennis* |
| Northern Saw-whet Owl[a] | *Aegolius acadicus* |
| Northern Shoveler | *Anas clypeata* |
| Orchard Oriole | *Icterus spurius* |
| Peregrine Falcon[a] | *Falco peregrinus* |
| Pie-billed Grebe | *Podilymbus podiceps* |
| Pine Siskin[a] | *Spinus pinus* |
| Prairie Falcon[a] | *Falco mexicanus* |

| Common Name | Scientific Name |
|---|---|
| Red-bellied Woodpecker | *Melanerpes carolinus* |
| Red-eyed Vireo | *Vireo olivaceus* |
| Redhead | *Aythya americana* |
| Red-headed Woodpecker | *Melanerpes erythrocephalus* |
| Red-tailed Hawk | *Buteo jamaicensis* |
| Red-winged Blackbird | *Agelaius phoeniceus* |
| Ring-necked Pheasant | *Phasianus colchicus* |
| Rock Pigeon | *Columbia livia* |
| Ruby-throated Hummingbird[a] | *Archilochus colubris* |
| Ruddy Duck | *Oxyura jamaicensis* |
| Sandhill Crane[a] | *Grus canadensis* |
| Savannah Sparrow[a] | *Passerculus sandwichensis* |
| Say's Phoebe | *Sayornis saya* |
| Sedge Wren[a] | *Cistothorus platensis* |
| Sharp-shinned Hawk[a] | *Accipiter striatus* |
| Sharp-tailed Grouse | *Tympanuchus phasianellus* |
| Short-eared Owl[b] | *Asio flammeus* |
| Song Sparrow | *Melospiza melodia* |
| Sora | *Porzana carolina* |
| Spotted Sandpiper | *Actitis macularius* |
| Spotted Towhee | *Pipilo maculatus* |
| Sprague's Pipit[b] | *Anthus spragueii* |
| Swainson's Hawk[a] | *Buteo swainsoni* |
| Swamp Sparrow[a] | *Melospiza georgiana* |
| Townsend's Solitaire[a] | *Myadestes townsendi* |
| Tree Swallow | *Tachycineta bicolor* |
| Trumpeter Swan[b] | *Cygnus buccinator* |
| Turkey Vulture | *Cathartes aura* |
| Upland Sandpiper | *Bartramia longicauda* |
| Vesper Sparrow | *Pooecetes gramineus* |
| Warbling Vireo | *Vireo gilvus* |
| Western Grebe[a] | *Aechmophorus occidentailis* |
| Western Kingbird | *Tyrannus verticalis* |
| Western Meadowlark | *Sturnella neglecta* |

| Common Name | Scientific Name |
|---|---|
| White-faced Ibis[a] | *Plegadis chihi* |
| Wild Turkey | *Meleagris gallapavo* |
| Willet | *Tringa semipalmata* |
| Willow Flycatcher | *Empidonax trailii* |
| Wilson's Phalarope | *Phalaropus tricolor* |
| Wilson's Snipe[a] | *Gallinago delicata* |
| Wood Duck | *Aix sponsa* |
| Yellow Warbler | *Setophaga petechia* |
| Yellow-billed Cuckoo | *Coccyzus americanus* |
| Yellow-breasted Chat | *Icteria virens* |
| Yellow-headed Blackbird | *Xanthocephalus* |
| Yellow-throated Vireo[a] | *Vireo flavifrons* |

Sources: Schneider et al. (2011); Pardieck et al. (2016)

[a] Nebraska Natural Legacy Project Tier II At-risk Species

[b] Nebraska Natural Legacy Project Tier I At-risk Species

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**Mammals of the Nebraska Sandhills**

| Common Name | Scientific Name |
|---|---|
| **Marsupials** | |
| Opossum | *Didelphis virginiana* |
| **Insectivores** | |
| Masked shrew | *Sorex cinereus* |
| Short-tailed shrew | *Blarina brevicauda* |
| Least shrew | *Cryptotis parva* |
| Eastern mole | *Scalopus aquaticus* |
| **Bats** | |
| Keen's bat | *Myotis keeni* |
| Small-footed bat | *Myotis leibi* |
| Silver-haired bat | *Lasionycteris noctivagans* |
| Big brown bat | *Eptesicus fuscus* |
| Red bat | *Lasiurus borealis* |
| Hoary bat | *Lasiurus cinereus* |
| Brazilian free-tailed bat | *Tadarida brasiliensis* |
| **Rabbits** | |
| Desert cottontail | *Sylvilagus auduboni* |
| Eastern cottontail | *Sylvilagus floridanus* |
| Black-tailed jackrabbit | *Lepus californicus* |
| White-tailed jackrabbit | *Lepus townsendi* |
| **Rodents** | |
| Franklin's ground squirrel | *Spermophilus franklini* |
| Spotted ground squirrel | *Spermophilus spilosoma* |
| Thirteen-lined ground squirrel | *Spermophilus tridecemlineatus* |
| Black-tailed prairie dog | *Cynomys ludovicianus* |
| Fox squirrel | *Sciurus niger* |
| Plains pocket gopher | *Geomys bursarius* |
| Plains pocket mouse | *Perognathus flavescens* |
| Silky pocket mouse | *Perognathus flavus* |
| Hispid pocket mouse | *Perognathus hispidus* |
| Ord's kangaroo rat | *Dipodomys ordi* |
| Beaver | *Castor canadensis* |
| Western harvest mouse | *Reithrodontomys megalotis* |

| Common Name | Scientific Name |
|---|---|
| Plains harvest mouse | *Reithrodontomys montanus* |
| White-footed mouse | *Peromyscus leucopus* |
| Deer mouse | *Peromyscus maniculatus* |
| Northern grasshopper mouse | *Onychomys leucogaster* |
| Eastern woodrat | *Neotoma floridana* |
| Southern bog lemming | *Synaptomys cooperi* |
| Prairie vole | *Microtus ochrogaster* |
| Meadow vole | *Microtus pennsylvanicus* |
| Muskrat | *Ondatra zibethicus* |
| Meadow jumping mouse | *Zapus hudsonius* |
| Porcupine | *Erethizon dorsatum* |
| House mouse | *Mus musculus* |
| Norway rat | *Rattus norvegicus* |
| **Carnivores** | |
| Coyote | *Canis latrans* |
| Red fox | *Vulpes* |
| Gray fox | *Urocyon cinereoargenteus* |
| Raccoon | *Procyon lotor* |
| Long-tailed weasel | *Mustela frenata* |
| Least weasel | *Mustela nivalis* |
| Mink | *Mustela vison* |
| Badger | *Taxidea taxus* |
| Spotted skunk | *Spilogale putorius* |
| Striped skunk | *Mephitis* |
| Bobcat | *Lynx rufus* |
| **Artiodactyls** | |
| Elk | *Cervus canadensis* |
| Mule deer | *Odocoileus hemionus* |
| White-tailed deer | *Odocoileus virginianus* |
| Pronghorn | *Antilocapra americana* |
| Bison | *Bison* |

Source: Freeman (1998a)

## Herpetofauna of the Nebraska Sandhills

| Common Name | Scientific Name |
|---|---|
| **Amphibians** | |
| Tiger salamander | *Ambystoma tigrinum* |
| Great plains toad | *Bufo cognatus* |
| Rocky mountain toad | *Bufo woodhousii* |
| Northern cricket frog | *Acris crepitans* |
| Western striped chorus frog | *Pseudacris triseriata* |
| Bull frog | *Rana catesbeiana* |
| Northern leopard frog | *Rana pipiens* |
| Plains spadefoot toad | *Spea bombifrons* |
| **Turtles** | |
| Snapping turtle | *Chelydra serpentina* |
| Yellow mud turtle | *Kinosternon flavescens* |
| Ornate box turtle | *Terrapene ornata* |
| Painted turtle | *Chrysemys picta* |
| Blanding's turtle | *Emydoidea blandingii* |
| Spiny softshell turtle | *Trionyx spiniferus* |
| **Lizards** | |
| Lesser earless lizard | *Holbrookia maculata* |
| Northern prairie lizard | *Sceloporus undulatus* |
| Six-lined racerunner | *Cnemidophorus sexlineatus* |
| Many-lined skink | *Eumeces multivirgatus* |
| **Snakes** | |
| Common or northern watersnake | *Nerodia sipedon* |
| Plains gartersnake | *Thamnophis radix* |
| Common or red-sided gartersnake | *Thamnophis sirtalis* |
| Western hognose snake | *Heterodon nasicus* |
| Blue or green racer | *Coluber constrictor* |
| Glossy snake | *Arizona elegans* |
| Bull snake | *Pituophis catenifer* |
| Milk snake | *Lampropeltis triangulum* |
| Prairie rattlesnake | *Crotalus viridis* |

Source: Freeman (1998b)

## Fish of the Nebraska Sandhills

| Common Name | Scientific Name |
|---|---|
| Bigmouth shiner | *Notropis dorsalis* |
| Black bullhead | *Ameiurus melas* |
| Bluegill | *Lepomis macrochirus* |
| Bluegill-green sunfish hybrid | *Lepomis macrochirus x Lepomis cyanellus* |
| Bluntnose minnow | *Pimephales notatus* |
| Brassy minnow | *Hybognathus hankinsoni* |
| Brook stickleback | *Culaea inconstans* |
| Brown trout | *Salmo trutta* |
| Central stoneroller | *Campostoma anomalum* |
| Channel catfish | *Ictalurus punctatus* |
| Common carp | *Cyprinus carpio* |
| Creek chub | *Semotilus atromaculatus* |
| Fathead minnow | *Pimephales promelas* |
| Flathead chub | *Platygobio gracilis* |
| Finescale dace | *Phoxinus neogaeus* |
| Freshwater drum | *Aplodinotus grunniens* |
| Golden shiner | *Notemigonus crysoleucas* |
| Grass pickerel | *Esox americanus* |
| Green sunfish | *Lepomis cyanellus* |
| Johnny darter | *Etheostoma nigrum* |
| Iowa darter | *Etheostoma exile* |
| Largemouth bass | *Micropterus salmoides* |
| Longnose dace | *Rhinichthys cataractae* |
| Longnose sucker | *Catostomus* |
| Northern pike | *Esox lucius* |
| Northern redbelly dace | *Phoxinus eos* |
| Orangethroat darter | *Etheostoma spectabile* |
| Pearl dace | *Margariscus margarita* |
| Plains minnow | *Hybognathus placitus* |
| Plains topminnow | *Fundulus sciadicus* |
| Pumpkinseed | *Lepomis gibbosus* |
| Quillback | *Carpiodes cyprinus* |
| Rainbow trout | *Oncorhynchus mykiss* |

| Common Name | Scientific Name |
|---|---|
| Red shiner | *Cyprinella lutrensis* |
| River carpsucker | *Cyprinus carpio* |
| River shiner | *Notropis blennius* |
| Rock bass | *Ambloplites rupestris* |
| Sand shiner | *Notropis stramineus* |
| Shorthead redhorse | *Moxostoma macrolepidotum* |
| Shortnose gar | *Lepisosteus platostomus* |
| Silver chub | *Macrhybopsis storeriana* |
| Stonecat | *Noturus flavus* |
| Western silvery minnow | *Hybognathus argyritis* |
| White crappie | *Pomoxis annularis* |
| White sucker | *Catostomus commersonii* |
| Yellow bullhead | *Ameiurus natalis* |
| Yellow perch | *Perca flavescens* |

Source: Fischer and Paukert (2008)

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# APPENDIX E:

# WHOOPING CRANE RISK ASSESSMENT

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# U.S. Fish and Wildlife Service's R-Project Transmission Line Risk Assessment for Potential Whooping Crane Collisions (Strikes)

## Step 1: Project Total Crane (round-trip) Migration Years for 2018–2068

The projected number of crane migration years (hereafter, "crane-years") depends on the expected growth rate for the population and how the growth rate is expected to change over the 50-year period of interest. For clarification, if a steady population of 100 cranes were to depart from the wintering grounds for 5 consecutive years, a total of 500 crane-years would be tallied.

Six population growth scenarios were examined.

Wilson et al. (2016) constructed an integrated population model (IPM) for the Aransas-Wood Buffalo population of whooping cranes based on data for 1977–2013 and reported a mean annual growth rate of 4.0% with 95% confidence limits of 3.5 to 4.6%. Thus, three growth scenarios were examined, average annual growth rates of 3.5%, 4.0% and 4.6%.

However, over a 50-year period, these initial growth rates might be affected by limited carrying capacity for cranes on the landscape. Consultation with crane biologists identified wintering habitat as the likely most limiting resource. Metzger et al. (2014) estimated current wintering habitat carrying capacity at 2,638 cranes and projected that the capacity would decline to 1,465 cranes by the year 2100. However, almost all of the decline is attributed to climate change and is expected to occur primarily after the year 2068 (largely after the year 2080). Therefore, for this assessment, the limit to population growth will be considered 2,638 cranes.

Three scenarios therefore will project density-dependent population growth. However, Butler et al. (2013) noted that growth to date from 18 cranes in winter 1938–1939 to 283 cranes in winter 2010–2011 showed no evidence of density dependence. Thus, the density dependence scenarios examined in this assessment will assume a mixed model wherein growth is density-independent until one-half of carrying capacity is reached (1,319 wintering cranes) and thereafter is linearly density-dependent. When density-dependent growth would kick-in is unknown, assuming it would occur at one-half of carrying capacity is simply a middle-of-the-road guess. Any other guess can be substituted and the number re-run accordingly.

Both Wilson et al. (2016) and Butler et al. (2013) made mention of the possibility (and observations of) that as the population grows habitats used by the population may expand beyond the area assessed for carrying capacity by Metzger et al. (2014). Also, it was indicated that Metzger was even in the process of updating habitat capacity estimates for a larger wintering area than was considered in Metzger et al. (2014) [W. Harrell, email, August 10, 2016]. In light of these multiple comments/observations, three additional scenarios for population growth examined in this assessment were for continuous density-independent growth at the average annual rates of 3.5%, 4.0%, and 4.6%.

Thus, for each average annual growth rate, there is a density-dependent (DD) and a density-independent (DI) growth scenario (total of six growth scenarios); keeping in mind that the DD scenarios are actually mixed DI and DD models (however, hereafter will be referred to as simply the DD scenarios).

**Results:** The 50-year cumulative number of crane-years projected for 2018–2068 vary from a low (3.5% DD growth) of 47,593 to a high (4.6% DI growth) of 69,731. Density-dependence effects ( i.e., wintering habitat carrying capacity effects) have only a modest influence on estimated crane-years, depressing the numbers by only 1.13%, 4.13%, and 10.43% for the three ascending initial growth scenarios (3.5%, 4.0%, and 4.6%). This is because even under the highest average annual growth rate scenario, one-half of wintering carrying capacity is not reached until fairly late in the 50-year life span of the R-Project. The estimates of population size in the year 2068 range from 1,831 cranes to 3,411 cranes. The estimates of density-dependent population growth rates in 2068 range from 1.18% to 2.23%.

**Special Note:** Matt Butler, crane population modeler, indicated in an email to Robert Harms (August 11, 2016) that the Butler et al. (2013) model predicts a 95% upper confidence limit of 1,847 cranes with a maximum likelihood estimate of only 1,485 cranes for the year 2068. Since the only numbers readily available for that model were the terminal, year 2068, projections, a full 50-year scenario for that model was not completed. Thus, it should be appropriately considered that five of the six simple scenarios examined for this assessment yield population growth estimates higher than the Butler model's 95% upper confidence limit and that it is Mr. Butler's expectation that the total crane population in the year 2068 would be no higher than approximately 1,000 to 1,500 cranes.

## Step 2: Estimating the Rate of Power-Line Strikes per Crane-Year

Stehn and Haralson-Strobel (2014, Table 2) present information for 50 documented mortalities in the Aransas-Wood Buffalo crane population that occurred between 1950 and 2010. Among those documented mortalities, 28 of 50 occurred during migration, or 56% (97.5% binomial confidence interval of 40.33 to 70.61%). Among the 28 documented mortalities that occurred during migration, 26 had a known cause of death; and among those 26 cases, 10 mortalities were due to power-line strikes, or 38.5% (97.5% binomial confidence interval of 20.35 to 60.24%). Total mortality for 1950–2010 is reported as 546 cranes.

Therefore, the maximum likelihood estimate of the total crane mortality during migration due to power-line strikes during 1950–2010 is: (546) x (.56) x (.385) = 118 cranes (rounded to nearest whole crane).

Combining the U.S. Fish and Wildlife Service's (Service) compound uncertainty about both the proportion of migratory mortalities and the proportion of power-line strikes, the 95% lower confidence limit (two 97.5% lower limits will yield a 95% overall confidence level) for total crane mortality from power line strikes during migration is: (546) x (.4033) x (.2035) = 45 cranes. Likewise, the 95% upper confidence limit for total migratory power-line mortality during 1950 to 2010 is: (546) x (.7061) x (.6024) = 232 cranes.

Stehn and Haralson-Strobel (2014, Table 1) report a total of 6,233 crane-years during 1950—2010.

Thus, the estimated rate of migratory power-line strikes per crane-year works out to:

> 95% LCL = (45) / (6,233) = 0.0072 strikes/crane-year; where LCL = lower confidence limit
>
> MLE = (118) / (6,233) = 0.0189 strikes/crane-year; where MLE = maximum likelihood estimate
>
> 95% upper confidence limit (UCL) = (232) / (6,233) = 0.0372 strikes/crane-year; where UCL = upper confidence limit

Finally, if the above rates are discounted for the fact that 82% of all mortality during 1950–2020 occurred in the U.S. portion of the migratory corridor, the final estimates become:

> 95% LCL = 0.0059 strikes/crane-year
>
> MLE = 0.0155 strikes/crane-year
>
> 95% UCL = 0.0305 strikes/crane-year

### Step 3: Project Total Number of Crane Power-line Strikes for 2018 to 2068

This step is simply the products of the results from Steps 1 and 2 for the six population growth scenarios.

The projected total numbers of crane power-line strikes for the years 2018 to 2068 range from a low of 281 (LCL for the 3.5% density-dependent growth scenario) to a high of 2,127 (UCL for the 4.6% density-independent growth scenario.

### Step 4: Projecting the Rate of Power-line Strikes Attributable to Transmission Lines

Rather than assuming that all power lines within the whooping crane migratory corridor are equally risky for cranes, this assessment focuses specifically on transmission lines. There are two reasons for this decision: (1) the proposed R-line is a transmission line, and (2) the only reliable Geographic Information System (GIS) data available for this assessment is for transmission lines and it was desired to use GIS information to make the assessment as specific as possible to the exact proposed R-line alignment. Distribution lines have not yet been comprehensively digitized (Chris O'Meilia, pers. comm.), and based on an opportunistic ground-truthing exercise conducted by Scott Larson and Lara Juliasson for Hughes County, South Dakota, the GIS data used for this assessment (S&P Global Platts 2015) did not include data for the vast majority of distribution lines found during Scott's ground survey (i.e., less than 69 kV lines), but did have accurate data for transmission lines.

Of the eight documented power-line strikes by whooping cranes occurring in the U.S., seven were collisions with a known type of power line. Of those seven, one was a transmission-line strike (NPPD, undated, Table 1) or 14.29%. The binomial 95% confidence interval for that estimated proportion is 0.75 to 58% (continuity corrected interval). Thus, there is a high degree of uncertainty associated with this parameter due to the minimal amount of data available for estimating purposes. However, the Watershed Institute (2012) cites Ward and Anderson (1992) as reporting that sandhill cranes hit transmission lines four times more frequently than distribution lines (i.e., 80% of all power-line strikes) even though distribution lines were twice as abundant in the study area; implying that the risk associated with transmission lines was 8-times greater than the risk associated with distribution lines. The Watershed Institute also cites Manville (2005) as concluding that more bird collisions were associated with transmission lines. Although, it is unknown to what extent sandhill cranes are a suitable surrogate for whooping cranes with respect to risk of power-line strikes, it appears that even the top end of the Service's range of uncertainty for proportion of total whooping crane power-line strikes that can be allocated to transmission lines must be considered plausible until more data for this parameter, specific to whooping cranes, becomes available.

Employing the maximum likelihood estimate (14.29%) and 95% confidence limits (0.75 to 58%), and the projections for total power-line strikes calculated above in Step 3, projections for total transmission line strikes in the migratory corridor for 2018-2068 can be calculated. The uncertainty interval for these projections is a 90% confidence interval because it is derived by compounding two 95% intervals (i.e., 0.95 squared equals 0.90). Because of the high uncertainty in the proportion of total strikes that can be allocated to transmission lines, these projections span a wide range of potential outcomes across the six population growth scenarios from as low as 2 total strikes to as high as 1,234 total strikes.

Within the U.S. portion of the whooping crane migratory corridor, 4 of 6 documented power-line strikes occurred within the 75$^{th}$ percentile migratory trace (NPPD, undated), roughly suggesting a 2:1 weighting of risk for power lines within versus outside the 75$^{th}$ percentile migratory trace. Intuitively, it makes sense that risk might be inversely related to a power line's proximity to the migratory corridor center line. GIS data indicate a total of 14,836 miles of transmission line path within the 75$^{th}$ percentile trace and 30,532 miles of transmission line path within the 76-95$^{th}$ percentile migratory trace. This total of 45,368 miles of transmission line path within the 95% migratory corridor trace for whooping cranes is a bit larger than the estimate of 34,268 miles presented in NPPD (undated). The discrepancy could be the result of how power lines were classified (here, all lines with greater than 69KV capacity were classified as transmission lines) or could be due to GIS data used for this assessment being more complete or more up to date than the data accessed by NPPD. Combining a 2:1 weighting of risk and the miles of lines in the two migratory corridor zones produces weighting factors of 0.4929 and 0.5071, thus we would expect about 49.3% of total projected transmission-line strikes to have occurred within the 75$^{th}$ percentile migratory trace and about 50.7% to have occurred in the 76 to 95$^{th}$ percentile trace. Risk is twice as high within the 75$^{th}$ percentile migratory trace, but the total extent of transmission lines is about one-half as great, yielding weighting factors that are nearly equal. Using this information, projected total whooping crane strikes per mile of transmission line in the two migratory corridor traces can be calculated for each population growth scenario. The projected rates for total whooping crane strikes per mile of transmission line for the time interval 2018-2068 range from a low of 0.00006645 cranes/mile to a high of 0.041 cranes/mile for the 75$^{th}$ percentile migratory corridor trace; and a low of 0.00003322 cranes/mile to a high of 0.0205 cranes/mile for the 76 to 95$^{th}$ percentile migratory corridor.

### Step 5: Projecting Total Numbers of Crane Strikes for the R-Project Transmission Line

The proposed path of the R-Project transmission line includes 54 miles within the 75$^{th}$ percentile migratory trace for whooping cranes and 134 miles within the 76 to 95$^{th}$ percentile migratory trace. Applying the projected total strike rates per mile of transmission line for each migratory zone calculated in Step 4 above to this specific proposed alignment of the R-Line yields projections for total strikes with the R-Project transmission line during 2018–2068 for the six population growth scenarios. Those results range from a low of essentially zero R-Project transmission line strikes (0.008 cranes), to a high of essentially five R-Project transmission line strikes (4.96 cranes). The maximum likelihood estimates range from a low of 0.422 strikes to a high of 0.619 strikes; however, the uncertainty surrounding these maximum likelihood estimates is so enormous that they should not be considered very much more plausible than any other outcomes embraced by the Service’s 90% confidence interval.

In conclusion, all three critical parameter values for the Service’s assessment, proportion of total mortality that occurs during migration, proportion of total mortality that is due to power-line strikes, and proportion of power-line strikes that can be allocated to transmission lines are being estimated from very minimal sample sizes, and accordingly, have a great degree of uncertainty associated with them and then those uncertainties are compounded and spread across the Service’s six population growth scenarios that embrace the uncertainty associated with that factor. Therefore, it should not be surprising that the range of projected chances for at least one whooping crane strike span from less than a 1% chance (0.8%) to a 100% chance. Although a tremendous amount of uncertainty exists, we can say that more than 5 total whooping crane strikes with the R-Project transmission line during 2018–2068 are not very plausible. It can also be concluded that for projected initial average annual growth rates below 4.0% it is more likely than not (a low bar for confidence) that no strikes will occur. The key facet for this case is uncertainty, immense uncertainty, such that the decisions to be made will essentially be a risk tolerance policy decision, not a science-directed decision.

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# APPENDIX F:

# AIR QUALITY DATA USED IN DETAILED ANALYSIS

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# CONTENTS

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# MOVES2014 and MOVES2014a

## Technical Guidance:
## Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity

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### 4.5 Vehicle Type Vehicle Miles Traveled (VMT)

EPA expects users to develop local VMT estimates for SIPs and regional conformity analyses, regardless of whether using the Inventory or Emission Rates approach. Travel demand forecasting models (TDFMs) are often the source of information used by Metropolitan Planning Organizations (MPOs) and state Departments of Transportation (DOTs) to estimate VMT, though reasonable professional practice may also be used in many areas. Transportation modelers for MPOs and state DOTs traditionally adjust estimates of vehicle miles of travel generated through the TDFM process to the HPMS estimates of VMT and/or other locally developed actual vehicle counts. These procedures generate consistent VMT estimates from TDFMs for roadway functional classes within HPMS for use in SIP analysis. Section 3, Developing Locality-Specific Inputs from Travel Demand Models, of the EPA document, "Volume IV: Chapter 2, Use of Locality- Specific Transportation Data for the Development of Mobile Source Emission Inventories," (September 1996), discusses how to reconcile traffic demand model results with HPMS VMT estimates. For regional conformity analysis, the transportation conformity regulations allow the interagency consultation process to determine if other information or procedures, such as locally developed count-based programs, may be acceptable.

MOVES2014 requires *annual* VMT by HPMS vehicle class as an input. However, many areas have average annual daily VMT. MOVES2014a allows the option of entering either annual VMT or daily VMT. EPA recommends that users with average annual daily VMT use MOVES2014a to take advantage of the daily VMT input option. For users who still need to use MOVES2014 or who want to use annual VMT in MOVES2014a to take advantage of capabilities in MOVES to allocate VMT across different time periods, EPA has created a spreadsheet-based tool, the "AADVMT Converter for MOVES2014," that allows users to input average annual daily VMT as well as monthly and weekend day adjustment factors to create the annual VMT by HPMS class and appropriate monthly and daily adjustments needed by MOVES2014.[20] EPA recommends that the same approach be used in any analysis that compares two or more cases (e.g., the base year and attainment year in a SIP analysis or the SIP motor vehicle emissions budget and the regional conformity analysis). The interagency consultation process should be used to agree upon a common approach. If different approaches are used for the SIP budget and the regional conformity analysis for practical reasons, the interagency consultation process should be used to determine how to address (and minimize) any differences in results. The methods used to develop inventories should be fully documented in the SIP submission and conformity determinations.

After the release of MOVES2010, the Federal Highway Administration modified the methodology used to generate VMT estimates in HPMS. As a result of that change, the old categories 20 and 30, which previously represented passenger cars and 2-axle, 4-tire trucks respectively, now represent short wheelbase and long wheelbase light-duty vehicles. Because the short wheelbase/long wheelbase distinction does not map well to MOVES source types, MOVES2014 uses a single category 25 to include all light-duty cars and trucks for VMT only. In MOVES2014, all VMT for HPMS categories 20 and 30 should be summed, and entered as category 25. Note that although HPMS categories 20 and 30 are combined for VMT entry purposes in MOVES2014, all other fleet and activity inputs (vehicle population, age distribution, average speed distribution, etc.) for Source Types 21, 31, and 32 are still handled separately in MOVES and all emission calculations and results are based on the emission and activity characteristics of each of these source types.

MOVES2014a includes the option to enter VMT by either the modified HPMS vehicle classes or by MOVES Source Types shown in Table 2 above. For users who are able to develop VMT data by broken down by the MOVES Source Types, entering VMT by Source Type will bypass the default allocation of VMT from HPMS class to Source Type that MOVES does internally.

Either option is acceptable for SIP and conformity purposes, but differences between the default allocation of VMT from HPMS classes to source types in MOVES and the user supplied source type VMT could result in differences in results between the two options. EPA recommends that the same approach be used in any analysis that compares two or more cases (e.g., the base year and attainment year in a SIP analysis or the SIP motor vehicle emissions budget and the regional conformity analysis). The interagency consultation process should be used to agree upon a common approach. If different approaches are used for the SIP budget and the regional conformity analysis for practical reasons, the interagency consultation process should be used to determine how to address (and minimize) any differences in results. The methods used to develop inventories should be fully documented in the SIP submission and conformity determinations.

[20] The AADVMT Converter for MOVES2014 can be found at www.epa.gov/otaq/models/moves/tools.htm. Instructions for use of the converter can be found within the spreadsheet.

### 4.5.1 Vehicle Type VMT: Guidance for Emission Rates Mode

If the Emission Rates option is used, and Source Type is selected in the Output Emission Detail Panel, MOVES will produce emission rates for running emissions by source type and road type in terms of grams per mile. Total running emissions would then be calculated outside of MOVES by multiplying the emission rates by the VMT for each source type and road type.

However, users will still need to enter data using the Vehicle Type VMT Importer that reflects the VMT in the total area where the lookup table results will be applied. This is necessary because MOVES uses the relationship between source type population and VMT to determine the relative amount of time vehicles spend parked vs. running. If the lookup table results will be applied to a large number of counties, use the total VMT for all the counties covered. The guidance in this section concerning the use of local VMT data applies both for developing the total VMT to input and for developing the geographically detailed VMT to use when applying the emission rates.

## *4.6 Average Speed Distribution*

Vehicle power, speed, and acceleration have a significant effect on vehicle emissions. At the County scale, MOVES models these emission effects by using distribution of vehicles hour traveled (VHT) by average speed. MOVES in turn uses the speed distribution to select specific drive cycles, and MOVES uses these drive cycles to calculate operating mode distributions. The operating mode distributions in turn determine the calculated emission rates. The guidance in this section concerning the use of local speed distribution data still applies whether local average speed distributions are applied within MOVES using the Inventory option or outside of MOVES using the Emission Rates option.

### 4.6.1 Average Speed Distribution: Guidance for Inventory Mode

For SIP development and regional conformity analyses, where activity is averaged over a wide variety of driving patterns, a local speed distribution by road type and source type is necessary. The Average Speed Distribution Importer in MOVES calls for a speed distribution in VHT in 16 speed bins, by each road type, source type, and hour of the day included in the analysis. EPA urges users to develop the most detailed local speed information that is reasonable to obtain.

However, EPA acknowledges that average speed distribution may not be available at the level of detail that MOVES allows. The following paragraphs provide additional guidance regarding the development of average speed distribution inputs.

Average speed, as defined for use in MOVES, is the distance traveled (in miles) divided by the time (in hours). This is not the same as the instantaneous velocity of vehicles or the nominal speed limit on the roadway link. The MOVES definition of speed includes all operation of vehicles including intersections and other obstacles to travel which may result in stopping and idling. As a result, average speeds, as used in MOVES, will tend to be less than nominal speed limits for individual roadway links.

Selection of vehicle speeds is a complex process. One recommended approach for estimating average speeds is to post-process the output from a travel demand network model. In most transportation models, speed is estimated primarily to allocate travel across the roadway network. Speed is used as a measure of impedance to travel rather than as a prediction of accurate travel times. For this reason, speed results from most travel demand models must be adjusted to properly estimate actual average speeds.

An alternative approach to develop a local average speed distribution is to process on-vehicle GPS data. There are a number of commercial vendors that can provide raw, or processed vehicle speed data from cell phone and other on-vehicle GPS collection devices. This information can be used to calculate a MOVES average speed distribution. As part of the MOVES2014 model, EPA used GPS data to calculate a national default average speed distribution. Users wishing to process their own GPS data into an average speed distribution should ensure that the data are representative of the modeling domain, and accurately capture variation in vehicle average speeds across the day, and year.

Speed is entered in MOVES as a distribution rather than a single value. Table 3 shows the speed bin structure that MOVES uses for speed distribution input. EPA encourages users to use underlying speed distribution data to represent vehicle speed as an input to MOVES, rather than one average value. Use of a distribution will give a more accurate estimate of emissions than use of a single average speed.

Table 3 MOVES Speed Bins

| Speed Bin ID | Average Bin Speed | Speed Bin Range |
|---|---|---|
| 1 | 2.5 | speed < 2.5mph |
| 2 | 5 | 2.5mph <= speed < 7.5mph |
| 3 | 10 | 7.5mph <= speed < 12.5mph |
| 4 | 15 | 12.5mph <= speed < 17.5mph |
| 5 | 20 | 17.5mph <= speed <22.5mph |
| 6 | 25 | 22.5mph <= speed < 27.5mph |
| 7 | 30 | 27.5mph <= speed < 32.5mph |
| 8 | 35 | 32.5mph <= speed < 37.5mph |
| 9 | 40 | 37.5mph <= speed < 42.5mph |
| 10 | 45 | 42.5mph <= speed < 47.5mph |
| 11 | 50 | 47.5mph <= speed < 52.5mph |
| 12 | 55 | 52.5mph <= speed < 57.5mph |

| | | |
|---|---|---|
| 13 | 60 | 57.5mph <= speed < 62.5mph |
| 14 | 65 | 62.5mph <= speed < 67.5mph |
| 15 | 70 | 67.5mph <= speed < 72.5mph |
| 16 | 75 | 72.5mph <= speed |

As is the case for other MOVES inputs, EPA does not expect that users will be able to develop distinct local speed distributions for all 13 source types. If a local average speed distribution is not available for some source types, states can use the same average speed distribution for all source types within an HPMS vehicle class. For example, states could use the same average speed distribution for source types 31 and 32 if separate average speed distributions for passenger trucks and light commercial trucks are not available. States could also use the same speed distributions across multiple HPMS vehicle classes if more detailed information is not available.

Average speed estimates for calendar years other than the calendar year on which the average speed estimates are based must be logically related to the current year methodology and estimates, with no arbitrary or unsupported assumptions of changes in average speeds. Future average speed estimates should account for the effect of growth in overall fleet VMT on roadway congestion and average speeds.

#### *4.6.1.1 Additional Guidance for Inventories Used in Attainment Modeling*

Results from photochemical models are sensitive to differences in the estimated inventory by time of day. For SIP-related on-road vehicle emission inventories for photochemical models, EPA encourages states to develop and use their own specific estimates of VHT by average speed by hour of the day. However, hourly estimates are not required. In the absence of local hourly speed data, users could develop peak and off-peak speed distributions if available, or develop a daily average speed distribution. However, generating a daily average speed distribution for a highway network with a considerable number of highly congested links at certain times of day is not generally recommended. Because the relationship between speed and emissions is not linear, and emissions tend to be highest is congested conditions, using a daily average speed distribution in an area with significant congestion at certain times of day, can result in significant underestimation of emissions. In this case, using peak and off-peak speed distributions is recommended at a minimum. The VHT fractions by average speed used in inventory modeling for SIPs and regional conformity analyses should be consistent with the most recent information used for transportation planning.

#### *4.6.1.2 Additional Guidance for Speeds on Local Roadways*

MOVES uses four different roadway types that are affected by the average speed distribution input:

- Rural restricted access,
- Rural unrestricted access,
- Urban restricted access, and
- Urban unrestricted access.

In MOVES, local roadways are included with arterials and collectors in the urban and rural unrestricted access roads category. Therefore, EPA recommends that the average speed distribution for local roadway activity be included as part of a weighted distribution of average speed across all unrestricted roads, local roadways, arterials, and connectors. Users who want to treat local roadways and arterials separately can develop separate average speed distributions and estimate results using two separate MOVES runs, each with appropriate VMT, one using the local roadway average speed distribution for unrestricted access roads and one using the arterial average speed distribution for unrestricted access roads. However, using properly weighted average speed distributions for the combination of all unrestricted access roads should give the same result as using separate average speed distributions for arterials and local roadways.

##### *4.6.1.3 Average Speed Distributions for Highways and Ramps*

For rural and urban restricted access highways, users should enter the speed distribution of vehicles traveling on the highway only, not including any activity that occurs on entrance and exit ramps. MOVES automatically calculates a speed distribution for ramp activity based on the speed distribution of vehicles traveling on the highway. Faster or slower highway speeds result in faster or slower ramp speeds (and higher or lower acceleration rates) calculated by MOVES. MOVES then calculates emissions for ramp activity based on this internally-calculated speed distribution for the ramps, using the appropriate distribution of operating modes related to that speed distribution, and the fraction of VHT that occurs on ramps. At this point, MOVES adds emissions for ramp activity to emissions calculated for vehicles traveling on the highway itself to get the total emissions for restricted access roads. MOVES also allows users to separate emissions between ramps and highways.

Section 4.8 describes the Ramp Fraction input and how it might be used to model ramps separately from highways. As noted in that section, even when ramps are handled separately from highways, the speed distribution entered in MOVES should be the speed distribution for the associated highways, not a ramp-specific speed distribution.

### 4.6.2 Average Speed Distribution: Guidance for Emission Rates Mode

Users can use Emission Rates with either a single county or a custom domain. Users will define one average speed distribution for the entire domain. This cannot vary by zone.

If the Emission Rates option is used, and Source Type is selected in the Output Emission Detail Panel, MOVES will produce a table of emission rates by source type and road type for each speed bin. Total running emissions would then be calculated outside of MOVES by multiplying the emission rates by the VMT for each source type in each speed bin. However, vehicle speed inputs are still important because they are used by MOVES to calculate the relative amounts of running and non-running activity, which in turn affects the rates for the non-running processes. Speed inputs for Rates runs that include *only* running emissions can be treated as placeholders (for example, the MOVES default speed distribution could be used), but speed inputs for Emission Rates runs that include any non-running processes must reflect realistic activity for the area.

## *4.7 Road Type Distribution*

The fraction VMT by road type varies from area to area and can have a significant effect on overall emissions from on-road mobile sources. EPA expects states to develop and use their own specific estimates of VMT by road type. For each source type, the Road Type Distribution table of the input database stores the distribution of VMT by road type (e.g., the fraction of passenger car VMT on each of the road types).

### 4.7.1 Road Type Distribution: Guidance for Inventory Mode

The VMT fractions by road type used in inventory modeling for SIPs and regional conformity analyses should be consistent with the most recent information used for transportation planning.

As is the case for other MOVES inputs, EPA does not expect that users will be able to develop local road type distributions for all 13 vehicle source types. If local road type distribution information is not available for some source types, states can use the same road type distribution for all source types within an HPMS vehicle class. For example, states could use the same road type distribution for source types 31 and 32 if separate average speed distributions for passenger trucks and light commercial trucks are not available. States could also use the same road type distribution across multiple HPMS vehicle classes if more detailed information is not available.

EPA recommends using the same approach for custom domain zones. Users will define one road type distribution and allocate it via the Custom Zone Tab using reasonable local data.

### 4.7.2 Road Type Distribution: Guidance for Emission Rates Mode

If the Emission Rates option is used, MOVES will automatically produce a table of running emission rates by road type. Running emissions would then be calculated outside of MOVES by multiplying the emission rates by the VMT on each road type for each source type in each speed bin. In that case, data entered using the Road Type Distribution Importer is still required, but is not used by MOVES to calculate the rates. However, road type distribution inputs are important for Emission Rates runs involving non-running processes, because they are used by MOVES to calculate the relative amounts of running and non-running activity, which in turn affects the rates for the non-running processes. Road type distribution inputs for Rates runs that include any non-running processes must reflect realistic activity for the area. The guidance in this section concerning the use of local road type data still applies whether local road type distributions are applied within MOVES using the Inventory option or outside of MOVES using the Emission Rates option.

# MOVES Emission Inventory for R-Project

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| avgSpeedBinID | 13 |
|---|---|

| Sum of ratePerDistance | Column Labels | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Row Labels | 1 | 2 | 3 | 5 | 6 | 31 | 79 | 87 | 90 | 91 | 98 | 100 | 106 | 107 | 110 | 112 | 115 | 116 | 117 | 118 | 119 | Grand Total |
| 1 | 0.0790483 | 4.07799 | 0.481554 | 0.00499423 | 0.00188323 | 0.00252926 | 0.074054 | 0.0732142 | 380.524 | 5294870 | 381.21 | 0.0252055 | | | 0.0222973 | 0.00326563 | 0.000576787 | | | 0.0190317 | 0 | 5295636.6 |
| 9 | | | | | | | | | | | | | 0.00625803 | | | | | 0.000782254 | | | | 0.007040284 |
| 10 | | | | | | | | | | | | | | 0.00712393 | | | | | 0.00106858 | | | 0.00819251 |
| 13 | 0.00852276 | | | | | | 0.00852276 | 0.0093119 | | | | | | | | | | | | | | 0.02635742 |
| 15 | | 0.00212055 | 1.92622E-05 | | | | | 0.000966428 | | | | 0.000201644 | | | 0.000178378 | 2.61251E-05 | 4.6143E-06 | | | 0.000152253 | 0 | 0.003669255 |
| **Grand Total** | **0.08757106** | **4.08011055** | **0.481573262** | **0.00499423** | **0.00188323** | **0.00252926** | **0.08257676** | **0.083492528** | **380.524** | **5294870** | **381.21** | **0.025407144** | **0.00625803** | **0.00712393** | **0.022475678** | **0.003291755** | **0.000581401** | **0.000782254** | **0.00106858** | **0.019183953** | **0** | **5295636.645** |
| | | CO | Nox | | | SO2 | | VOC | | | CO2e | | | | PM2.5 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Days** | 400 | | | | | | |
| **Individuals** | 200 | | | | | | |
| **Miles (roundtrip)** | 36 | **CO** | **NOx** | **SO2** | **VOC** | **CO2e** | **PM2.5** |
| **Total Miles** | 2,880,000 | 11,750,718 | 1,386,931 | 7,284 | 240,458 | 1,097,884,800 | 64,730 |
| **Total Tons** | | 11.75 | 1.39 | 0.01 | 0.24 | 1,097.88 | 0.06 |
| **Tons/Month** | | 0.59 | 0.07 | 0.00 | 0.01 | 54.89 | 0.00 |
| **Tons/Year** | | 7.05 | 0.83 | 0.00 | 0.14 | 658.73 | 0.04 |

# USFS FIA Data: Aboveground Carbon in Live Trees by Species Group and Diameter Class, by County

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**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

**Summary Attribute:** Carbon in live trees and saplings above ground

**Report Layout:** Table break:
U.S. States (plot.statecd)
Row break:
Species group (tree.spgrpcd)
Column break:
Diameter class (tree.p2:diaclcd)

**Region Selection:** Nebraska(31)
counties:
Blaine(9)

**Filter Selection:** No filters

**Survey Years** 2015

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31) -- Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | | | | | |
|---|---|---|---|---|---|---|
| Tree species groups | Not measured (0) | 5.0-6.9 in (3) | 7.0-8.9 in (4) | 11-12.9 in (6) | 13-14.9 in (7) | Total |
| Other (-) | 0 | -- | -- | -- | -- | 0 |
| Other eastern softwoods (9) | -- | 1,029 | 2,718 | 8,246 | 5,120 | 17,113 |
| **Totals:** | **0** | **1,029** | **2,718** | **8,246** | **5,120** | **17,113** |

**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

**Summary Attribute:** Carbon in live trees and saplings above ground

**Report Layout:** Table break:
U.S. States (plot.statecd)
Row break:
Species group (tree.spgrpcd)
Column break:
Diameter class (tree.p2:diaclcd)

**Region Selection:** Nebraska(31)
counties:
Garfield(71)

**Filter Selection:** No filters

**Survey Years** 2015

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31) -- Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | | | | | |
|---|---|---|---|---|---|---|
| Tree species groups | Not measured (0) | 5.0-6.9 in (3) | 7.0-8.9 in (4) | 9-10.9 in (5) | 11-12.9 in (6) | Total |
| Other (-) | 0 | -- | -- | -- | -- | 0 |
| Jack pine (5) | 0 | -- | 0 | -- | -- | 0 |
| Other eastern softwoods (9) | -- | 2,462 | 9,142 | 10,482 | 9,638 | 31,725 |
| Ash (36) | -- | 1,155 | -- | -- | -- | 1,155 |
| Other eastern soft hardwoods (41) | -- | 1,253 | 2,325 | -- | -- | 3,578 |
| **Totals:** | **0** | **4,870** | **11,467** | **10,482** | **9,638** | **36,457** |

**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

**Summary Attribute:** Carbon in live trees and saplings above ground

**Report Layout:** Table break:
U.S. States (plot.statecd)
Row break:
Species group (tree.spgrpcd)
Column break:
Diameter class (tree.p2:diaclcd)

**Region Selection:** Nebraska(31)
counties:
Lincoln(111)

**Filter Selection:** No filters

**Survey Years** 2015

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31) -- Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree species groups | Not measured (0) | 1.0-2.9 in (1) | 3.0-4.9 in (2) | 5.0-6.9 in (3) | 7.0-8.9 in (4) | 9-10.9 in (5) | 11-12.9 in (6) | 13-14.9 in (7) | 15-16.9 in (8) | 17-18.9 in (9) | 19-20.9 in (10) | 21-28.9 in (11) | Total |
| Other (-) | 0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0 |
| Other eastern softwoods (9) | 0 | 19,857 | 47,476 | 75,806 | 85,681 | 86,851 | 61,170 | 42,944 | 45,985 | 24,452 | -- | -- | 490,222 |
| Woodland softwoods (23) | -- | -- | -- | 484 | 2,450 | 7,029 | 4,915 | -- | -- | -- | -- | -- | 14,878 |
| Ash (36) | 0 | -- | -- | 10,470 | 27,524 | 10,962 | 33,535 | 9,828 | 11,855 | -- | -- | -- | 104,173 |
| Cottonwood and aspen (37) | 0 | -- | -- | -- | -- | 3,638 | -- | 14,947 | -- | 27,037 | -- | 26,638 | 72,259 |
| Other eastern soft hardwoods (41) | 0 | 1,868 | 7,286 | 7,552 | 8,445 | 6,754 | 4,911 | 9,905 | -- | -- | 24,553 | -- | 71,273 |
| Other eastern hard hardwoods (42) | 0 | -- | -- | 1,209 | 6,193 | 6,511 | -- | 5,982 | -- | -- | -- | -- | 19,896 |
| **Totals:** | **0** | **21,725** | **54,762** | **95,522** | **130,293** | **121,745** | **104,530** | **83,605** | **57,840** | **51,489** | **24,553** | **26,638** | **772,701** |

**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

**Summary Attribute:** Carbon in live trees and saplings above ground

**Report Layout:** Table break:
U.S. States (plot.statecd)
Row break:
Species group (tree.spgrpcd)
Column break:
Diameter class (tree.p2:diaclcd)

**Region Selection:** Nebraska(31)
counties:
Logan(113)

**Filter Selection:** No filters

**Survey Years** 2015

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31) -- Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | |
|---|---|---|
| Tree species groups | Not measured (0) | Total |
| Other (-) | 0 | 0 |
| **Totals:** | **0** | **0** |

**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

| | |
|---|---|
| **Summary Attribute:** | Carbon in live trees and saplings above ground |
| **Report Layout:** | Table break:<br>U.S. States (plot.statecd)<br>Row break:<br>Species group (tree.spgrpcd)<br>Column break:<br>Diameter class (tree.p2:diaclcd) |
| **Region Selection:** | Nebraska(31)<br>counties:<br>Loup(115) |
| **Filter Selection:** | No filters |
| **Survey Years** | 2015 |

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31) -- Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | | |
|---|---|---|---|
| Tree species groups | Not measured (0) | 5.0-6.9 in (3) | Total |
| Other (-) | 0 | -- | 0 |
| Other eastern softwoods (9) | -- | 1,781 | 1,781 |
| **Totals:** | **0** | **1,781** | **1,781** |

**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

**Summary Attribute:** Carbon in live trees and saplings above ground

**Report Layout:** Table break:
U.S. States (plot.statecd)
Row break:
Species group (tree.spgrpcd)
Column break:
Diameter class (tree.p2:diaclcd)

**Region Selection:** Nebraska(31)
counties:
Thomas(171)

**Filter Selection:** No filters

**Survey Years** 2015

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31)** -- **Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree species groups | Not measured (0) | 1.0-2.9 in (1) | 3.0-4.9 in (2) | 5.0-6.9 in (3) | 7.0-8.9 in (4) | 9-10.9 in (5) | 11-12.9 in (6) | 13-14.9 in (7) | 17-18.9 in (9) | 19-20.9 in (10) | Total |
| Other (-) | 0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0 |
| Other yellow pines (3) | 0 | 226 | -- | -- | -- | -- | -- | -- | -- | -- | 226 |
| Other eastern softwoods (9) | 0 | 1,801 | 2,064 | 11,325 | 20,758 | 33,153 | 36,655 | 23,211 | 11,429 | 16,093 | 156,490 |
| Other eastern soft hardwoods (41) | -- | -- | -- | 2,551 | -- | -- | -- | -- | -- | -- | 2,551 |
| Eastern noncommercial hardwoods (43) | -- | 550 | -- | -- | -- | -- | -- | -- | -- | -- | 550 |
| **Totals:** | **0** | **2,576** | **2,064** | **13,876** | **20,758** | **33,153** | **36,655** | **23,211** | **11,429** | **16,093** | **159,817** |

**53.1 - Aboveground carbon in live trees (at least 1 inch d.b.h./d.r.c.), in short tons, by species group and diameter class**

**Summary Attribute:** Carbon in live trees and saplings above ground

**Report Layout:** Table break:
U.S. States (plot.statecd)
Row break:
Species group (tree.spgrpcd)
Column break:
Diameter class (tree.p2:diaclcd)

**Region Selection:** Nebraska(31)
counties:
Wheeler(183)

**Filter Selection:** No filters

**Survey Years** 2015

(The color of each estimated value represents its percent sampling error (pse); if estimate is **black**, pse is less than or equal to 25%; if estimate is **teal**, pse is greater than 25% and less than or equal to 50%; if estimate is **gold**, pse is greater than 50%)

**Inventory -- NEBRASKA 2015: 2010-2015: CURRENT AREA, CURRENT VOLUME**

**Nebraska (31) -- Carbon in live trees and saplings above ground on forest land by Species group and Diameter class (in short tons)**

| | Tree diameter classifications | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree species groups | Not measured (0) | 1.0-2.9 in (1) | 3.0-4.9 in (2) | 5.0-6.9 in (3) | 7.0-8.9 in (4) | 9-10.9 in (5) | 11-12.9 in (6) | 13-14.9 in (7) | 15-16.9 in (8) | 17-18.9 in (9) | Total |
| Other (-) | 0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0 |
| Other eastern softwoods (9) | 0 | 800 | -- | 10,021 | 3,168 | 3,207 | 4,953 | 14,045 | -- | -- | 36,194 |
| Ash (36) | 0 | -- | 18,411 | 11,083 | 2,524 | 2,015 | 6,549 | -- | -- | -- | 40,582 |
| Cottonwood and aspen (37) | 0 | 638 | -- | -- | -- | -- | -- | -- | -- | -- | 638 |
| Other eastern soft hardwoods (41) | -- | -- | -- | -- | 1,619 | -- | -- | -- | 10,304 | 16,148 | 28,072 |
| Other eastern hard hardwoods (42) | -- | -- | -- | -- | 0 | -- | 6,562 | -- | -- | 16,115 | 22,677 |
| Eastern noncommercial hardwoods (43) | -- | 275 | -- | -- | -- | -- | -- | -- | -- | -- | 275 |
| **Totals:** | **0** | **1,713** | **18,411** | **21,105** | **7,311** | **5,222** | **18,064** | **14,045** | **10,304** | **32,263** | **128,438** |

# R-Project Emissions Estimates

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## Fugitive Dust Emissions from Access Route Construction

For the puposes of calculating air emissions, it was assumed that a maximum of approximately 284 acres of land for Alternative A and 557 acres of land for Alternative B would be disturbed due to access route construction or upgrades. During construction and upgrading, watering and speed controls will be used to suppress and control fugitive dust. Speed controls, but no watering, will be used on roads subsequent to construction for maintenance and inspection activities. The use of water and speed controls in the road construction zone is expected to result in at least 80% control of fugitive dust (coarse particulates, i.e. $PM_{10}$). Fine particulates ($PM_{2.5}$) are expected to make up approximately 12.6% of $PM_{10}$, per the California Air Resources Bureau's (CARB) $PM_{2.5}$ Speciation Profiles, 2006.

Emissions estimated using Midwest Research Insitute's Level 1 (MRIL1) $PM_{10}$ Emission Factor, where only the area and duration of construction are known. The MRIL1 $PM_{10}$ emission factor is based on a work schedule of 168 hours per month. This project's schedule is anticipated to be approximately 260 hours per month. It is also assumed that only 33% of the roads would be under construction at any given time. Based on the work schedule, the MRIL1 $PM_{10}$ Emission Factor has been multiplied by (260/168) to adjust for the increased project work schedule in comparison to the emission factor's development.

| | | |
|---|---|---|
| MRI Level 1 $PM_{10}$ Emission Factor: | 0.17 | tons per acre per month |
| $PM_{2.5}$ Emission Factor: | 0.021 | tons per acre per month |

**Temporary Access Routes**

| | | |
|---|---|---|
| Alternative A: | 258 | acres |
| Alternative B: | 506 | acres |

**Permanent Access Routes**

| | | |
|---|---|---|
| Alternative A: | 26 | acres |
| Alternative B: | 51 | acres |

**Total Access Route Construction**

| | | |
|---|---|---|
| Alternative A: | 284 | acres |
| Alternative B: | 557 | acres |

**Alternative A Fugitive PM Emissions:**

Tons of $PM_{10}$ = (0.17 tons/acre/mo)*(284 acres)*(0.33)*(1 - 0.80)*(24 months)
= 76.5 tons total
= 38.2 tons per year

Tons of $PM_{2.5}$ = (0.021 tons/acre/mo)*(284 acres)*(0.33)*(1 - 0.80)*(24 months)
= 9.4 tons
= 4.7 tons per year

**Alternative B Fugitive PM Emissions:**

Tons of $PM_{10}$ = (0.17 tons/acre/mo)*(557 acres)*(0.33)*(1 - 0.80)*(24 months)
= 150.0 tons
= 75.0 tons per year

Tons of $PM_{2.5}$ = (0.021 tons/acre/mo)*(557 acres)*(0.33)*(1 - 0.80)*(24 months)
= 18.5 tons
= 9.3 tons per year

Fugitive dust emissions from the use of access routes during construction determined using procedures outlined in U.S. EPA's AP-42, Section 13.2.2

| | | |
|---|---|---|
| Alternative A: maximum distance of unpaved roads: | 167.4 | miles (based on road width of 14 feet) |
| Alternative B: maximum distance of unpaved roads: | 328.2 | miles (based on road width of 14 feet) |
| # of structures (Alternatives A & B): | 988 | |
| Alternative A: average maximum distance between structures: | 0.17 | miles |
| Alternative A: average round trip distance between structures: | 0.34 | miles |
| Alternative A: average maximum distance between structures: | 0.33 | miles |
| Alternative A: average round trip distance between structures: | 0.66 | miles |
| Numer of vehicle trips per day: | 9 | |
| Alternative A: vehicle miles traveled per day: | 3.05 | miles |
| Alternative A: vehicle miles traveled per 24-months: | 1,907.8 | miles |
| Alternative B: vehicle miles traveled per day: | 5.98 | miles |
| Alternative B: vehicle miles traveled per 24-months: | 3,741.7 | miles |

Equation 1(b) from AP-42 Section 13.2.2:

$$E = \frac{k*(s/12)^{a}*(S/30)^{d}}{(M/0.5)^{c}}$$

Where:

E = emission factor in pounds per vehicle mile traveled (lb/VMT)
k = empirical constant, = 1.8 for $PM_{10}$ emissions, and = 0.18 for $PM_{2.5}$ emissions
s = surface material silt content, assumed to be 8.5% (average of AP-42 values)
S = mean vehicle speed in miles per hour, assumed to be 15 mph
M = surface moisture content, assumed to be 6.5% (average of AP-42 values)
a = empirical constant, = 1
d = empirical constant, = 0.5
c = empirical constant, = 0.2

E = 0.54 lb/VMT for $PM_{10}$
0.054 lb/VMT for $PM_{2.5}$

PM Emissions from the Use of Access Routes During Construction:

Alternative A $PM_{10}$ Emissions = 0.51 tons
Alternative A $PM_{2.5}$ Emissions = 0.051 tons

Alternative B $PM_{10}$ Emissions = 1.01 tons
Alternative B $PM_{2.5}$ Emissions = 0.10 tons

## Fugitive Dust Emissions from General Construction Areas

| Alternative A Construction Areas | | |
|---|---|---|
| Structure Work Areas: | 486 | acres |
| Wire-Pulling, Tensioning and Splicing Sites: | 275 | acres |
| Construction Yards/Stating Areas: | 203 | acres |
| Fly Yards and Assembly Areas: | 193 | acres |
| Distribution Power Line Moves: | 43 | acres |
| Well Relocations: | 0.4 | acres |
| Substations: | 25 | acres |
| Total Disturbance: | 1,225.4 | acres |

| Alternative B Construction Areas | | |
|---|---|---|
| Structure Work Areas: | 825 | acres |
| Wire-Pulling, Tensioning and Splicing Sites: | 294 | acres |
| Construction Yards/Stating Areas: | 203 | acres |
| Fly Yards and Assembly Areas: | 0 | acres |
| Distribution Power Line Moves: | 43 | acres |
| Well Relocations: | 0.4 | acres |
| Substations: | 25 | acres |
| Total Disturbance: | 1,390.4 | acres |

Tower pad emissions estimated using Midwest Research Institute's Level 1 Emission Factors for $PM_{10}$. It is estimated that at any given time, only 33% of tower pad sites and staging areas would be under construction. The use of water and speed controls are estimated to reduce emissions by at least 80%.

MRI Level 1 $PM_{10}$ Emission Factor: 0.17 tons per acre per month
$PM_{2.5}$ Emission Factor: 0.021 tons per acre per month

**Alternative A Fugitive PM Emissions:**

Tons of $PM_{10}$ = (0.17 tons/acre/mo)*(1,225.4 acres)*(0.33)*(1 - 0.80)*(24 months)
= 330.4 tons total
= 165.2 tons per year

Tons of $PM_{2.5}$ = (0.021 tons/acre/mo)*(1,225.4 acres)*(0.33)*(1 - 0.80)*(24 months)
= 41.6 tons total
= 20.8 tons per year

**Alternative B Fugitive PM Emissions:**

Tons of $PM_{10}$ = (0.17 tons/acre/mo)*(1,390.4 acres)*(0.33)*(1 - 0.80)*(24 months)
= 374.9 tons total
= 187.5 tons per year

Tons of $PM_{2.5}$ = (0.021 tons/acre/mo)*(1,390.4 acres)*(0.33)*(1 - 0.80)*(24 months)
= 47.2 tons total
= 23.6 tons per year

## Exhaust Emissions fron Heavy Construction Equipment

Exhaust emissions from diesel construction equipment were estimated using the California Air Resources Board's 2007 Off-Road Emissions Inventory Database, in conjunction with the U.S. Energy Information Administration's suggested value of 161.3 pounds of $CO_2$ emissions per million Btu of diesel fuel. The CARB Database factors are considered appropriate because the equipment included in the database is similar to the equipment for the proposed R-Project. Composite emission factors were developed from the CARB database and were used in conjunction with the total hours of operation for all equipment. Based on an operating schedule of 10 hours per day, 6 days per week for 12 months, the hours of operation for the project are 3,120 hours per year. The following is a list of equipment to be used, with expected runtimes over the course of the project.

| | |
|---|---|
| Hours per Day: | 10 |
| Days per Week: | 6 |
| Hours per Week: | 60 |

| | | | Alternative A Duration | | Alternative B Duration | |
|---|---|---|---|---|---|---|
| Activity | Type of Equipment | Quantity | (weeks) | (hours) | (weeks) | (hours) |
| Access Scenario 2 and Scenario 3 (see Chapter 2 for a description of the access scenarios) | Bulldozer (D-8 Cat or equivalent) | 1 | 16 | 960 | 32 | 1920 |
| | Front-end loader | 1 | 16 | 960 | 32 | 1920 |
| | Dump truck | 1 | 16 | 960 | 32 | 1920 |
| | Grader | 1 | 16 | 960 | 32 | 1920 |
| | Roller compactor | 1 | 16 | 960 | 32 | 1920 |
| | Water truck | 1 | 16 | 960 | 32 | 1920 |
| | Diesel tractor with lowboy | 1 | 16 | 960 | 32 | 1920 |
| | Light vehicles | 2 | 16 | 960 | 32 | 1920 |
| ROW clearing | ATV | 2 | 29 | 1740 | 29 | 1740 |
| | Brush mower/shredder | 1 | 29 | 1740 | 29 | 1740 |
| | Light vehicles | 2 | 29 | 1740 | 29 | 1740 |
| | Mechanized feller-buncher | 1 | 29 | 1740 | 29 | 1740 |
| | Grapple skidder | 1 | 29 | 1740 | 29 | 1740 |
| Assemble lattice towers in fly yards/assembly areas | Crane, all-terrain (35 ton) | 2 | 40 | 2400 | 0 | 0 |
| | Diesel tractor/trailer | 2 | 40 | 2400 | 0 | 0 |
| | Tool trailer | 1 | 40 | 2400 | 0 | 0 |
| | Air compressor | 2 | 40 | 2400 | 0 | 0 |
| | Mechanics truck | 1 | 40 | 2400 | 0 | 0 |
| | Light vehicles | 4 | 40 | 2400 | 0 | 0 |
| Handle material in construction yards/staging areas | Crane, all-terrain (35 ton) | 4 | 65 | 3900 | 65 | 3900 |
| | Heavy forklift | 4 | 65 | 3900 | 65 | 3900 |
| | Light vehicles/ATV | 6 | 65 | 3900 | 65 | 3900 |
| | Mechanic truck | 2 | 65 | 3900 | 65 | 3900 |
| | Job site trailers | 6 | 65 | 3900 | 65 | 3900 |
| Structure staking | ATV | 1 | 19 | 1140 | 19 | 1140 |
| | Light vehicle | 1 | 19 | 1140 | 19 | 1140 |
| Helical pier foundation installation | Tracked excavator | 1 | 48 | 2880 | 0 | 0 |
| | Bobcat-type front-end loader | 1 | 48 | 2880 | 0 | 0 |
| | Tracked material carrier | 1 | 48 | 2880 | 0 | 0 |
| | Light vehicle/ATV | 1 | 48 | 2880 | 0 | 0 |
| | Mechanics truck | 1 | 48 | 2880 | 0 | 0 |
| | Welding truck | 1 | 48 | 2880 | 0 | 0 |
| | Water truck | 1 | 48 | 2880 | 0 | 0 |

| Activity | Type of Equipment | Quantity | Alternative A Duration | | Alternative B Duration | |
|---|---|---|---|---|---|---|
| | | | (weeks) | (hours) | (weeks) | (hours) |
| Lattice structure hauling/erection | Crane, all-terrain (35 ton) | 2 | 27 | 1620 | 0 | 0 |
| | Tracked material carrier | 2 | 27 | 1620 | 0 | 0 |
| | Tool trailer | 2 | 27 | 1620 | 0 | 0 |
| | Air compressor | 4 | 27 | 1620 | 0 | 0 |
| | Mechanics truck | 2 | 27 | 1620 | 0 | 0 |
| | Light vehicle/ATV | 4 | 27 | 1620 | 0 | 0 |
| Foundation excavation/ installation | Auger rig | 2 | 22 | 1320 | 55 | 3300 |
| | Dump truck | 2 | 22 | 1320 | 55 | 3300 |
| | Front end loader | 2 | 22 | 1320 | 55 | 3300 |
| | Backhoe | 2 | 22 | 1320 | 55 | 3300 |
| | Concrete truck | 8 | 22 | 1320 | 55 | 3300 |
| | Diesel tractor/trailer | 2 | 22 | 1320 | 55 | 3300 |
| | Crane, all-terrain (35 ton) | 4 | 22 | 1320 | 55 | 3300 |
| | Tool trailer | 2 | 22 | 1320 | 55 | 3300 |
| | Mechanics truck | 1 | 22 | 1320 | 55 | 3300 |
| | Light vehicle | 4 | 22 | 1320 | 55 | 3300 |
| | Water truck | 2 | 22 | 1320 | 55 | 3300 |
| Structure assembly/erection | Heavy crane, 120–150 ton | 1 | 26 | 1560 | 65 | 3900 |
| | Bucket truck | 1 | 26 | 1560 | 65 | 3900 |
| | Tool trailer | 1 | 26 | 1560 | 65 | 3900 |
| | Truck (2 ton) | 1 | 26 | 1560 | 65 | 3900 |
| | Mechanics truck | 1 | 26 | 1560 | 65 | 3900 |
| | Light vehicle | 4 | 26 | 1560 | 65 | 3900 |
| | Fork lift, all-terrain | 1 | 26 | 1560 | 65 | 3900 |
| | Crane, all-terrain (35 ton) | 1 | 26 | 1560 | 65 | 3900 |
| | Diesel tractor/trailer | 2 | 26 | 1560 | 65 | 3900 |
| Stringing, pulling, and tensioning | Conductor reel trailers | 6 | 75 | 4500 | 75 | 4500 |
| | Shield wire reel trailers | 2 | 75 | 4500 | 75 | 4500 |
| | 3-drum pullers | 2 | 75 | 4500 | 75 | 4500 |
| | Single drum pullers | 2 | 75 | 4500 | 75 | 4500 |
| | Double bull-wheel tensioner | 1 | 75 | 4500 | 75 | 4500 |
| | Diesel tractor/trailer | 4 | 75 | 4500 | 75 | 4500 |
| | Crane, all-terrain (35 ton) | 2 | 75 | 4500 | 75 | 4500 |
| | Sagging equipment (D-8 Cat) | 2 | 75 | 4500 | 75 | 4500 |
| | Bucket truck | 1 | 75 | 4500 | 75 | 4500 |
| | Mechanics truck | 1 | 75 | 4500 | 75 | 4500 |
| | Tool trailer | 1 | 75 | 4500 | 75 | 4500 |
| | Light vehicles | 4 | 75 | 4500 | 75 | 4500 |
| GGS Construction | Light duty pickup | -- | -- | 500 | -- | 500 |
| | Truck, 12–20K | -- | -- | 350 | -- | 350 |
| | Medium duty pickup | -- | -- | 250 | -- | 250 |
| | Heavy duty pickup | -- | -- | 300 | -- | 300 |
| | Heavy duty crane | -- | -- | 100 | -- | 100 |
| | Bobcat loader | -- | -- | 400 | -- | 400 |
| | Digger derrick < 25K | -- | -- | 10 | -- | 10 |
| | Digger derrick > 25K | -- | -- | 10 | -- | 10 |
| | Bucket truck > 43 foot | -- | -- | 20 | -- | 20 |
| | Tracked digger derrick | -- | -- | 100 | -- | 100 |

| Activity | Type of Equipment | Quantity | Alternative A Duration (weeks) | Alternative A Duration (hours) | Alternative B Duration (weeks) | Alternative B Duration (hours) |
|---|---|---|---|---|---|---|
| Thedford Grading | Scraper | -- | -- | 210 | -- | 210 |
| | Bulldozer | -- | -- | 210 | -- | 210 |
| | Tractor | -- | -- | 210 | -- | 210 |
| | Grader | -- | -- | 210 | -- | 210 |
| Thedford 345kV/115kV Construction, including new transformer | Light duty pickup | -- | -- | 2,000 | -- | 2,000 |
| | Truck, 12–20K | -- | -- | 1,450 | -- | 1,450 |
| | Medium duty pickup | -- | -- | 950 | -- | 950 |
| | Heavy duty pickup | -- | -- | 900 | -- | 900 |
| | Heavy duty crane | -- | -- | 550 | -- | 550 |
| | Bobcat loader | -- | -- | 2,300 | -- | 2,300 |
| | Digger derrick < 25K | -- | -- | 30 | -- | 30 |
| | Digger derrick > 25K | -- | -- | 30 | -- | 30 |
| | Bucket truck > 43 foot | -- | -- | 40 | -- | 40 |
| | Tracked digger derrick | -- | -- | 600 | -- | 600 |
| Holt Co. Grading | Scraper | -- | -- | 150 | -- | 150 |
| | Bulldozer | -- | -- | 150 | -- | 150 |
| | Tractor | -- | -- | 150 | -- | 150 |
| | Grader | -- | -- | 150 | -- | 150 |
| Holt Co. Construction | Light duty pickup | -- | -- | 1,000 | -- | 1,000 |
| | Truck, 12–20K | -- | -- | 750 | -- | 750 |
| | Medium duty pickup | -- | -- | 450 | -- | 450 |
| | Heavy duty pickup | -- | -- | 400 | -- | 400 |
| | Heavy duty crane | -- | -- | 400 | -- | 400 |
| | Bobcat loader | -- | -- | 1,500 | -- | 1,500 |
| | Digger derrick < 25K | -- | -- | 10 | -- | 10 |
| | Digger derrick > 25K | -- | -- | 10 | -- | 10 |
| | Bucket truck > 43 foot | -- | -- | 40 | -- | 40 |
| | Tracked digger derrick | -- | -- | 400 | -- | 400 |

Total Hours of Operation for All Equipment in Alternative A: 182,290
Total Hours of Operation for All Equipment in Alternative B: 188,530

| Calendar Year: | | 2017 | 2018 | 2019 | | SCALING DOWN FOR HOURS RUNTIME: | |
|---|---|---|---|---|---|---|---|
| Equipment Class: | | Construction and Mining* | Construction and Mining* | Construction and Mining* | TOTALS | Alternative A | Alternative B |
| Base Fuel | lb/yr | 1,657,778,319 | 1,720,803,883 | 1,783,995,157 | 5,162,577,359 | 2,151,738.59 | 2,225,395.12 |
| Base NOx | tpy | 24,754 | 22,867 | 21,981 | 69,602 | 29.01 | 30.00 |
| Base PM | tpy | 1,219 | 1,109 | 1,053 | 3,380 | 1.41 | 1.46 |
| Base VOC | tpy | 1,886 | 1,764 | 1,718 | 5,367 | 2.24 | 2.31 |
| Base $CO_2$ | tpy | 2,580,407 | 2,678,509 | 2,776,869 | 8,035,784 | 3,349 | 3,464 |
| Base Activity | hrs/yr | 70,196,692 | 72,893,476 | 75,590,259 | 218,680,427 | 91,145 | 94,265 |

*All values obtained from CARB Off-Road Database

## Emissions from the Use of Helicopters during Construction

Current plans include the potential for helicopter use to support construction activities, which may involve: delivery of construction laborers, equipment, and materials to structure sites; structure placement; hardware installation; and wire stringing operations. Helicopters may also be used to support the administration and management of the project. It is anticipated that one heavy life and one medium lift helicopter will be used. For conservatism, it will be assumed that both helicopters will be heavy-lift units.

For the purposes of estimating helicopter exhaust emissions, the total estimated operating hours for each type of helicopter are assumed as follows:

Alternative A:
Heavy Lift Units: 5460 hours

Alternative B:
Heavy Lift Units: 4500 hours

Emission factors derived from the Federal Aviation Administration's 2005 Aircraft Emission Database (EDMS), version 4.4. These factors are delineated for idle and approach/climb-out. The in-flight working mode is assumed to have a similar emissions signature as approach/climb-out mode.

Emission Factors:

| Unit Type | CO (lb/hr) | NOx (lb/hr) | $PM_{10}$ (lb/hr) | SOx (lb/hr) | VOC (lb/hr) |
|---|---|---|---|---|---|
| Heavy Lift | 2.98 | 15.5 | 2.09 | 0.96 | 0.2 |

Source: California Public Utilities Commission, 2006

Total Emissions During Construction:

| Scenario | CO (tons) | NOx (tons) | $PM_{10}$ (tons) | SOx (tons) | VOC (tons) | $CO_2$ (tons) |
|---|---|---|---|---|---|---|
| Alternative A | 8.14 | 42.32 | 5.71 | 2.62 | 0.55 | 10,082.92 |
| Alternative B | 6.71 | 34.88 | 4.70 | 2.16 | 0.45 | 8,310.09 |

$CO_2$ emissions calculated using the Conklin and De Decker Associates Aircraft $CO_2$ Calculator, 2015.

## Emissions from Construction Worker-Related Travel

For the purposes of estimating air emissions from worker-related travel, it was assumed that construction workers would make an estimated one round trips per day to project sites. A conservative round-trip distance of 36 miles was assumed for this purpose. Based on these assumptions, the total daily mileage would be 7,200 vehicle miles traveled. Over the course of construction (24 months), this would result in 4,505,143 vehicle miles traveled.

| | | |
|---|---|---|
| Construction Personnel: | 200 | |
| Round Trip Distance Per Day: | 36 | miles |
| Total Vehicle Miles Per Day: | 7,200 | miles |
| Days Per Year: | 313 | days |
| Vehicle Miles Per Year: | 2,252,571 | miles |
| Total Vehicle Miles for Project: | 4,505,143 | miles |

Emissions estimates are based on the USEPA emissions model Motor Vehicle Emission Simulator or MOVES2014a. To ensure a conservative emission factor, the MOVES emissions modeling was conducted for a January morning hour (7:00 a.m.) because emissions are generally higher at lower temperatures. The analysis was based on passenger vehicles traveling at an average speed of 60 miles per hour on rural unrestricted access type roadways (i.e., arterials, connectors, and local streets). The MOVES modeling was conducted for a 2017 analysis year. Appendix E provides a detailed overview of the MOVES input assumptions.

| Pollutant: | NOx | VOC | CO | $SO_2$ | $PM_{2.5}$ | $CO_2$ |
|---|---|---|---|---|---|---|
| Total Emissions (tons) | 1.66 | 0.29 | 14.10 | 0.01 | 0.08 | 1,317.46 |
| Annual Emissions (tons/year) | 0.83 | 0.14 | 7.05 | 0.00 | 0.04 | 658.73 |

## Emissions from Operations - Maintenance and Inspection

It is assumed that the transmission line will be inspected on a semi-annual basis. Assuming that 167.4 miles of unpaved roads for Alternative A and 328.2 miles of unpaved roads for Alternative B would be used to access the various transmission line corridor points results in an annual VMT calculation of 669.6 miles (2 round trips) for Alternative A and 1,312.8 miles (2 round trips) for Alternative B. It is assumed that light-duty trucks would be used for this task, and road speeds would be less than 25 mph.

Fugitive dust emissions from the use of access routes during inspection and maintenance determined using procedures outlined in U.S. EPA's AP-42, Section 13.2.2

Equation 1(b) from AP-42 Section 13.2.2:

$$E = \frac{k*(s/12)^a*(S/30)^d}{(M/0.5)^c}$$

| | | |
|---|---|---|
| Where: | E = | emission factor in pounds per vehicle mile traveled (lb/VMT) |
| | k = | empirical constant, = 1.8 for $PM_{10}$ emissions, and = 0.18 for $PM_{2.5}$ emissions |
| | s = | surface material silt content, assumed to be 8.5% (average of AP-42 values) |
| | S = | mean vehicle speed in miles per hour, assumed to be 25 mph |
| | M = | surface moisture content, assumed to be 6.5% (average of AP-42 values) |
| | a = | empirical constant, = 1 |
| | d = | empirical constant, = 0.5 |
| | c = | empirical constant, = 0.2 |

| | | |
|---|---|---|
| E = | 0.70 | lb/VMT for $PM_{10}$ |
| | 0.070 | lb/VMT for $PM_{2.5}$ |

Vehicle Miles Per Year

| | | |
|---|---|---|
| Alternative A: | 669.6 | miles |
| Alternative B: | 1,312.8 | miles |

Alternative A:

| | | |
|---|---|---|
| Total $PM_{10}$ Emissions = | 0.23 | tons per year |
| Total $PM_{2.5}$ Emissions = | 0.023 | tons per year |

Alternative B:

| | | |
|---|---|---|
| Total $PM_{10}$ Emissions = | 0.46 | tons per year |
| Total $PM_{2.5}$ Emissions = | 0.046 | tons per year |

Exhaust emissions from the use of access routes during inspection and maintenance determined using the CARB EMFAC2014 database. It is assumed that the vehicle mix in the project area would be similar to the vehicle mix in California. It was assumed that the construction would occur in 2017 or 2018. All speeds up to 25 mph were used in conjunction with gasoline as the selected fuel type.

Alternative A

| Pollutant: | NOx | VOC | CO | $PM_{10}$ | $PM_{2.5}$ | $CO_2$ |
|---|---|---|---|---|---|---|
| Emission Factor (lb/VMT) | 0.0033 | 0.0032 | 0.057 | 0.000090 | 0.000083 | 1.94 |
| Annual Emissions (tons) | 0.0011 | 0.0011 | 0.019 | 0.000030 | 0.000028 | 0.65 |

Alternative B

| Pollutant: | NOx | VOC | CO | $PM_{10}$ | $PM_{2.5}$ | $CO_2$ |
|---|---|---|---|---|---|---|
| Emission Factor (lb/VMT) | 0.0033 | 0.0032 | 0.057 | 0.000090 | 0.000083 | 1.94 |
| Annual Emissions (tons) | 0.0022 | 0.0021 | 0.038 | 0.000059 | 0.000055 | 1.27 |

Aerial inspections are also expected to occur on an annual basis using a helicopter. A light-lift helicopter will be used for this task. Total annual helicopter use is expected to be 37 hours.

Emission factors derived from the Federal Aviation Administration's 2005 Aircraft Emission Database (EDMS), version 4.4. These factors are delineated for idle and approach/climb-out. The in-flight working mode is assumed to have a similar emissions signature as approach/climb-out mode.

Emission Factors:

| Unit Type | CO (lb/hr) | NOx (lb/hr) | $PM_{10}$ (lb/hr) | SOx (lb/hr) | VOC (lb/hr) |
|---|---|---|---|---|---|
| Light Lift | 2.98 | 15.5 | 2.09 | 0.96 | 0.20 |

Source: California Public Utilities Commission, 2006

Estimated Annual Emissions from Operations, assuming 37 hours per year:

| Unit Type | CO (tons) | NOx (tons) | $PM_{10}$ (tons) | SOx (tons) | VOC (tons) | $CO_2$ (tons) |
|---|---|---|---|---|---|---|
| Light Lift | 0.055 | 0.29 | 0.039 | 0.018 | 0.0037 | 10.93 |

$CO_2$ emissions calculated using the Conklin and De Decker Associates Aircraft $CO_2$ Calculator, 2015.

## Total Estimated R-Project Air Emissions

### Alternative A

| Pollutant | Construction Emissions (total tons in project period) | | | |
|---|---|---|---|---|
| | Fugitive Dust | Construction Equipment | Worker Travel | Total |
| VOC | -- | 5.02 | 0.29 | 5.30 |
| CO | -- | 8.14 | 14.10 | 22.24 |
| NOx | -- | 100.33 | 1.66 | 101.99 |
| SOx | -- | 2.62 | 0.01 | 2.63 |
| $PM_{10}$ | 407.43 | 8.52 | 0.08 | 416.03 |
| $PM_{2.5}$ | 51.13 | 8.52 | 0.08 | 59.74 |
| $CO_2$ | -- | 16,781.47 | 1,317.46 | 18,098.93 |

| Pollutant | Operational Emissions (tons/year) |
|---|---|
| VOC | 0.0048 |
| CO | 0.074 |
| NOx | 0.29 |
| SOx | 0.018 |
| $PM_{10}$ | 0.27 |
| $PM_{2.5}$ | 0.062 |
| $CO_2$ | 11.58 |

### Alternative B

| Pollutant | Construction Emissions (total tons in project period) | | | |
|---|---|---|---|---|
| | Fugitive Dust | Construction Equipment | Worker Travel | Total |
| VOC | -- | 5.08 | 0.29 | 5.36 |
| CO | -- | 6.71 | 14.10 | 20.81 |
| NOx | -- | 94.88 | 1.66 | 96.54 |
| SOx | -- | 2.16 | 0.01 | 2.17 |
| $PM_{10}$ | 525.93 | 7.62 | 0.080 | 533.63 |
| $PM_{2.5}$ | 65.87 | 7.62 | 0.080 | 73.57 |
| $CO_2$ | -- | 15,237.95 | 1,317.46 | 16,555.41 |

| Pollutant | Operational Emissions (tons/year) |
|---|---|
| VOC | 0.0058 |
| CO | 0.093 |
| NOx | 0.29 |
| SOx | 0.018 |
| $PM_{10}$ | 0.50 |
| $PM_{2.5}$ | 0.084 |
| $CO_2$ | 12.21 |

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