

APPENDIX M

Raptor Nest Survey Report

**Raptor Nest Survey
Philip Wind Project
Haakon County, South Dakota**

**Final Report
January – June 2022**

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1 INTRODUCTION

Philip Wind Partners, LLC (Philip Wind) is considering development of the Philip Wind Project (Project) in central South Dakota. Philip Wind contracted Western EcoSystems Technology, Inc. (WEST) to conduct aerial and ground-based raptor nest surveys, including those for bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles. Surveys were conducted throughout the March 2022 Project Area and the Study Area, a separate 2.0-mile (mi) buffer from the Project Area (Figure 1.1).

Raptor nest surveys were conducted in accordance with guidance provided in the U.S. Fish and Wildlife Service (USFWS) Land-Based Wind Energy Guidelines (USFWS 2012), the USFWS Eagle Conservation Plan Guidance (ECPG; USFWS 2013), the USFWS Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (Revisions; USFWS 2016), the USFWS Updated Eagle Nest Survey Protocol (USFWS 2020) and the USFWS Region 6 Recommended Protocol for Conducting Pre-construction Eagle Nest Surveys at Wind Energy Projects (Protocol; USFWS 2021).

The objective of the raptor nest surveys was to identify and record the location and status of all raptor nests within the Project and Study areas. Results of these surveys provide baseline information on the nesting status of all raptor species at the Project.

2 PROJECT AREA

The Project is located approximately 14 mi north of the city of Philip in Haakon County, South Dakota (Figure 1.1). The Project Area encompasses approximately 68,569 acres (ac) within two level IV ecoregions: the Sub-humid Pierre Shale Plains and the Rivers Breaks (U.S. Environmental Protection Agency [USEPA] 2012). These ecoregions, historically dominated by grasslands have been extensively converted for agricultural use (e.g., row crops and livestock grazing; USEPA 2012), and contain semi-permanent and seasonal wetlands, often referred to as prairie potholes.

Topography within the Project Area is gently rolling to flat. The primary land cover within the Project Area is primarily grassland/herbaceous and cultivated crops. Wetlands are relatively evenly dispersed throughout the Project Area and are primarily classified as freshwater emergent and freshwater pond. Topography and land cover types in the Study Area are similar to those described for the Project Area.

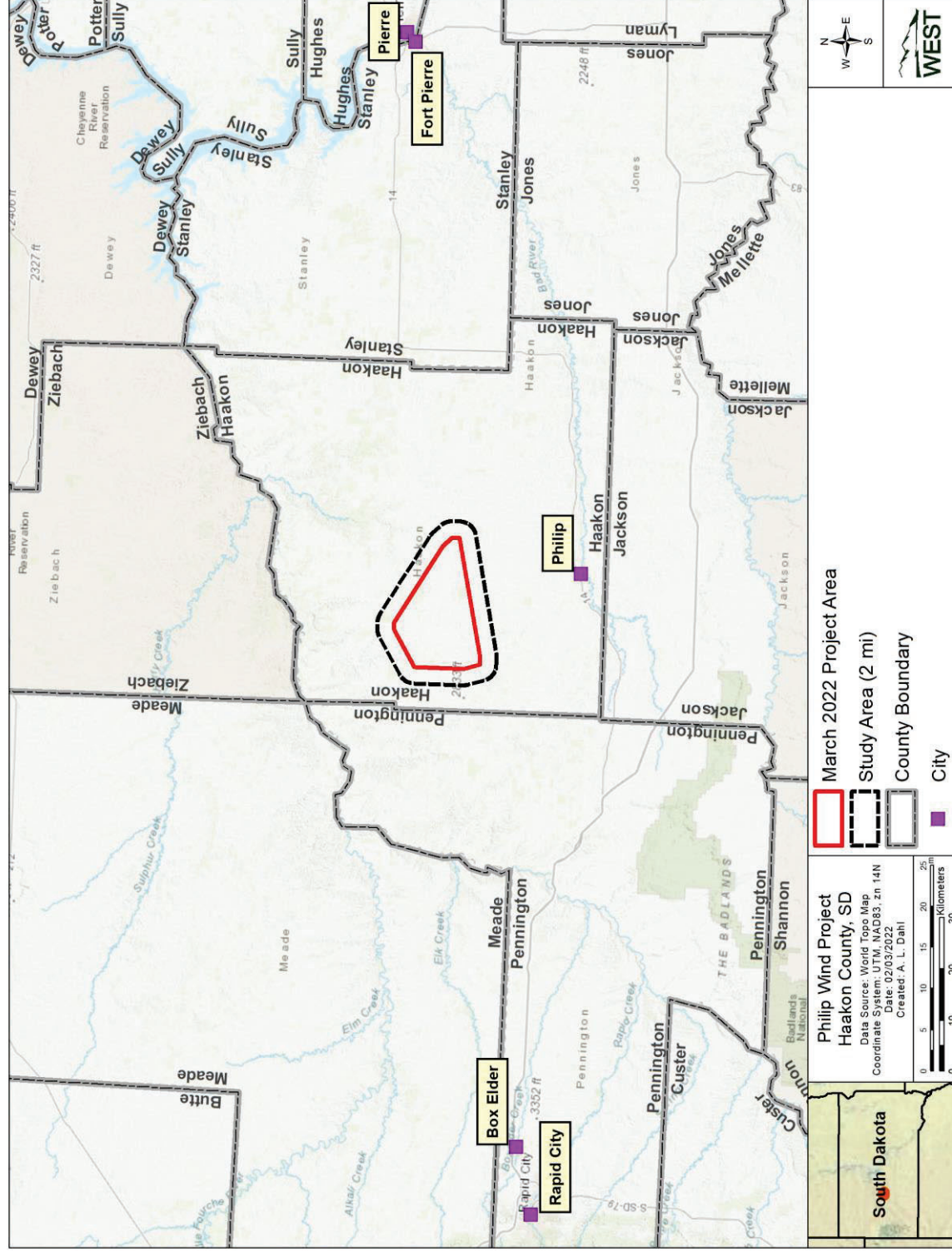


Figure 1.1. Location of the Philip Wind Project in Haakon County, South Dakota, 2022.

3 METHODS

WEST defines raptors as medium- to large-sized birds of prey and includes the following types: accipiters, buteos, eagles, falcons, kites, northern harriers (*Circus hudsonius*), osprey (*Pandion haliaetus*), and owls. In addition, one non-raptor species (great blue heron, *Ardea herodias*) was included in the study.

The Protocol recommends conducting aerial nest surveys to check the status of known eagle nests and to search for new eagle nests and ground-based surveys to check occupancy or productivity of known eagle nests (USFWS 2021).

3.1 Aerial Surveys

The aerial survey methods were used to locate nests within the Project and Study areas as aerial surveys allowed for a thorough visual inspection of potentially suitable nesting habitats. Pre-flight planning included a desktop review of aerial imagery, and national land cover data, and topographic data to develop a survey route, and to identify potential eagle and other raptor nesting habitats within the Project and Study areas. Potential nesting habitats for eagles and other raptors included riparian corridors, woodlands, large trees, and anthropogenic structures such as power poles. In addition, WEST used previous survey efforts (Tetra Tech 2018) to inform methods, including one historic bald eagle nest documented within the Project Area and one historic golden eagle nest documented in the Study Area. WEST also submitted a request to South Dakota Game, Fish, and Parks (SDGFP) Natural Heritage Program, but no data was available from SDGFP for the Project and Study areas (C. Heimerl, SDGFP, pers. comm., October 21, 2022).

Two experienced WEST biologists conducted Survey 2, the first round of a double observer (i.e., a primary and a secondary observer) aerial raptor nest survey from a Robinson R-44 Raven II helicopter with bubble windows that provided good visibility (Pagel et al. 2010, USFWS 2013). The survey was conducted early in the season prior to deciduous tree leaf-out to ensure easier detection of nests and before fledging of nestlings. Conducting the survey early in the season also ensured the search effort coincided with the period when eagles were likely incubating eggs or tending young, and was based on chronology for nesting eagles in the region (Pagel et al. 2010). The survey period also was scheduled when some of the other local raptor species were likely nesting (e.g., buteos, northern harriers, owls); however, late-nesting species may not yet have been present.

One experienced WEST biologist conducted a second aerial survey (Survey 4) to confirm nest status and to check each nest observed during the first round. Survey 4 also was used to record information on raptors that initiate nesting later in the breeding season. The same methods used during Survey 2 were repeated during Survey 4.

In general, the helicopter was flown at approximately 150–200 ft above ground level at an air speed of approximately 60–70 mi per hour surveying all potential habitat by flying meandering

transects spaced approximately 0.5 mi apart. During the survey, the pilot positioned the helicopter to allow the biologist a thorough visual inspection of giant and large stick nest structures located in suitable nesting habitat. The survey team took great care to minimize disturbance to breeding eagles and raptors. When nests were located, the pilot reduced speed and adjusted the flight track such that one of the biologists could clearly see the nest to document the nest accurately. The pilot approached the nest slowly from the raptor's field of view and maintained the greatest possible distance (no closer than 150 m) at which the nest status could be documented. The airspace was occupied for the minimum possible duration, no longer than 15–30 seconds (Pagel et al. 2010, USFWS 2013). The survey flight path was recorded using a hand-held Global Positioning System (GPS)-enabled tablet running GAIA GPS software (GAIA GPS, Version: v2022.9) to ensure the Project and Study areas were covered adequately.

To determine the status of a nest, the biologists evaluated behavior of adults on or near the nest, and the presence of eggs, young, whitewash, or fresh building materials. Species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

3.2 Ground-based Surveys

Ground-based surveys (Surveys 1,3,5,6) were used to check the status of known eagle nest locations for occupancy (surveys 1 and 3) or productivity (surveys 5 and 6) of any new eagle nest locations observed during aerial surveys. One experienced biologist conducted the raptor nest ground surveys. The biologist focused on locating giant and large stick nest structures in suitable nesting habitats within the Project and Study areas by driving along all public roads allowing for a thorough visual inspection of the habitat, and in particular, to provide views of trees from several different angles. When the biologist observed a nest or suitable habitat, they scanned the area or nest with binoculars and recorded data. The biologist took great care to minimize disturbance to breeding eagles and other raptors. The ground survey was conducted during the hours after sunrise and before sunset.

To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, and the presence of eggs, young, whitewash, or fresh building materials. Species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible. If an inactive nest consistent in size and structure with an eagle nest was observed, the biologist monitored the nest for four hours per survey, or until occupancy was confirmed.

3.3 Survey Protocol

The survey protocol and schedule followed the Protocol (USFWS 2021).

- **Survey 1:** Ground-based survey to check known eagle nest locations; January 1 – February 21.
- **Survey 2:** Aerial survey to check known eagle nest locations and to search for new eagle (and non-eagle raptor) nests; February 22 – March 21.

- **Survey 3:** Ground-based survey to check known eagle nest locations, including new eagle nests found during Survey 2; March 22 – April 21.
- **Survey 4:** Aerial survey to check known eagle nest locations, including new eagle nests found during Survey 2, and to search for new eagle (and non-eagle raptor) nests; April 22 – May 31.
- **Survey 5:** Ground-based survey to check known eagle nest locations, including those found during Surveys 2 and 4; each unoccupied eagle nest should be observed for at least four hours; June 1 – July 7.
- **Survey 6:** Ground-based survey to check all known eagle nest locations; each unoccupied eagle nest should be observed for at least four hours; July 8 – August 31.

3.4 Data Collection and Terminology

Each nest was assigned a unique nest identification (ID) number, location was recorded with a GPS, and attribute data including species, substrate, status, condition, location within the Project and Study areas, and relative nest size and nest characteristics were documented. Below are detailed descriptions of nest attributes and applicable definitions and terms. Representative photographs of nests were taken when possible and are presented in Appendix A.

Nest condition – Nest condition was categorized using descriptions ranging from poor to good, which provided a general sense of when a nest or nest site may have been last used.

- **poor:** a nest that appeared dilapidated (e.g., in disrepair, sloughing, or sagging heavily) and required major repair to be suitable for successful nesting.
- **fair:** a nest that was in generally good condition with a fairly well-defined bowl, minor sagging, and that may have required some repair in order to be used.
- **good:** a nest that was in excellent condition with a well-defined bowl, no sagging or sloughing, and that was considered suitable for nesting.
- **unknown:** nest condition is unknown

Nest Characteristics – Each nest was recorded according to two general categories: 1) giant and large stick nests (potentially suitable for eagle use) and 2) non-eagle size. Nest size and nest characteristics including structure, location relative to landscape features, and building materials can all be important in distinguishing eagle and potential eagle nests from nests of non-eagle raptors (e.g., buteos, northern harriers, owls).

Nest Size – Both eagle species build nests that can be from 50% to 200% larger than the nests of other raptors known to nest in the region (Buehler 2020, Katzner et al. 2020). Eagle nests may be used by great horned owls, osprey, and ferruginous hawks.

- **giant:** eagle nests
 - bald eagle nests are approximately 2.3–4.0 ft high and approximately 5.0–6.0 ft in diameter, and are located high in the tree canopy, which offers good flight access

(Buehler 2020). Bald eagles nest in large trees near water bodies containing sufficient foraging opportunities (Isaacs and Anthony 2011, Buehler 2020).

- golden eagle nests are 1.5–3.0 ft high and approximately 3.0–5.0 ft in diameter, and are comprised of a few large, several medium, and an abundant number of small sticks (Watson 2010). Golden eagles typically nest along cliffs, in large live trees, and on anthropogenic structures, such as nesting platforms that can bear the weight of the eagle's large stick nests (Katzner et al. 2020).
- large: nests approximately 24–36 inches in diameter could support eagles, but can also be used by species such as great horned owl (*Bubo virginianus*), osprey, and ferruginous hawk (*Buteo regalis*);
- medium: nests approximately 12–24 inches in diameter usually characteristic of Swainson's or red-tailed hawk;
- small: nests less than 12 inches in diameter usually characteristic of small falcons (e.g., American kestrel [*Falco sparverius*], peregrine falcon [*Falco peregrinus*]), and accipiters (northern goshawk [*Accipiter gentilis*] and cooper's hawk [*Accipiter cooperii*]).

Nest status – Nest status was categorized using definitions originally proposed by Postupalsky (1974) and these definitions follow those of the ECPG.

- occupied: nests were classified as occupied if any of the following were observed at the nest structure: 1) an adult in an incubating position; 2) eggs; 3) nestlings or fledglings; 4) presence of an adult (sometimes sub-adults); 5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on the nest rim or underneath.
 - occupied active: nest had eggs, nestlings, and/or an adult in incubating/brooding position at the time of the survey;
 - occupied inactive: nest had evidence of recent tending of the nest or presence by an adult, but there were no eggs, nestlings, or adult in incubating/brooding position;
- inactive: nest with no evidence of nest tending and no eggs, nestlings, or adults present during the first survey;
- unoccupied: a nest classified as inactive for at least two consecutive rounds of surveys;
- missing: the nest was completely missing or could not be found;
- unknown: the nest may or may not have been present; status could not be determined.

Nest substrate – Nest substrate included anthropogenic structures (e.g., power line poles and nest platforms), cliffs and rock outcrops, and trees.

Raptor Nest – Raptor nests were defined as structures made or the place used by raptors, for laying their eggs and sheltering their young (Steenhof and Newton 2007).

3.5 Data Management

3.5.1 Quality Assurance and Quality Control

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the survey, including in the field, during data entry and analysis, and report writing. All WEST field staff were trained in proper survey techniques and all data collected were recorded in a tablet, electronically, and/or on paper. Data were reviewed before the data were submitted for data entry and after data were entered. If errors or anomalies were found, follow-up measures were implemented including discussions and review of field data with biologists and/or Project managers.

4 RESULTS

Two aerial surveys (Survey 2: February 24 and March 19, 2022; Survey 4: April 19, 2022) and three ground-based surveys (Survey 1: January 13, 2022; Survey 3: April 8, 2022; Survey 5: June 15, 2022) occurred during the recommended Protocol survey period. Ground-based Survey 6 did not occur because no activity, including no visual identification of adults in the area or confirmation of young in the nest, was documented within 4 hours during Survey 5 (Figure 4.1). No federally or state threatened or endangered species were observed during surveys.

4.1 Nest Status

4.1.1 Eagles

One historic bald eagle nest (BAEA-1) in the Project Area and one historic golden eagle nest (GOEA-1) in the Study Area identified during previous surveys (Tetra Tech 2018) were located during the surveys. Both nests were occupied active in 2022 (Table 4.2, Figure 4.2; Appendix A). GOEA-1 was active and occupied, first by a ferruginous hawk (*Buteo regalis*; Survey 2) then later in the season (Surveys 3 and 4) was occupied (not active) by a golden eagle.

4.1.2 Non-eagle Raptors

Six non-eagle raptor nests were documented within the Project and Study areas (Figure 4.2). All three active red-tailed hawk (*B. jamaicensis*) nests (RN-01, RN-05, and RN-06) were within Study Area, whereas all three inactive unidentified raptor nests (RN-02, RN-03, and RN-04) were within the Project Area.

4.1.3 Non-raptors

Two active great blue heron (*Ardea herodias*) rookeries were documented within the Study Area. Two of the three red-tailed hawk nests (RN-01 and RN-05) were located within these rookeries (Table 4.2; Figure 4.2).

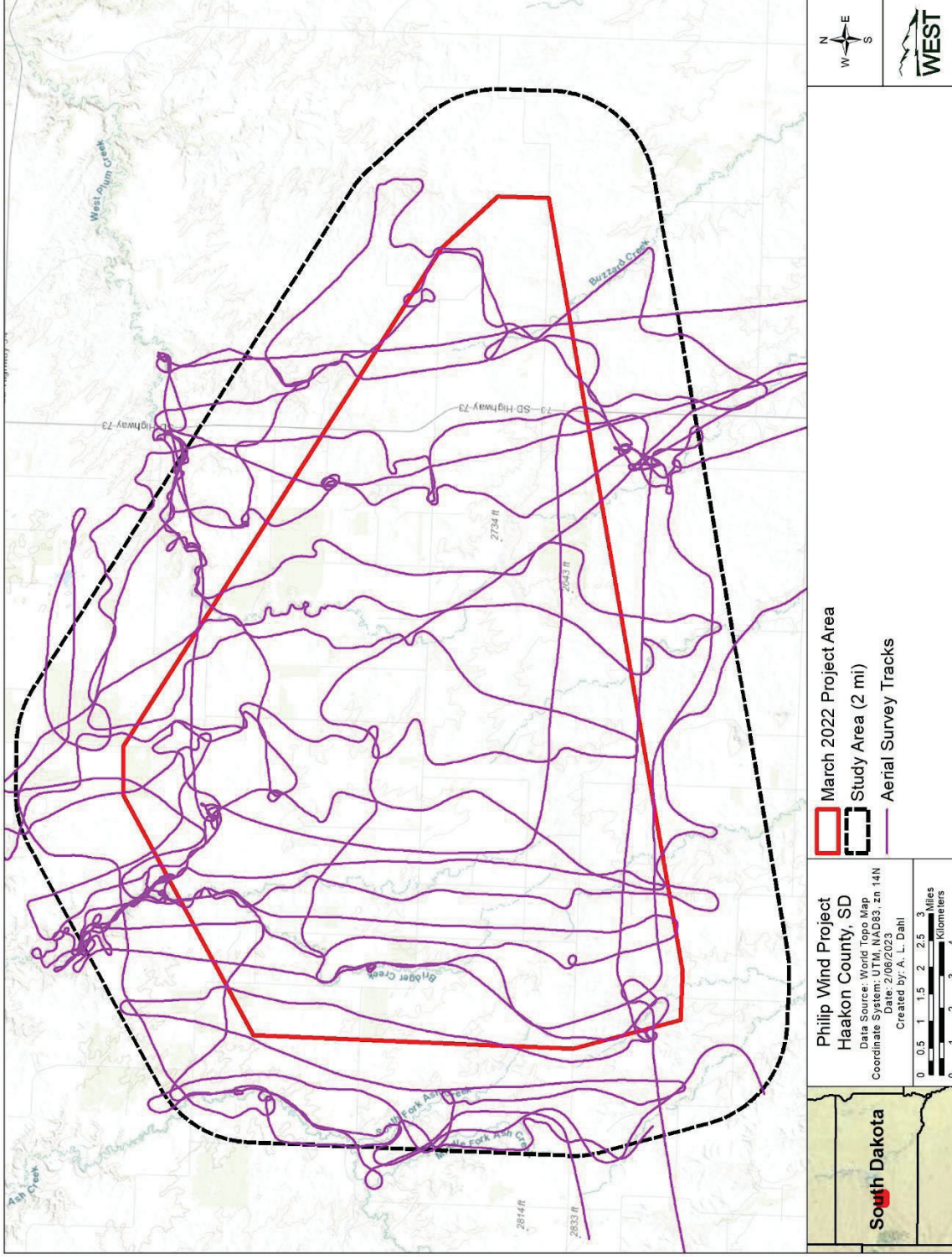


Figure 4.1. Aerial survey flight paths at the Philip Wind Project in Haakon County, South Dakota, from January 13 – June 15, 2022.

Table 4.2. Nests identified during the raptor nest surveys conducted within the Project and Study areas of the Philip Wind Project, Haakon County, South Dakota, from January 13 – June 15, 2022.

Nest ID	Species	Nest Status	Nest Size	Nest Condition	Nest Substrate	Location	Comments
BAEA-1	Bald Eagle	Occupied/Active	Giant	Good	Deciduous Tree	Project Area	One egg and 2 nestlings observed during Survey 4; no activity at the nest during Survey 5
GOEA-1	Ferruginous Hawk/ Golden Eagle	Occupied/Active	Giant	Good	Deciduous Tree	Study Area	Occupied active by Ferruginous hawk during Survey 2 then one golden eagle tending the nest on Survey 3; no eggs or nestlings observed during Survey 4; no activity at the nest during Survey 5
RN-01	Red-tailed Hawk	Occupied/Active	Medium	Good	Deciduous Tree	Study Area	Nest within a Great blue heron rookery
RN-02	Unidentified raptor	Inactive	Small	Good	Deciduous Tree	Project Area	–
RN-03	Unidentified raptor	Inactive	Small	Fair	Deciduous Tree	Project Area	–
RN-04	Unidentified raptor	Inactive	Medium	Fair	Deciduous Tree	Project Area	–
RN-05	Red-tailed Hawk	Occupied/Active	Medium	Good	Deciduous Tree	Study Area	Nest within a Great blue heron rookery
RN-06	Red-tailed Hawk	Occupied/Active	Medium	Good	Deciduous Tree	Study Area	

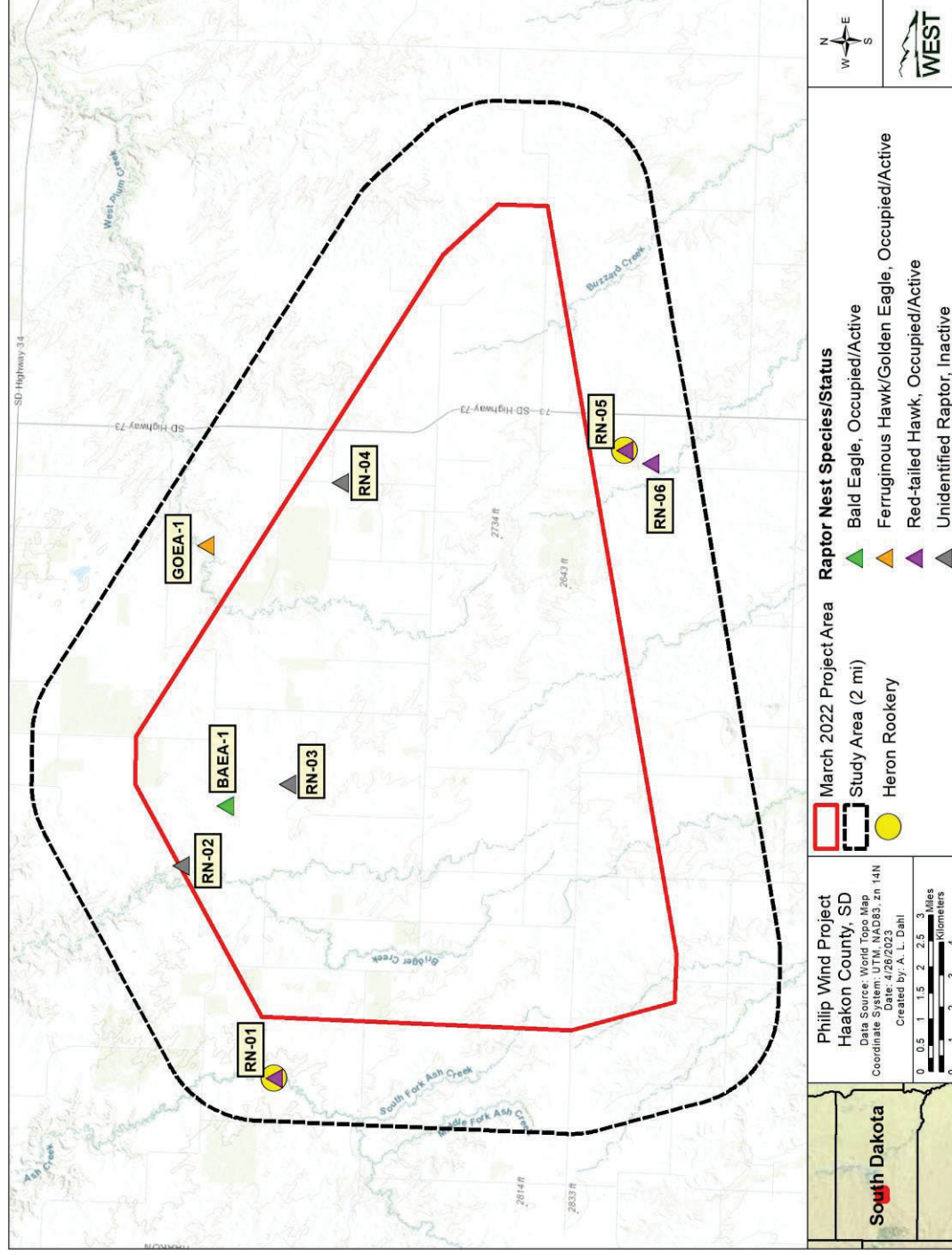


Figure 4.2. Location of raptor nests within the Project and Study areas at the Philip Wind Project in Haakon County, South Dakota, from January 13 – June 15, 2022.

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**Appendix A. Photographs of Eagle Nests Documented during the Raptor Nest Surveys
Conducted within the Project and Study Areas, Philip Wind Project, Haakon County,
South Dakota, from January 13 – June 15, 2022**



Appendix A1. Nest ID BAEA-1. Bald eagle in occupied active nest.



Appendix A2. Nest ID GOEA-1. Golden eagle in occupied active nest.