APPLICATION FOR A CERTIFICATE OF SITE COMPATIBILITY

SUBMITTED TO:

NORTH DAKOTA PUBLIC SERVICE COMMISSION

SUBMITTED BY:

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BOWMAN COUNTY, NORTH DAKOTA

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Exhibit 1 - Certificate of Site Compatibility Application - redacted
Bowman Wind, LLC

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ACRONYM LIST

AADT	Annual Average Daily Traffic
ABNP	Aransas-Wood Buffalo National Park
ADLS	Aircraft Detection Lighting System
AM/FM	amplitude modulation/frequency modulation
ANSI	American National Standards Institute
AOI	area of interest
APE	area of potential effect
Application	Certificate of Site Compatibility Application
AWWI	American Wind Wildlife Institute
BBCS	Bird and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BCR	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BOP	Balance-of-Plant
Bowman Wind	Bowman Wind, LLC
CFR	Code of Federal Regulation
Certificate	Certificate of Site Compatibility
C&I	commercial and industrial
Commission	North Dakota Public Service Commission
CRP	Conservation Reserve Program
dB(A)	decibels using the A-weighted scale
DOE	U.S. Department of Energy
ECPG	Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2
EEI	Eagle Environmental, Inc.
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FRS	Facility Registry Service
FSA	Farm Service Agency
GIS	geographic information system
GW	gigawatt

IARC	International Agency for Research on Cancer
ICBM	intercontinental ballistic missile
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPaC	Information for Planning and Consultation
LUST	leaking underground storage tank
MBTA	Migratory Bird Treaty Act
met	meteorological
MISO	Midcontinent Independent System Operator
MW	megawatt
MWh	megawatt hour
MWh/y	megawatt hours per year
NA	not applicable
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDDEQ	North Dakota Department of Environmental Quality
NDDOT	North Dakota Department of Transportation
NDGF	North Dakota Game and Fish
NDPR	North Dakota Parks and Recreation
NDSWC	North Dakota State Water Commission
NDTL	North Dakota Department of Trust Lands
NEC	National Electric Code
NESC	National Electric Safety Code
NIEHS	National Institute of Environmental Health Sciences
NLCD	National Land Cover Database
NLEB	northern long-eared bat
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O&M	operations and maintenance
OSE	Office of the State Engineer
Phase I ESA	Phase I Environmental Site Assessment
PLOTS	Private Lands Open to Sportsmen
PPA	Power Purchase Agreement
Project	Bowman Wind Farm
Project Area	The 42,144-acre area identified in Figure 1 of this Application.
PW ND1	Prairie Winds ND1 wind facility
QCRS	Quality Cultural Resource Services, Inc.

RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
RUA	Road Use Agreement
SCADA	Supervisory Control and Data Acquisition
SCP	Species of Conservation Priority
SHPO	State Historic Preservation Office
SHSND	State Historical Society of North Dakota
SPCC	Spill Prevention, Control, and Countermeasures
SODAR	Sonic Detection and Ranging
SPP	Southwest Power Pool
SSI	Swedish Radiation Protection Authority
SSM	Swedish Radiation Safety Authority
SSURGO	Soil Survey Geographic Database
Study Area	The 104,000-acre area that includes the Project Area, as shown in Figure 1 of this Application.
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
TWh	terawatt hour
UDP	Unanticipated Discoveries Plan
USC	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
WDNR	Wisconsin Department of Natural Resources
WEG	Wind Energy Guidelines
WHO	World Health Organization
WMA	Wildlife Management Area

1.0 INTRODUCTION

Bowman Wind, LLC (Bowman Wind) is submitting this application (Application) for a Certificate of Site Compatibility (Certificate) to the North Dakota Public Service Commission (Commission) for the proposed Bowman Wind Project (Project) in Bowman County, North Dakota.

The Project will encompass an approximately 42,144-acre project area (Project Area) located approximately 3.5 miles west of the City of Bowman, North Dakota. An over 104,000-acre study area (Study Area), which includes the Project Area, was analyzed for the environmental review to best position the Project Area to avoid or minimize impacts. The Project nameplate capacity will be up to 208.7 megawatts (MWs), with up to 200.1 MWs of electricity delivered to the grid, and will result in the construction of up to 74 wind turbines. Additional Project facilities include access roads, electrical collection and communication systems and cabling, an operation and maintenance (O&M) facility, two permanent meteorological (met) towers, a Project substation, and battery storage facility (see Figure 1, Project Location Map).

Bowman Wind is in the process of identifying an off-taker for the Project's output. Potential off-takers include utilities and commercial & industrial customers seeking physical or virtual power purchase agreements (PPA). Alternatively, the Project may run "merchant," selling its power directly into the Southwest Power Pool (SPP) market, or the Project may be sold to a utility who would use the power to directly supply its customer base.

Bowman Wind, LLC, is a wholly owned subsidiary of Apex Clean Energy Holdings, LLC (Apex). Apex is an independent renewable energy company based in Charlottesville, Virginia. Since its founding in 2009, Apex has evolved into one of the fastest-growing companies in the industry. Nearly 20 Apex-originated wind and solar facilities are now operating around the country, totaling 4.7 gigawatts (GWs). Operating assets under management have grown to 2.2 GW. Apex has signed contracts for the sale of 28 projects totaling 6.4 GW of capacity, and its development portfolio of approximately 20 GW of wind, solar, and storage projects is one of the largest in the United States. Apex's mission-driven team of more than 250 renewable energy experts uses a data-focused approach to create solutions for the world's most innovative and forward-thinking customers.

1.1 Compliance with the Energy Conversion and Transmission Facility Siting Act, North Dakota Century Code Chapter 49-22

The North Dakota Energy Conversion and Transmission Facility Siting Act, North Dakota Century Code (NDCC) Chapter 49-22 (Siting Act) requires the proponent of a wind energy conversion facility exceeding 0.5 MW to obtain a Certificate from the Commission in order to locate, construct, and operate the facility in the state of North Dakota. An application for a Certificate must meet certain criteria set forth in the Siting Act, as well as in North Dakota Administrative Code (NDAC) Article 69-06-08 (Siting Rules). The siting of an energy conversion facility is to be made in an orderly manner compatible with environmental preservation and the efficient use of resources (NDCC Section 49-22-02).

In this Application, Bowman Wind presents the information required by the Siting Act and the Commission's Siting Rules. Bowman Wind has considered the exclusion and avoidance areas, the selection criteria, and the policy criteria in the design of the Project, in accordance with NDCC Chapter 49-22 and NDAC Chapter 69-06-08. Information regarding Project design, wind resources, and technical information has been included in this Application to allow a thorough understanding of the Project and to aid in review by the Commission, regulatory agencies, and the public. Table 1.1-1 provides a summary of information included in this Application and the section of the document in which each siting requirement is addressed.

Table 1.1-1
Certificate Completion Checklist

State Authority	Description	Section
Chapter 69-06-04-01 Certificate of Site Compatibility		
Section 2: Contents		
a. (1)	A description of the type of energy conversion facility proposed.	1.0, 4.1
a. (2)	A description of the gross design capacity.	1.2
a. (3)	A description of the net design capacity.	1.2.5
a. (4)	A description of the estimated thermal efficiency of the energy conversion process and the assumptions upon which the estimate is based.	N/A
a. (5)	A description of the number of acres that the proposed facility will occupy.	1.0, 1.2.2
a. (6) a	A description of the anticipated time schedule for obtaining the certificate of site compatibility.	1.3
a. (6) b	A description of the anticipated time schedule for completing land acquisition.	1.3
a. (6) c	A description of the anticipated time schedule for starting construction.	1.3
a. (6) d	A description of the anticipated time schedule for completing construction.	1.3
a. (6) e	A description of the anticipated time schedule for testing operations.	1.3
a. (6) f	A description of the anticipated time schedule for commencing commercial production.	1.3

Table 1.1-1
Certificate Completion Checklist

State Authority	Description	Section
a. (6) g	A description of the anticipated time schedule for beginning any expansions or additions.	1.4
b.	Copies of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state, or local agency.	Summarized in Appendix I (Bird and Bat Conservation Strategy)
c.	An analysis of the need for the proposed facility based on present and projected demand for the product or products to be produced by the proposed facility, including the most recent system studies supporting the analysis of the need.	2.1
d.	A description of any feasible alternative methods of serving the need.	2.2
e.	A study area that includes the proposed facility site, of sufficient size to enable the Commission to evaluate the factors addressed in North Dakota Century Code section 49-22-09.	1.0, 6.0-6.17, 8.0-8.10
f.	A discussion of the utility's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives.	Appendix A
g.	A map identifying the criteria that provides the basis for the specific location of the proposed facility within the study area.	Figure 2
h.	A discussion of the criteria evaluated within the study area, including exclusion areas, avoidance areas, selection criteria, policy criteria, design and construction limitations, and economic considerations.	3.0-3.6
i.	A discussion of the mitigative measures that the applicant will take to minimize adverse impacts which results from the location, construction, and operation of the proposed facility.	6.1.2, 6.2.2, 6.3.2, 6.4.2, 6.5.2, 6.6.2, 6.7.2, 6.8.2, 6.9.2, 6.10.2, 6.11.2, 6.12.2, 6.13.2, 6.14.2, 6.15.2, 6.16.2, 6.17
j.	The qualifications of each person involved in the facility site location study.	10.0
k.	A map of the study area showing the location of the proposed facility and the criteria evaluated.	Figure 5
l.	An 8 ½-inch by 11-inch black and white map suitable for newspaper publication depicting the site area.	Figure 13
m.	A discussion of present and future natural resource development in the area.	6.2, 6.8, 6.10-6.16
n.	Map and GIS requirements. The applicant shall provide information that is complete, current, presented clearly and concisely, and supported by appropriate references to technical and other written material available to the Commission.	Figures 1-12, CD submittal

Table 1.1-1 Certificate Completion Checklist		
State Authority	**Description**	**Section**
NDCC Section 49-22-08 Description of Application Requirements		
Section 1: An application for a certificate shall be in such form as the commission may prescribe, containing the following information:		
a.	A description of the size and type of facility.	1.0, 4.0
b.	A summary of any studies which have been made of the environmental impact of the facility.	1.2.3, 1.2.4, 6.0-6.17
c.	A statement explaining the need for the facility.	2.1
d.	An identification of the location of the preferred site for any energy conversion facility.	1.2, Figure 1
e.	An identification of the location of the preferred corridor for any transmission facility.	N/A
f.	A description of the merits and detriments of any location identified and a comprehensive analysis with supporting data showing the reasons why the preferred location is best suited for the facility.	1.1, 1.2, 2.0-3.6, 6.0-6.17, 8.0-8.10
g.	A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility.	6.1.2, 6.2.2, 6.3.2, 6.4.2, 6.5.2, 6.6.2, 6.7.2, 6.8.2, 6.9.2, 6.10.2, 6.11.2, 6.12.2, 6.13.2, 6.14.2, 6.15.2, 6.16.2, 6.17
h.	An evaluation of the proposed site or corridor with regard to the applicable considerations set out in section 49-22-09 and the criteria established pursuant to section 49-22-05.1.	1.1, 3.0-3.6, 6.0-6.17, 8.0-8.10
i.	Such other information as the applicant may consider relevant or the commission may require.	Complete Application including Appendices and Figures
NDCC 49-22-09(1) Factors to be considered in evaluating applications and the designation of sites, corridors, and routes.		
a.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	6.0-6.17, 8.1
b.	The effects of new energy conversion and transmission technologies and systems designed to minimize adverse environmental effects.	8.2
c.	The potential for beneficial uses of waste energy from a proposed energy conversion facility.	8.3
d.	Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.	8.4

Table 1.1-1
Certificate Completion Checklist

State Authority	Description	Section
e.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.	8.5
f.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	8.6
g.	The direct and indirect economic impacts of the proposed facility.	8.7
h.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	6.2, 6.9, 8.8
i.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	3.1, 3.2, 6.6, 6.7, 8.9
j.	The effect of the proposed site or route on areas which are unique because of biological wealth or because they are habitats for rare and endangered species.	6.16, 8.10
k.	Problems raised by federal agencies, other state agencies, and local entities.	9.0

1.2 Project Summary

The Project will be located in central Bowman County in southwestern North Dakota (see Figure 1, Project Location Map). The planned nameplate capacity for the Project is up to 208.7 MW of wind energy capacity. Bowman Wind may use a GE-127 turbine with an output of 2.82 MW. The Project's permanent facilities will include:

- up to 74 wind turbines and related equipment,
- new gravel access roads and improvements to existing roads (as needed),
- underground electrical collection and communication lines, with above-ground junction boxes,
- two permanent met towers,
- Aircraft Detection Lighting System (ADLS) components,
- O&M facility,
- battery storage facility, and
- Project substation.

Bowman Wind plans to construct a 230 kilovolt (kV) Gen-Tie transmission line that will be less than a mile in length (up to 0.30 miles or 1,548 feet) to facilitate the Project's interconnection. The proposed transmission line would extend from the Project substation and interconnect to the existing Rhame substation located in Township 131N, Range 104W, Section 15. Pursuant to NDCC Section 49-22-03-6(b), the Project's transmission line is not defined as an "electric transmission facility" because it is less than one mile in length. As such, the proposed line falls outside of the Commission's siting jurisdiction and is not described further in this Application. The transmission line will be permitted though Bowman County and is shown on Figure 2, Facilities Layout for reference.

1.2.1 Study Area

The Study Area is comprised of portions of 168 sections (containing approximately 104,297 acres) of agricultural land and rangeland in central Bowman County, North Dakota, situated between the towns of Rhame and Bowman. Table 1.2-1 provides a list of the townships, sections, and ranges (all in Bowman County) that are included in the Study Area. Also see Figure 1, Project Location Map.

Table 1.2-1
Study Area Location

Township Name	Township	Range	Section(s)
Rhame	132N	104W	13, 24-25, 36
Marion	132N	103W	17-21, 25-36
Star	132N	102W	30-31
West Bowman Unorganized Territory	131N	105W	25, 36
Adelaide	131N	104W	1, 3-4, 9-36
Hart Unorganized Territory	131N	103W	1-36
Bowman	131N	102W	6-7, 18-19, 30-31
West Bowman Unorganized Territory	130N	105W	1, 12-13, 24
Nebo	130N	104W	1-30, 33-36
Amor	130N	103W	1-23, 25-30
Gem	130N	102W	6-7, 18

1.2.2 Project Area

The Project Area is comprised of portions of 96 sections (containing approximately 42,144 acres) of agricultural land and rangeland in central Bowman County, North Dakota, situated between the towns of Rhame and Bowman. Bowman Wind currently holds Wind Energy Lease and Easement agreements with approximately 70 landowner partners, which is sufficient acreage to construct the anticipated 200.1 MW Project (Table 1.2-2; Figure 1, Project Location Map).

Table 1.2-2
Project Area Location

Township Name	Township	Range	Section(s)
Rhame	132N	104W	24
Marion	132N	103W	19, 29-36
Adelaide	131N	104W	14-15, 20-29, 31-34
Hart Unorganized Territory	131N	103W	1-5, 7-8, 10-11, 14-16, 18-23, 25-26, 28-32, 34-36
Bowman	131N	102W	6
Nebo	130N	104W	1-4, 7-18, 20-24, 27
Amor	130N	103W	1-12, 16-22, 28

1.2.3 Project Layout

In this Application, Bowman Wind is providing a preliminary Project layout (see Figure 2, Facilities Layout). The Project layout includes 85 turbine locations, which provides for 11 alternate turbine

locations. Additionally, the preliminary locations for access roads and collection lines are included in the layout. The preliminary layout is designed to accommodate the GE-127 turbine or a larger turbine model. A more detailed description of the turbine model being considered for the Project is included in Section 4.1.1 of this Application.

Based on the analyses completed to date, Bowman Wind's turbine layout optimizes electrical generation and efficiency, while avoiding or minimizing environmental, cultural, and economic impacts. Bowman Wind has and will continue to thoroughly evaluate its preliminary turbine and ancillary facility locations. Further, Bowman Wind will continue to coordinate with landowners and applicable agencies regarding the Project's design and layout. The Project's turbines and ancillary facilities have been sited so as to comply with the Commission's and Bowman County's setback requirements.

Once the Project is constructed, Bowman Wind will file as-built surveys with the Commission and Bowman County.

1.2.4 Selection of Project Area

The renewable energy produced by Bowman Wind's proposed Project will be positioned to help meet the regional need for renewable energy, or national C&I customer demand. Bowman Wind selected the Project Area because of its extraordinary wind resource, nearby electrical infrastructure for interconnection to the grid, geographic diversification within our portfolio, and landowner support. Further, the Project is compatible with the existing land use and environmental features within the Project Area.

1.2.4.1 Project Development History

Bowman Wind initiated wildlife field studies in 2017 for a large area of interest (AOI). Over the following four years, Bowman Wind reshaped the Project Area as a result of studies and agency coordination, which are discussed below.

2017

Bowman Wind initiated wildlife studies in 2017 on a 120 square mile (approximately 77,000 acre Area of Interest) that generally stretched from US Highway 12 south 18 miles to the South Dakota border. Bowman Wind conducted the first year of avian use surveys and prairie grouse lek surveys, and prairie dog colony mapping within this AOI. In 2018, Bowman Wind expanded the Project Area to include the area between US Highway 12 and the Slope County border, an additional 40 square miles. The additional area was added based on North Dakota Game and Fish (NDGF) concerns about unbroken grassland and greater sage grouse leks near the South Dakota border. The additional area north of US Highway 12 contains more cultivated cropland.

2018

In 2018, Bowman Wind conducted wildlife studies on a 160 square mile (approximately 102,000 acre) Project Area. These included a second year of avian use surveys that included the additional area added, raptor nest surveys including eagles, prairie grouse lek surveys, desktop review of suitable northern long-eared bat summer habitat (summer and foraging), a desktop grassland assessment, and ground-based prairie dog colony mapping. To avoid prairie grouse leks near the South Dakota border and ridgeline topography near the Slope County border that is commonly

used by raptors and eagles, Bowman Wind reduced the Project Area to 99 square miles (63,000 acres).

2019

In 2019, Bowman Wind continued wildlife-specific studies including concluding the second year of avian use surveys, raptor and eagle nests surveys, prairie grouse lek surveys, prairie dog colony mapping, and northern long-eared bat habitat assessment.

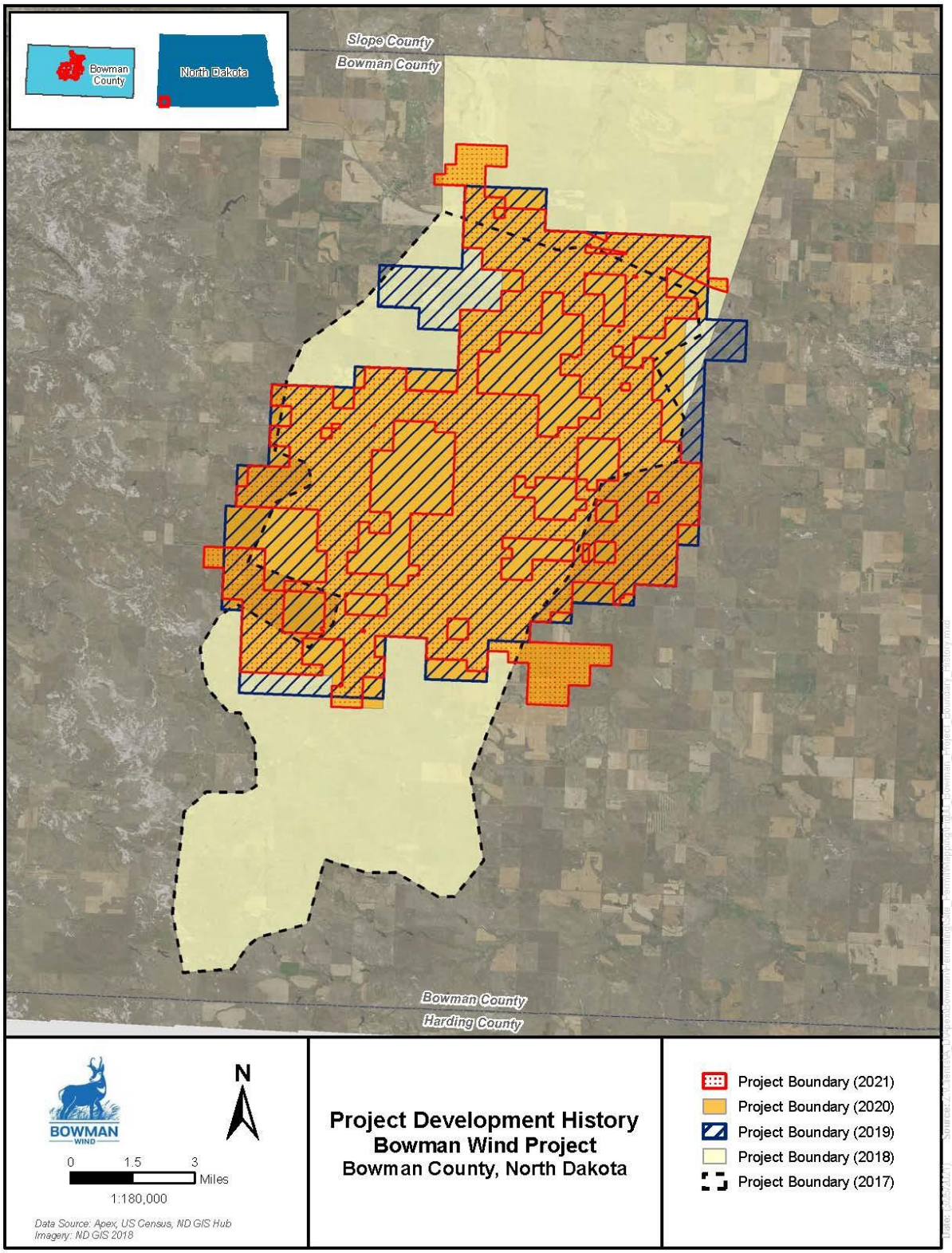
2020

Bowman Wind refined the Project Area in 2020 to create distance from the City of Bowman and its extraterritorial area (one-mile buffer of city limits) and add potential parcels on the periphery of the Project that have been previously disturbed (i.e., not unbroken grassland). In 2020, Bowman Wind completed a grassland assessment and bat acoustic monitoring. Within the Project Area, the layout was iteratively refined to avoid and minimize impacts to wetlands, woodlands, prairie dog colonies, prairie grouse leks, unbroken grasslands, and cultural resources. Several supporting studies were completed with the 2020 Project Area while land acquisition was ongoing; these include sound, shadow flicker, telecommunications, cultural resources, and the Bird and Bat Conservation Strategy (BBCS).

2021

Prior to filing this Application, Bowman Wind further refined the Project Area to include participating and pending participating parcels and exclude non-participating parcels. This boundary is the Project Area used for analyses in this Application, unless otherwise noted.

Image 1.2-1 Bowman Wind Project Development History



1.2.5 Project Area Wind Characteristics

The U.S. Department of Energy (DOE) and the North Dakota Division of Community Services have conducted wind resource assessment studies in North Dakota. According to the DOE, annual average wind speeds of 6.5 meters per second (m/s) and above are suitable for wind power projects. The October 2010 DOE wind map for the state of North Dakota indicates that the wind resources within the Project Area average 8.5 to 9.0 m/s at a height of 80 meters above the ground (DOE, 2010).

Six temporary met towers are currently located on-site, and compilation and assessment of wind resource data has been ongoing since September 2016 (when the first two met towers were installed). The met towers have collected data showing that long-term annual wind speeds are at the upper end of the average range for North Dakota, indicating that the Project Area is an excellent resource for electrical generation. All of the temporary met towers will be removed during construction of the Project, or within a year following commercial operation of the Project.

To augment data collection from the existing temporary and proposed permanent met towers, the Project deployed a temporary trailer-mounted Sound Detection and Ranging (SODAR) unit. SODAR measures wind speed and direction by emitting faint acoustic chirps and measuring the frequency shift of the reflected sound wave SODARs provide data up to and beyond hub height of the proposed turbines and help to supplement wind data collected from more traditional measurement towers.

As discussed further in Section 4.1.2 of this Application, Bowman Wind will install two permanent met towers as part of the Project. The final locations of these permanent met towers will be selected with input from the turbine manufacturer and will meet applicable setback requirements.

1.2.6 Projected Output

The Project will have a nameplate capacity of up to 208.7 MW, with up to 200.1 MW delivered to the grid per the Project's interconnection request. Installing up to 208.7 MW will enable the Project to account for and overcome losses that are associated with turbine availability, turbine performance, and electrical losses within the collection system that may otherwise reduce the output below the authorized interconnection threshold. The Project has a projected average output ranging from 800,000 to 1,000,000 MW hours per year (MWh/y). Variations in the actual Project output will depend upon final wind turbine selection and any additional changes to the final design and layout of the facility. As a point of reference, this amount of electrical output is enough to power approximately 75,000 average American homes.

1.3 Project Schedule

Bowman Wind anticipates that civil construction (i.e., roads, gravel pads and potentially aggregate stockpiling) could begin as early as the Second Quarter of 2022, provided that applicable construction permits and approvals have been obtained. The proposed Project schedule is as follows:

- **Land Acquisition:** With the exception of land owned by landowners who have pending participation (i.e., those landowners for which administrative documents are in-process to participate in the Project), all land that is proposed to house Project facilities is subject to agreements allowing for construction of the Project. Prior to seeking an Alternate Energy Construction Permit (aka building permits) from Bowman County, Bowman Wind will have secured a Wind Energy Lease and Easement agreement from all landowners with Project facilities.
- **Certificate of Site Compatibility:** Bowman Wind anticipates the Certificate will be issued by the Commission in Fourth Quarter 2021.
- **Wind Energy Facility Siting Permit:** Bowman Wind will file an application for a Wind Energy Facility Siting Permit with Bowman County in April 2021. Bowman Wind anticipates the County will issue a Wind Energy Facility Siting Permit in July 2021.
- **Other Permits:** Bowman Wind will acquire all other permits necessary for construction of the Project prior to conducting the work for which the permit is required (see Section 7.0).
- **Construction:** Project construction is anticipated to begin as early as Second Quarter 2022 and be completed by the end of 2022.
- **Commissioning:** Upon completion of the construction phase, the Project will undergo detailed inspection and testing procedures before being commissioned. Inspection and testing will occur for each individual component of the wind turbines, as well as the associated communication, meteorological, collection, and Supervisory Control and Data Acquisition (SCADA) system.
- **Commercial Operations:** Bowman Wind anticipates full commercial operation to occur by the end of 2022.

1.4 Expansion or Addition

No additions or expansions have been identified at this time. However, should the opportunity arise for expansion or addition to the proposed Project, Bowman Wind may develop additional adjacent areas. Bowman Wind would obtain all necessary permits and approvals for any expansion project.

1.5 Project Ownership

The Project will be developed, constructed, owned, and operated by Bowman Wind.

1.6 Project Cost

The estimated total cost to construct the Project is approximately $420 million.

2.0 NEED FOR FACILITY

2.1 Need Analysis

Bowman Wind is in the process of identifying an off-taker for the Project's output. As an independent power producer, Bowman Wind is able to bid into a variety of markets and contractual structures. Bowman Wind is actively marketing the Project to a number of potential off-takers who would enter into 10 to 20 year physical or virtual power purchase agreements (PPA). Another option is for the Project to run "merchant," selling its power directly into the SPP market and earning the spot Locational Marginal Price (LMP). Alternatively, the Project may be sold to a utility who would use the power to directly supply its customer base.

Utilities and other customers seeking to diversify and build their energy generation portfolios are attracted to wind energy projects because of their ability to offer long-term contracts at a fixed and competitive price, while providing the associated environmental benefits to meet existing and future renewable energy procurement and sustainability goals and mandates. In North Dakota, excellent wind resources create high capacity factor generation, reducing the cost/megawatt hour (MWh). In general, alternative energy sources provide lower costs per MWh than conventional sources.[1]

In addition to traditional utility demand for renewable energy, a growing number of corporations are turning to renewable energy to save money on energy and meet their sustainability goals.[2] Commercial and industrial (C&I) customers either purchase renewable energy directly or obtain renewable benefits and cost savings through financially settled contracts, sometimes called virtual PPAs.[3] Also, many utilities are creating "green tariffs," which allow customers to purchase up to 100 percent renewable energy from the utility.[4] Corporations such as Apple, Google and Facebook, along with many others, have recently set goals to obtain 100 percent of their energy from renewables.[5]

These clean energy goals fuel the demand for corporate renewables procurement and subsequent PPAs. Corporate contracts accounted for 22 percent of 2018 PPAs for renewables in the United States.[6] Over 6.53 GW of renewable energy was purchased by non-utilities in 2018.[7]

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[1] Lazard, Lazard's Levelized Cost of Energy Analysis – Version 13.0 (November 2019), at 2. Available online at https://www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-130-vf.pdf. Accessed February 17, 2021.

[2] Renewable Energy Buyers Alliance. REBA Deal Tracker – Large Energy Buyers Accelerate Renewable Energy Deals. Available online at https://rebuyers.org/deal-tracker/. Accessed March 16, 2021.

[3] Rocky Mountain Institute. 2019. Introduction to the virtual Power Purchase Agreement, Available online at https://rmi.org/insight/virtual-power-purchase-agreement/. Accessed March 16, 2021.

[4] U.S. Environmental Protection Agency – Green Power Partnership. Utility Green Tariffs, What are Utility Green Tariffs? Available online at https://www.epa.gov/greenpower/utility-green-tariffs. Accessed March 16, 2021.

[5] RE100 Members. Available online at https://www.there100.org/re100-members. Accessed March 16, 2021.

[6] Emma Foehringer Merchant, Corporate Renewables Procurement Accounted for Nearly a Quarter of All Deals in 2018 (Feb. 5, 2019). Available online at https://www.greentechmedia.com/articles/read/corporate-renewables-procurements-quarter-ppa-2018. Accessed February 2021.

[7] Advanced Energy Economy, Corporate Renewable Deals 2014-2018. Available online at https://businessrenewables.org/corporate-transactions/. Accessed February 2021.

That compares to 2.78 GW procured by non-utilities in 2017 and approximately 1.73 GW in 2016. Corporate PPA volumes in in the United States have increased each of the past five years, highlighting the broader trend of increased demand for renewables across the United States.[8] According to Wood Mackenzie's report titled an "*Analysis of Commercial and Industrial Wind Energy Demand in the United States*," the United States is "at the beginning stage of a corporate renewables procurement boom," with approximately "85 gigawatts of renewable energy demand" from the "largest U.S. companies" alone through 2030.[9] These growth trends are expected to continue well into the future.[10] Further, the buyers are not just large corporations; smaller companies are entering into aggregated purchasing models and further driving additional market expansion.[11]

2.2 Alternatives

Wind energy is currently among the most cost-effective generation resources. As demonstrated in Lazard's November 2019 Levelized Cost of Energy Analysis (Version 13.0), wind energy, which became cost-competitive with conventional generation sources several years ago, is approaching costs that are at or below the marginal cost of certain conventional generation technologies.

Due to wind energy's cost effectiveness and the Project's purpose of providing additional renewable energy, non-renewable alternatives were not considered. Additionally, based on the size, type, and timing of the Project, it is unlikely that an alternative source of renewable energy would be feasible. As discussed in Section 1.2.4 above, the Project's location is optimal for wind generation. A 200 MW ground-based solar energy project would require partnership with landowners willing to have a large, contiguous block of land removed from production for the life of the project. Further, as discussed in Section 1.2.1 above, Bowman Wind has already leased sufficient acreage to construct an over 200 MW wind project and is in the process of obtaining permits required to commence construction. With respect to hydropower and biomass, the necessary hydrological profile for a 200 MW hydropower project is not available in the Project Area, and there is not a steady, sustainable fuel source for a 200 MW biomass plant in the area.

2.3 Ten-Year Plan

In accordance with NDCC Section 49-22-04 and NDAC Chapter 69-06-02, Bowman Wind submitted a Ten-Year Plan for years 2020-2030 on July 1, 2020, included in Appendix B. Bowman Wind's Ten-Year Plan is consistent with this Application for a Certificate.

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[8] Wood Mackenzie, Corporates usher in new wave of US wind and solar growth (Aug. 20, 2019). Available online at https://www.woodmac.com/our-expertise/focus/Power--Renewables/corporates-usher-in-new-wave-of-u.s.-wind-and-solar-growth/. Accessed February 2021.

[9] Wood Mackenzie, Corporates usher in new wave of US wind and solar growth (Aug. 20, 2019). Available online at https://www.woodmac.com/our-expertise/focus/Power--Renewables/corporates-usher-in-new-wave-of-u.s.-wind-and-solar-growth/. Accessed February 2021.

[10] Wood Mackenzie, Corporates usher in new wave of US wind and solar growth (Aug. 20, 2019). Available online at https://www.woodmac.com/our-expertise/focus/Power--Renewables/corporates-usher-in-new-wave-of-u.s.-wind-and-solar-growth/. Accessed February 2021.

[11] Emma Foehringer Merchant, 2018 Was Record Year for Corporate Clean Energy Contracts (Jan. 31, 2019). Available online at https://www.greentechmedia.com/articles/read/reports-confirm-a-record-year-for-corporate-clean-energy-contracts#gs.nxat51. Accessed February 2021.

3.0 SITE SELECTION CRITERIA

Bowman Wind selected the Project Area based on landowner support, as well as an assessment of area technical and environmental characteristics, and energy demand in the region. Site selection for the Project was also based upon the criteria described in NDAC Chapter 69-06-08. These criteria are discussed further below.

3.1 Exclusion Areas[12]

The geographical areas identified in Section 69-06-08-01(1) of the NDAC "must be excluded in the consideration of a site for an energy conversion facility." NDAC Section 69-06-08-01(2) also lists geographical areas that "must be excluded in the consideration of a site for a wind energy conversion facility." The applicability of these exclusion areas is summarized below in Table 3.1-1. Exclusion areas in the Study and Project Areas are depicted on Figure 3, Exclusion Areas.

Table 3.1-1
Summary of Exclusion Areas

General Exclusion Area	Present Within Project Area?	Description	Section Addressed
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	None	NA	6.2, 6.6, 6.7, 6.8, 6.12
Designated or registered state: parks; forests; forest management lands; historic sites; monuments; historical markers; archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves.	None	NA	6.2, 6.6, 6.7, 6.8, 6.12
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	None	NA	6.8, 6.9
Areas critical to the life stages of threatened or endangered animal or plant species.	None	NA	6.16
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	None	NA	6.16
Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility.	None	NA	6.2

[12] As defined in NDAC Section 69-06-01-01(8), exclusion criteria are "criteria that remove areas from consideration for energy conversion facility sites and transmission facility routes." Exclusion areas are composed of these limiting criteria.

Table 3.1-1
Summary of Exclusion Areas

General Exclusion Area	Present Within Project Area?	Description	Section Addressed
Areas within thirty feet [9.14 meters] on either side of a direct line between an intercontinental ballistic missile (ICBM) launch facility and a missile alert or launch control facilities to avoid microwave interference. This restriction only applies to aboveground structures, not to surface features, such as roads, or belowground infrastructure.	None	There are no ICBMs in Bowman County or the adjacent counties.	6.4
Additional Exclusion Areas for Wind Energy Conversion Facilities – Areas within:[1]			
1.1x the turbine height from the nearest edge of an interstate or state roadway right-of-way (ROW).	Present	No turbines will be located within these exclusion areas	4.2
1.1x the turbine height plus 75 feet from the centerline of any county or maintained township roadway.	Present	No turbines will be located within these exclusion areas	4.2
1.1x the turbine height from the nearest edge of railroad ROW.	Present	No turbines will be located within these exclusion areas	4.2
1.1x the turbine height from the neared edge of a 115 kV or higher transmission line ROW.	Present	No turbines will be located within these exclusion areas	4.2
1.1x the turbine height from the property line of a non-participating landowner and 3x the height of the turbine from an inhabited rural residence of a non-participating landowner, unless a variance is granted. A variance may be granted if an authorized representative or agent of the permittee, the nonparticipating landowner, and affected parties with associated wind rights file a written agreement expressing all parties' support for a variance to reduce the setback requirement in this subsection. A nonparticipating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in NDCC Chapter 17-04.	Present	No turbines will be located within these exclusion areas	4.2

[1] For the purposes of setbacks, Bowman Wind assumed a turbine up to 105 meters in hub height, with an up to 158-meter rotor diameter, and/or total tip height of 184 meters.

3.2 Avoidance Areas[13]

Per Section 69-06-08-01(3) of the NDAC, "[t]he following geographical areas may not be approved as a site for an energy conversion facility unless the applicant shows that under the circumstances there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility the commission may consider, among other things, the proposed management of adverse impacts; the orderly siting of facilities; system reliability and integrity; the efficient use of resources; and alternative sites. Economic considerations alone will not justify approval of these areas. A buffer zone of a reasonable width to protect the integrity of the area must be included. Natural screening may be considered in determining the width of the buffer zone." An additional avoidance area for wind energy conversion facilities is set forth in NDAC Section 69-06-08-01(4). See Table 3.2-1 for a discussion of the criteria outlined in Section 69-06-08-01(3) and (4). Avoidance areas in the Study and Project Areas are depicted on Figure 4, Avoidance Areas.

Table 3.2-1
Summary of Avoidance Areas

Avoidance Area	Present Within Project Area?	Description	Section Addressed
Historical resources which are not designated as exclusion areas.	Present	Bowman Wind has completed a Class I cultural resources inventory for the Project Area; as well as, a Class III cultural resource inventory of areas that may be impacted by Project Construction. Bowman Wind has also completed a Class II Architectural History reconnaissance survey. Cultural resource sites will be avoided. An Unanticipated Discoveries Plan is included in Appendix G for unidentified resources encountered during construction. This plan has been provided to the State Historical Society of North Dakota (SHSND) for approval.	6.7
Areas within the city limits of a city or the boundaries of a military installation.	None	NA	6.4, 6.4

[13] As defined in NDAC 69-06-01-01, avoidance criteria are "criteria that remove areas from consideration for energy conversion facility sites and transmission facility routes unless it is shown that under the circumstances there are no reasonable alternatives." Avoidance areas are composed of these limiting criteria.

Table 3.2-1
Summary of Avoidance Areas

Avoidance Area	Present Within Project Area?	Description	Section Addressed
Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood.	Present	There are 95 acres of 100-year floodplain in the Project Area associated with Spring Creek and an unnamed tributary of Spring Creek in the northern portion and Cold Turkey Creek in the central southeast portion of the Project Area. No Project facilities (turbines, access roads, Project substation, O&M facility, or battery storage facility) are within floodplains.	6.12
Areas that are geologically unstable.	None	NA	6.11
Woodlands and wetlands.	Present	Wetlands are present within the Project Area as are small woodlands and shelter belts. All permanent wetland impacts will be avoided to the extent practicable. Temporary impacts may occur due to the installation of collection lines. Trees are sparsely located throughout the Project and the Project has been designed to minimize tree removal to the extent possible. If impacts to trees occur, Bowman Wind will follow the Commission's tree and shrub mitigation specifications.	6.9, 6.13, 6.14
Areas of recreational significance which are not designated as exclusion areas.	None	NA	-
Additional Avoidance Areas for Wind Energy Conversion Facilities – Areas within:			
A geographic area where, due to the operation of the facility, the sound levels within one hundred feet on an inhabited residence or community building will exceed forty-five dBA. The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.	Present	Bowman Wind has completed a sound assessment for the GE-127 2.82 MW at all 85 proposed turbine locations. Sound levels do not exceed 45 dBA within 100 feet of inhabited residences or community buildings. Bowman County requires a setback distance of at least 2,640 feet between turbines and occupied dwellings, commercial buildings or publicly-used facilities, which minimizes the potential for sound impacts.	6.5

3.3 Selection Criteria[14]

Per Section 69-06-08-01(5) of the NDAC, "[a] site may be approved in an area only when it is demonstrated to the Commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area, as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum." Table 3.3-1 provides a summary of the selection criteria.

Table 3.3-1
Summary of Selection Criteria

Selection Criteria	Potential Adverse Effects from Project	Section Addressed
The Impact Upon Agriculture:		
(1) Agricultural production.	Out of 42,144 acres in the Project Area, up to 22,910 acres could be utilized for agricultural production (cultivated crops, hay/pasture, and conservatively including grassland/herbaceous areas that may be used for grazing – see Table 6.2-1). The Project is proposed to permanently impact less than one percent of the total land within the Project Area, regardless of land use.	6.2, 6.10
(2) Family farms and ranches.	While some economic losses to producers will occur due to conversion of agricultural land, Bowman Wind will provide additional income to these households, and has designed the Project to minimize impacts to family farms and ranches to the extent possible. Any economic losses are anticipated to be minor in comparison. Additionally, Bowman Wind has designed the Project with a turbine setback distance of 2,640 feet between turbines and occupied dwellings and coordinated with landowners on site plan reviews for their parcel(s).	6.5, 6.9
(3) Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation.	Landowners have not expressed concerns related to irrigation on their property, and no known irrigation is present in the Project Area.	NA
(4) Surface drainage patterns and ground water flow patterns.	No adverse impacts are anticipated to surface drainage or groundwater flow patterns.	6.11, 6.12
(5) The agricultural quality of the cropland.	No adverse impacts to agricultural quality of cropland are anticipated. Landowners will be compensated for the placement of Project facilities on their property and will be reimbursed for revenues lost due to temporary crop damage from construction activities.	6.2, 6.10

[14] As defined in NDAC 69-06-0101, selection criteria is defined as "criteria that guide and govern the selection of energy conversion facility sites and transmission facility corridors and routes in order to minimize adverse human and environmental impact after the exclusion and avoidance criteria have been applied."

Table 3.3-1
Summary of Selection Criteria

Selection Criteria	Potential Adverse Effects from Project	Section Addressed
The impact upon the availability and adequacy of:		
(1) Law enforcement.	No adverse impacts to law enforcement are anticipated	6.3
(2) School systems and education programs.	No adverse impacts to school systems and education programs are anticipated.	6.3
(3) Governmental services and facilities.	No adverse impacts to government services and facilities are anticipated	6.3
(4) General and mental health care facilities.	No adverse impacts to general and mental health care facilities are anticipated.	6.3
(5) Recreational programs and facilities.	No adverse impacts to recreational programs and facilities are anticipated.	6.8
(6) Transportation facilities and networks.	There will be a temporary increase in truck traffic during construction activities. Bowman Wind will coordinate with local road authorities regarding haul roads. During facility operations, road use will generally be similar to other area traffic.	6.3
(7) Retail service facilities.	No adverse impacts are anticipated to retail service facilities.	6.3
(8) Utility services.	No adverse impacts are anticipated to utility services. Bowman Wind will coordinate with Basin Electric or other local utility for electricity for the O&M facility and Southwest Water Authority on rural water or a well.	6.3
The impact upon:		
(1) Local institutions.	No adverse impacts to local institutions are anticipated.	6.3
(2) Noise-sensitive land uses.	Sound sensitive land uses within the Project Area include residences near turbine sites. Bowman Wind has implemented a minimum setback of 2,640 feet between turbines and occupied dwellings, commercial buildings, and publicly-used facilities. The Project will comply with the Commission's sound avoidance criterion.	6.5
(3) Light-sensitive land uses	Subject to Federal Aviation Administration (FAA) approval, Bowman Wind will use commercially reasonable efforts to install a light-mitigating technology that is consistent with applicable requirements.	5.2, 6.6
(3) Rural residences and businesses.	Bowman Wind has implemented a minimum setback of at least 2,640 feet between turbines and occupied dwellings, commercial buildings and publicly-used facilities, and no adverse impacts are anticipated.	6.5, 6.6
(4) Aquifers.	There are no aquifers in Bowman County or the Project Area; therefore, no adverse impacts to aquifers are anticipated.	6.11
(5) Human health and safety.	No impacts to human health and safety area anticipated.	6.4

Table 3.3-1
Summary of Selection Criteria

Selection Criteria	Potential Adverse Effects from Project	Section Addressed
(6) Animal health and safety.	No adverse impacts to domestic animal health or safety concerns are anticipated. Measures to keep livestock away from construction activities will be used as necessary. Coordination is ongoing with U.S. Fish and Wildlife Service (USFWS) and North Dakota Game and Fish (NDGF) regarding any potential risks to avian and bat species.	6.15, 6.16
(7) Plant life.	Temporary and permanent vegetation impacts will occur during construction. Following construction, temporarily disturbed non-cultivated areas will be re-vegetated with a seed mixture free of noxious weeds, in accordance with Commission requirements.	6.14
(8) Temporary and permanent housing.	Temporary housing may be utilized in the form of motels or rental housing. Local housing facilities could experience short-term economic benefits. No long-term adverse impacts are anticipated.	6.1
(9) Temporary and permanent skilled and unskilled labor.	Bowman Wind will encourage its Balance-of-Plant (BOP) contractor to source materials and the construction workforce from within the State of North Dakota and/or areas surrounding the Project. Bowman Wind expects that the selected BOP contractor will develop a sourcing and workforce plan that seeks to achieve this goal within the parameters of the Project's requirements for quality, safety, budget, and schedule.	3.6
Cumulative impact:		
The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development.	Oil and gas development occurs in the Project Area. Efforts to minimize cumulative effects from the Project include use of existing public and oil roadways to the extent possible. The access road to Turbines 52 and 53 utilizes an oil and gas access road for at least part of the access. Prior to and during construction, Bowman Wind will continue to coordinate with oil and gas parties in or near the Project Area for the continued development of both the mineral and surface estates. The 13-turbine Cedar Hills Wind Project is located 5.5 miles west of the Project Area.	6.11

3.4 Policy Criteria[15]

In accordance with Section 69-06-08-01(6) of the NDAC, "[t]he Commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies and practices, and in a proper case may require the adoption of such policies and practices. The commission may also give preference to an applicant that will maximize interstate benefits." These policy criteria are addressed below in Table 3.4-1.

Table 3.4-1
Summary of Policy Criteria

Policy Criteria	Applicant's Policies and Practices	Section Addressed
Recycling of the conversion byproducts and effluents	NA	NA
Energy conservation through location, process, and design	The Project has been designed to maximize energy conversion where available.	1.2, 3.5
Training and utilization of available labor in this state for the general and specialized skills required	Bowman Wind will use skilled and trained labor from North Dakota within the parameters of the Project's requirements for quality, safety, budget, and schedule.	6.1
Use of a primary energy source or raw material located within the state	The energy generated will come from the available wind resources of the state. In addition, gravel will likely be obtained from a local source for road and pad construction, as well as for aggregate for concrete.	1.2.4
Not relocating residents	No relocation of residences will occur.	6.1
The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management	Bowman Wind plans to acquire unbroken grassland conservation easements for the life of the Project as a voluntary offset for grassland breeding bird impacts.	6.15
Economies of construction and operation	As a 200.1 MW wind energy project, Bowman Wind will benefit from economies of scale related to the Project's construction and operation. Wind energy projects have one-time costs that remain relatively stable despite the scale of the project. Therefore, a larger project will have cost advantages in comparison to a smaller project because the fixed costs are spread out over more units of output. Some examples of wind energy project costs that remain similar despite the size of the project include: an on-site office space, crane mobilization, and substation procurement and construction.	3.6, 6.1

[15] As defined in NDAC 69-06-01-01(12), policy criteria are "criteria that guide and govern the selection of energy conversion facility sites and transmission facility corridors and routes in order to maximize benefits during the construction and operation of a facility."

Table 3.4-1
Summary of Policy Criteria

Policy Criteria	Applicant's Policies and Practices	Section Addressed
Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife	None. The Project is compatible with existing recreation and wildlife uses.	NA
Use of citizen coordinating committees	Bowman Wind has coordinated and will continue to coordinate with landowners and local businesses and groups located within and near the Project Area.	9.0
A commitment of a portion of the energy produced for use in this State	Energy produced by the Project will interconnect to the transmission grid at the Rhame substation. The power produced by the Project will be positioned to help meet local renewable energy initiatives/goals, the regional need for renewable energy, or national C&I customer demand.	2.1
Labor relations	No impacts to labor relations are anticipated.	NA
The coordination of facilities	Existing facilities and facility corridors were considered in the location of the Project and its associated facilities.	3.5, 6.3, 6.4
Monitoring of impacts	Bowman Wind will monitor construction activities and use Best Management Practices (BMPs) throughout Project construction. During operation and restoration, Bowman Wind will monitor the Project and assess impacts as well as comply with all requirements set forth in the Certificate. Bowman Wind also includes a Bird and Bat Conservation Strategy as Appendix I, which outlines wildlife-specific monitoring.	5.1, 5.2, 6.17
A commitment to install lighting mitigation technology for wind energy conversion facilities subject to commercial availability and Federal Aviation Administration (FAA) approval.	Bowman Wind will utilize a light-mitigating technology system that is consistent with applicable requirements, subject to FAA approval and commercial availability.	5.2, 6.6

3.5 Design and Construction Limitations

When determining the Project location, Bowman Wind considered the following design and construction limitations: wind resources, interconnection to the electrical transmission system, environmental constraints, applicable setbacks, and landowner and local support. As discussed in Section 1.2.4, Bowman Wind assessed the meteorological conditions of the Project Area to verify the site has an economically viable wind resource.

Further, capacity for interconnection to the existing electrical transmission system was also a significant factor in Project design. The Project is in Definitive Interconnection System Impact Study Phase 2 Report/Decision Point 2 and expects to be in Generator Interconnection Agreement negotiations with the SPP for interconnection to the transmission grid Quarter 4, 2021.

Site control was also critical to the Project. Bowman Wind has secured voluntary wind energy lease agreements and easements with the exception of the landowners that are pending participation as administrative documents are completed.

Several site-specific limitations also affected the Project's design and construction, including:

- avoidance or minimization of impacts to sensitive environmental resources; and
- setback requirements from features, including occupied residences, non-participating landowners' property lines, and existing roads and transmission lines.

See Section 6.0 for a more detailed discussion of the site-specific resources and mitigation measures utilized.

3.6 Economic Considerations

The economics of a wind farm are driven, first and foremost, by the value of the wind resource. Information on the wind resource at the site is discussed in Section 1.2.4 above. Since 2016, Bowman Wind has compiled and assessed wind resource data in the Project Area. The data has indicated that the Project Area will provide an excellent resource for wind generation with high economic output.

The Project will utilize the area's wind resource to generate and distribute renewable energy. Construction of the Project will result in positive economic impacts in the general Project Area. The Project will provide approximately $948,000 per year in direct economic benefits via production taxes, in addition to direct payments to participating landowners. The Project will also result in significant and measurable indirect economic benefits to the general Project Area, including increased retail activity at restaurants, gas stations, and local purchases of construction materials and supplies, such as concrete, fuel and aggregate.

4.0 DESCRIPTION OF THE PROPOSED FACILITY

4.1 Project Components

Project components include wind turbines, associated facilities, and temporary facilities, as discussed in the following subsections.

4.1.1 Wind Turbines

The following subsections describe characteristics of the wind turbines that would be used for the Project.

4.1.1.1 Wind Turbine Technology

Wind turbines convert the kinetic energy of the wind into the rotational energy of a rotor and drivetrain. This energy is in turn converted into electrical power by generators integrated within the wind turbine housing. An automated 'pitch' system will control the speed of the rotor by turning the face of each rotor blade into or out of the wind. Modern wind turbines typically produce energy in a wind speed range of 3.1 to 25 meters per second or 7 to 56 miles per hour (mph). Power quality will be further accomplished through the use of power electronics, which convert generator output to achieve required output voltage and frequency control. An integrated wind speed and direction monitoring system works with a 'yaw' motion control system to keep the face of the turbine presented into the wind.

Throughout this Application, Bowman Wind utilized the GE-127 2.82 MW turbine for analysis purposes. However, wind turbine technology is rapidly evolving to become more efficient in converting wind energy to electricity. As a result, the turbine model ultimately selected for the Project may be different, depending on the technology available. Bowman Wind has sited the Project such that all proposed turbine locations meet the exclusion and avoidance area criteria as well as the Commission and Bowman County setbacks for a turbine up to 105 meters (345 feet) in hub height, with an up to 158 meter (519 feet) rotor diameter, and with a total tip height of 184 meters (604 feet), which provides flexibility in turbine model selection. Regardless of the turbine model selected, the Project will meet all applicable Commission and County setbacks and other requirements. Additionally, if a turbine model other than the GE-127 2.82 is selected, Bowman Wind will provide the Commission with updated turbine specifications, sound modeling, and shadow flicker modeling demonstrating compliance with the applicable siting requirements.

4.1.1.2 Wind Turbine Characteristics

The GE-127 2.82 MW turbine is the turbine under current consideration for the Project. However, Bowman Wind plans to select the most appropriate technology for the Project in terms of cost efficiency and optimization of wind and land resources, which may result in a different turbine model being selected. Table 4.1-1 describes the characteristics of the GE-127. As described above, the Project layout is designed to accommodate the GE-127 or a larger turbine up to 105 meters in hub height and/or with an up to 158-meter rotor diameter and total tip height of 184 meters.

Table 4.1-1
Wind Turbine Characteristics

Characteristic	GE-127 2.82 MW
Nameplate capacity (kilowatts)	2,820
Hub height (m)[1]	89 m (292 ft)
Rotor Diameter (m)	127 m (417 ft)
Total height[2] (m)	152.5 m (501 ft)
Cut-in wind speed[3] (m/s)	3.0 m/s
Rated capacity wind speed[4] (m/s)	11.5 m/s
Cut-out wind speed[5] (m/s)	30 m/3
Maximum wind speed (m/s)	40 m/s
Wind Swept Area (m^2)	12,668 sq. m
Primary Turbine Positions	74
Alternate Turbine Positions	11

1 Hub height = the turbine height from the ground to the top of the nacelle.
2 Total height = the total turbine height from the ground to the tip of the blade in an upright position.
3 Cut-in wind speed = wind speed at which turbine begins operation
4 Rated capacity wind speed = wind speed at which turbine reaches its rated capacity
5 Cut-out wind speed = wind speed above which turbine shuts down operation

The Project nameplate capacity will be up to 208.7 MW, with up to 200.1 MW delivered to the grid per the Project's interconnection request. Installing a nameplate capacity of up to 208.7 MW will enable the Project to account for and overcome losses that are associated with turbine availability, turbine performance, and electrical losses within the collection system that may otherwise reduce the output below the authorized interconnection threshold.

4.1.1.3 Rotor

The rotor diameter of the turbine under current consideration is 127 meters (417 feet) but the Project layout has been designed to accommodate a rotor diameter up to 158 m. The rotor consists of three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the generator, brake, cooling system, and other electrical and mechanical systems.

4.1.1.4 Towers

The towers on which the nacelle is mounted, will be constructed of conical tubular steel, with a hub height of up to approximately 105 meters (344 feet). All tower welds will be performed according to specifications established by the American National Standards Institute (ANSI). Surfaces of the tower components will be sandblasted and coated by the manufacturer to protect against corrosion. A secured door at the base of the tower will provide internal access to the turbine.

4.1.1.5 Lightning and Ground Protection

Lightning and ground protection for all wind farm equipment is designed and constructed to be compliant with all applicable National Electrical Code (NEC) and National Electric Safety Code (NESC) requirements. Grounding and shielding components are integrated into the foundation and structural elements of all equipment and conductor lines. In particular, each wind turbine will

include conductive elements in the blades and a complete grounding and shielding network within the turbine, tower, and foundation.

4.1.1.6 Lighting

Turbines will be lit so as to satisfy minimum Federal Aviation Administration (FAA) requirements. In addition, the Project will comply with the light-mitigating technology system requirements set forth in NDCC Section 49-22-16.4. The components and specific locations of the ADLS system will be dependent on FAA's review of turbine technology, terrain, and other factors.

4.1.1.7 Foundation

Each turbine will sit atop a concrete foundation. Foundation size and design will be finalized once geotechnical analyses have been completed and the turbine model selected; however, it is estimated that the foundation will be approximately 60 feet in diameter and 6 to 12 feet in depth.

4.1.2 Associated Facilities

Associated facilities include access roads, an electrical collection and communications system, met towers, an O&M facility, a Project substation, and a battery storage facility.

4.1.2.1 Access Roads

Construction and service access to each turbine location will be facilitated by a compacted gravel road within the Project Area. Roads have been located in consultation with the landowner to avoid or minimize impacts to land use and the environment. The permanent access roads will be approximately 16 feet wide and constructed with locally-sourced gravel, if available. The Project roads will support the size and weight of maintenance vehicles. Following construction, the temporarily affected areas will be restored to pre-construction conditions, to the extent practicable, and pursuant to landowner agreements.

4.1.2.2 Electrical Collection System and Communication System

An electrical collection system consisting of buried cables will interconnect all turbines to the Project substation. This system will operate at up to 34.5 kV and have been sited to minimize cost and land impacts and in consideration of landowner input, setback requirements and other constraints. A small number of cabling junction boxes may be located above ground and marked with bollards or other markings. The permanent impact resulting from above ground collection system components will be less than a half-acre. Once construction is complete, the land will be returned to pre-construction conditions, to the extent practicable, following installation of the collection system.

4.1.2.3 Meteorological Towers

The Project will include two permanent met towers that will remain in place for the life of the Project. These permanent met towers will be as tall as the hub height of the selected wind turbine and will provide data critical to assessing the performance of the Project and aid in short-term forecasting and operation protocols for the Project. Bowman Wind includes three locations for the permanent met towers in this Application, two of which will be utilized.

4.1.2.4 O&M Facility

An O&M facility will be constructed in the Project Area and will provide access and storage for Project O&M. The O&M facility is proposed to be located in the west-central portion of the Project Area along Rhame Road. The buildings typically used for this purpose are approximately 3,000 to 5,000 square feet and house the equipment to operate and maintain the Project. The parking lot adjacent to the building is typically approximately 3,000 square feet. Bowman Wind includes a 5.3-acre area for the O&M facility and associated parking area.

4.1.2.5 Project Substation

The Project's underground collection system will extend from the turbines to a Project substation. The substation will be located on approximately 5 acres. Figure 2, Project Facilities, shows the preliminary location of the Project substation.

The Project substation will be designed to provide voltage step-up from the collection system to the 230 kV transmission system voltage. This facility will house the production metering, various collection system, and facility isolation and protective functions. The facility will be fenced to provide site security and safety.

4.1.2.6 Battery Storage Facility

The Project will include a battery storage facility capable of up to 100 MW/400 MWh hours of storage (the battery can discharge up to 100 MW for four hours). This facility will cover up to 16.9 acres located immediately adjacent to the Project substation and will be fenced. Within the fence, there will be up to 108 containers that are approximately 40 feet in length oriented in rows approximately 20 feet apart. These containers will be eight to ten feet in height. The containers generally look like sleek groups of self-contained shipping containers or cabinets. The containers house lithium ion batteries, which employ the same fundamental technology as that used in laptops, cell phones, and hybrid cars. There are typically two heating, ventilation, and air conditioning systems attached to each container for cooling. Additionally, each container has an associated inverter. One transformer is also required for every two containers. Both inverters and transformers measure approximately 8 feet by 8 feet. Collection lines from the wind project will run to the Battery Storage Facility, which will be connected to the Project substation. Image 4.1-1 below shows a battery storage facility adjacent to a substation and wind farm (Stromsta, 2020).

Image 4.1-1: Representative Battery Storage Facility

The battery storage facility will be capable of storing power generated from the wind farm when production exceeds system demand (oversupply) or when the wind generation is unable to be delivered to the load due to transmission constraints. The battery storage facility will provide additional reliability for and deliverability to the grid by having the ability to store low-cost excess generation (relative to load) and inject it onto the grid at times of increased demand.

4.1.3 Temporary Facilities

Other temporary facilities will be required for the construction phase of the Project, including a concrete batch plant, laydown areas for an equipment and construction management facility, intersection improvements to facilitate over-length turning, crane paths and working pads, and staging areas for turbine delivery. The temporarily affected areas will be restored to pre-construction conditions, to the extent practicable after construction has been completed, and in accordance with landowner agreements.

4.2 Project Layout

The Project layout consists of 85 turbine locations, which includes 11 alternate turbine locations. Additionally, the layout includes proposed locations for access roads, collection and communication lines, crane paths, a Project substation, battery storage facility, an O&M facility, and permanent met towers. The Project layout is designed to accommodate the current turbine model under consideration, as well as a turbine up to 105 meters in hub height, with an up to 158-meter rotor diameter, and/or a total tip height of 184 meters. Turbine model specifications for the GE-127 2.82 are provided in Section 4.1.1.

Bowman Wind has designed the Project to optimize electrical generation and efficiency, while minimizing impacts to existing resources, infrastructure, and land use. Bowman Wind has coordinated with landowners regarding infrastructure placement, and has utilized existing roads,

driveways, field edges, and other previously disturbed areas for access roads to the extent possible. Bowman Wind has worked and will continue to work diligently with its landowner partners throughout Project development.

The Project has been sited to comply with the Commission's and Bowman County's setback requirements. Table 4.2-1 identifies Commission and County setbacks applicable to the Project, as well as voluntary setback commitments made by Bowman Wind. These are also displayed on Figure 5, Project Setbacks. Regardless of the turbine model selected, the Project layout will comply with all of the setback requirements outlined below. Setbacks are measured from the edge of the base of the turbine tower to the applicable feature.

Table 4.2-1
North Dakota Commission and Bowman County Setback Requirements

Commission Setback Type	Turbine Setback[1]
Nearest edge of an interstate or state roadway right-of-way (ROW)	1.1 times the height of the turbine
The geographic center of an ICBM launch or launch control facility	1,200 feet
Direct line between an ICBM launch facility and a missile alert or launch control facilities to avoid microwave interference	Areas within 30 feet (9.14 meters) on either side of a direct line between an ICBM launch facility and a missile alert or launch control facilities
County or maintained township roadway	1.1 times the height of the turbine plus 75 feet from the centerline of the roadway
Nearest edge of a railroad ROW	1.1 times the height of the turbine
Nearest edge of a 115-kilovolt or higher transmission line ROW	1.1 times the height of the turbine
Property line of a non-participating landowner	1.1 times the height of the turbine[2]
Inhabited residence or a community building	A wind energy conversion site must not include a geographic area where, due to the operation of the facility, the sound levels within 100 feet of an inhabited residence or a community building will exceed 45 decibels (dBA)[3]
Nonparticipating inhabited rural residence	3 times the height of the turbine[4]
Bowman County	
Occupied Structures[5]	2,640 feet from occupied dwelling, commercial building, or publicly used facility.
Public Roads and Above Ground Communications and Electric Lines[5]	500 feet or 1.1 times the rotor diameter, whichever is greater as measure from the edge of the existing ROW.
Non-Participating Property[5]	2.5 times the rotor diameter
Public Recreation Areas, including: • NDGF Private Lands Open to Sportsmen, • NDGF Wildlife, Management Areas, • USFWS National Wildlife Refuges, • USFWS Waterfowl Production Areas,	1,320 feet

Table 4.2-1
North Dakota Commission and Bowman County Setback Requirements

Commission Setback Type	Turbine Setback[1]
• U.S. Army Corps of Engineers Lands and Lakes, • Waterfowl Rest Areas, • Community Centers, • Public Parks, • Public Playgrounds, • Golf Courses, • Fairgrounds, • Sports and/or rodeo arenas, • Bars, saloons, or taverns, • Dance halls or community centers	
Churches and Cemeteries	1,320 feet
Shooting Ranges	1,320 feet
Extra-territorial Areas	One mile outward from city limits
Sound Levels	Sound levels within 100 feet of any non-participating residence shall not exceed 45 dBA (Leq). This sound standard does not apply to participating dwellings.
Shadow Flicker	30 hours per year for non-participating occupied residences
Section Lines[6]	1,000 feet from section lines

1 Setbacks are based on a turbine up to 105 meters in hub height, with an up to 158-meter rotor diameter, and/or a total tip height of 184 meters.

2 As set forth in NDAC Section 69-06-08-01(2), a variance may be granted if an authorized representative or agent of the permittee and affected parties with associated wind rights file a written agreement expressing all parties' support for a variance to reduce the setback requirement in this subsection. A non-participating landowner is a landowner that has not signed a wind option agreement or a wind easement, as defined in NDCC Chapter 17-04, with the permittee of the wind energy conversion facility.

3 The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building, as provided in NDAC Section 69-06-08-01(4).

4 As set forth in NDCC Section 49-22-05.1(3), a variance from this setback requirement may be granted if an authorized representative or agent of the permittee, the nonparticipating landowner, and affected parties with associated wind rights file a written agreement expressing the support of all parties for a variance to reduce the setback requirement. A non-participating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in NDCC Chapter 17-04.

5 A Variance may be granted if an authorized representative or agent of the applicant, permittee, or current owner and those affected parties on adjoining properties with associated wind rights sign a form, notarized and legally binding agreement expressing all parties support for a Variance that waives or reduces the setback requirements.

6 Bowman Wind plans to request a variance from this setback for nine turbine locations.

4.3 Estimated Project Facility Impacts

In its Project layout, Bowman Wind includes 85 turbine positions that meet Project setbacks, optimize the wind resource, and minimize human and environmental impacts, of which, 74 turbine positions would be constructed (for the GE-127 2.82 MW turbine). In addition, Bowman Wind has identified access road, collection line, and crane path corridors for approximate acreage of temporary and permanent impacts (Table 4.3-1). To the extent possible, Bowman Wind has collocated these linear facilities. For purposes of calculating impacts, all 85 turbine locations and associated facilities (access roads, crane paths, collection lines) were included.

Table 4.3-1
Summary of Permanent and Temporary Footprint from Project Facilities (acres)[1]

Project Facility	Description of Footprint	Temporary	Permanent
Turbines	50-foot radius for turbine pad	-	15.3
	200-foot radius for construction workspace	222.9	-
Access Roads	16-foot-wide road	-	63.8
	150-foot-wide construction workspace	473.3	-
Crane Paths	120-foot-wide corridor	154.4	-
Electrical Collection and Communication Lines	75-foot-wide corridor	169.7	-
Met Towers	75-foot by 75-foot workspace	0.4	-
	15-foot by 15-foot area	-	<0.1
Laydown/Staging Areas	Footprint of two laydown/staging areas within the Project Area	31.9	-
Project Substation	Footprint of facility	-	5.4
O&M Facility	Footprint of facility	-	5.3
Battery Storage Facility	Footprint of facility	-	16.9
	Total	**1,352.7**	**106.7**

[1] Bowman Wind has collocated Project facilities to minimize impacts. To avoid double counting of impacts, permanent impacts are calculated first followed by temporary impacts prioritized by electrical collection and communication lines (ground disturbing activity), then turbine workspace, then crane paths, and last access roads.

5.0 PROJECT CONSTRUCTION, OPERATION, AND DECOMMISSIONING

5.1 Project Construction

5.1.1 Construction Activities

A variety of activities must be completed to carry the Project through construction. Below is a preliminary list of activities necessary to develop the Project. Pre-construction, construction, and post-construction activities for the Project include:

- Pre-construction:
  - geotechnical analysis;
  - design high voltage electrical system, transmission line, power collection system, Project substation, and battery storage facility;
  - design turbine foundations, access roads, and associated facilities;
  - underground utility and oil and gas facility discovery; and
  - procure all necessary turbine and associated facility components (towers, nacelles, blades, foundations, and transformers).
- Construction:
  - construct temporary laydown yards and construction management facility;
  - construct temporary intersection modifications to facilitate turbine component delivery;
  - construct access roads and install collection lines;
  - construct the Project substation;
  - construct the battery storage facility;
  - install tower foundations and underground cable; and
  - place towers and set turbines.
- Post-Construction
  - restore disturbed areas not intended for permanent above ground facilities;
  - test facility; and
  - begin commercial production.

Haul road permits will be acquired from the townships, Bowman County, or the North Dakota Department of Transportation (NDDOT), as necessary. Furthermore, Bowman Wind will acquire all necessary permits to cross/bore state, county, and township roads required for the installation of its collection lines. Bowman Wind will negotiate a road use and maintenance agreement with Bowman County and applicable townships, if needed.

During construction, equipment and worker vehicles will travel to and from the site. Peak construction is anticipated to be in summer and early fall when the majority of the foundation construction, access road, electrical and substation work is taking place. Upon completion of construction, heavy equipment will be removed from the site.

In addition, culverts or other drainage methods will be installed or upgraded as needed in accordance with County and State requirements.

5.1.2 Construction Management

Bowman Wind will be responsible for scheduling and coordinating the Project construction activities, including:

- obtaining building, electrical, grading, road, and utility permits;
- performing civil, structural, and electrical engineering;
- conducting surveying and geotechnical analysis;
- forecasting Project labor needs;
- facilitating subcontractor involvement;
- securing construction materials;
- overseeing construction tasks, including site and access road development; foundation excavation and pouring; electrical and communications installation; turbine and met tower erection; substation installation; and system testing; and
- managing the Project budget.

During construction, coordination will be ongoing between Bowman Wind and construction teams. The construction manager will engage in ongoing correspondence with local officials, and landowners.

5.1.3 Commissioning

Upon completion of the construction phase, the Project will undergo detailed inspection and testing procedures before being commissioned. Inspection and testing will occur for each individual component of the wind turbines, as well as the associated communication, meteorological, collection and SCADA systems.

5.2 Project Operation and Maintenance

Before the Project becomes fully operational, O&M staff will be integrated into Project construction. The O&M staff will work cooperatively with the construction manager to create a smooth transition from construction through commissioning and operating the facility.

5.2.1 Supervisory Control and Data Acquisition System

Each wind turbine will communicate directly with the SCADA system for remote performance monitoring, energy reporting and troubleshooting. The SCADA system provides data on turbine generation and production, availability, meteorology, and communications. The SCADA system allows for 24/7 monitoring of the Project, and relays alarms and communication errors to an off-site operations center. Bowman Wind will provide service and maintenance for the Project. Permanent, full-time staff will perform these duties.

5.2.2 Light-Mitigating Technology

Subject to FAA approval, Bowman Wind will install a light-mitigating technology consistent with applicable requirements. See Section 4.1 above.

5.2.3 Maintenance Schedule

The following schedule is anticipated to be used for scheduled service activities:

- **First Service Inspection** – The first service inspection will take place 1 to 3 months after the turbines have been commissioned. Focus will be placed on bolt tightening, greasing, and oil filtering.
- **Semi-Annual Service Inspection** – Semi-annual service inspections will commence 6 months after the first inspection. The semi-annual inspections will consist of lubrication and safety testing.
- **Annual Service Inspection** – The annual service inspection will include the same items as the semi-annual service inspection plus bolt tightening and a full component check.
- **Two-Year Service Inspection** – The 2-year service inspection will include items checked during the annual inspection, as well as terminal connector tightening.
- **Five-Year Service Inspection** – The 5-year service inspection will include items checked during the annual inspection, as well as braking system inspection, oil and grease testing, balance check and terminal connector tightening.

5.3 Decommissioning and Restoration

At the end of the Project's useful life, Bowman Wind will decommission the Project in accordance with Bowman County Zoning Ordinance Chapter 6.11.7 (Restoration of Property) and North Dakota Wind Turbine Decommissioning Guidelines (NDAC Article 69-09-09). This includes the following (unless waived by the Commission pursuant to NDAC Section 69-09-09-05(2)):

- Dismantling and removal of all towers, turbine generators, transformers, fencing, overhead cables, inverters, substations, and other equipment.
- Removal of underground cables to a depth of 24 inches.
- Removal of foundations, buildings, and ancillary equipment to a depth of 4 feet.
- Site restoration and reclamation to the approximate original topography that existed prior to construction of the facility with topsoil respread over the disturbed areas at a depth similar to that in existence prior to the disturbance.
- Grading and restoring topsoil of areas disturbed by the facility, and reseeding according to natural resource conservation service recommendations, unless the commission approves an owner request signed by the applicable landowner, identifying the surface features the landowner prefers to remain in place, and the reason the landowner prefers those features to remain.

In accordance with NDAC Section 69-09-09-06, Bowman Wind will file a decommissioning plan with the Commission prior to the commencement of operation of the Project and comply with the applicable financial assurance provisions.

6.0 ENVIRONMENTAL ANALYSIS

This section describes the existing conditions within the 42,144-acre Project Area. Bowman Wind also analyzed a 104,000-acre Study Area to best position the Project in a way that will avoid or minimize impacts to environmental resources. The existing conditions, or affected environment, described herein represent the baseline conditions that may be affected by the proposed Project. This section also discusses the potential direct environmental impacts of the proposed Project. Potential indirect impacts are identified within the resource discussions where applicable. Mitigation measures, such as best management practices (BMPs), which would avoid, minimize, or mitigate impacts, are discussed where appropriate. Bowman Wind notes that several supporting studies were completed on the broader 2020 Project Area (i.e., sound, shadow flicker, telecommunications, cultural resources, and the BBCS) while land acquisition was still ongoing. Therefore, the description of existing conditions for some resources is overly inclusive. However, the impact discussions for these resources consider the results of surveys. For example, there are four telecommunication towers in the 2020 Project Area, 3 of which are in the 2021 Project Area. Bowman Wind reports the four telecommunication towers and analyzes impacts on all four.

Project impacts discussed in the following sections are related to the placement of up to 85 turbines and associated access roads, collection and communication lines (with above ground junction boxes), crane paths, permanent met towers, an O&M facility, a Project substation, and battery storage facility. Thus, to be conservative, the analysis presented overestimates potential Project impacts, as Bowman Wind plans to construct up to 74 turbines.

6.1 Demographics

The following sections describe existing demographics, potential impacts, and proposed mitigation.

6.1.1 Existing Conditions

The Project is located in a sparsely populated rural area that is predominantly comprised of shrub/scrub, herbaceous, and cultivated land in the southwestern corner of North Dakota. The Project Area is within portions of Adelaide, Amor, Marion, Nebo, and Rhame Townships and Hart Unorganized Territory. The closest incorporated municipalities to the Project are Rhame (0.25 mile west), Bowman (3.5 miles east), Marmarth (14 miles northwest), and Scranton (17 miles east). Demographic information for the Project Area is based on data from the U.S. Census Bureau's QuickFacts and Explore Census Data websites. Data is provided at the county level to characterize the socioeconomic environment in the Project Area and at the state level for the purpose of comparison. Demographic information is summarized in Table 6.1-1.

The per capita income in Bowman County between 2014 and 2018 was $36,221, which is similar to the state level (U.S. Census Bureau, 2019). The unemployment rate in Bowman County is similar to the state level, at 2.5 percent and 2.8 percent, respectively. Approximately 8.7 percent of the people in Bowman County are reported living at or below the poverty level, which is lower than the state level of 10.7 percent. The top three industries of employment in Bowman County and the State of North Dakota are agriculture, forestry, fishing and hunting, and mining; educational services, and health care and social assistance; and retail trade (U.S. Census Bureau, 2018b). The percentage of people in Bowman County employed by the educational services, and health care and social assistance and retail trade industries is similar to the state

level, while those employed in the agriculture, forestry, fishing and hunting, and mining industry is higher in Bowman County than at the state level.

Table 6.1-1
Demographics in the Project Area

Counties and Townships	North Dakota	Bowman County
ACS Population Estimates July 1, 2019[1]	762,062	3,024
2018 Estimated Total Vacant Housing Units[2]	52,781	371
Per Capita Income 2014-2018 (U.S. 2018 Dollars)[1]	35,373	36,221
Unemployment Rate (%)[3]	2.8	2.5
Persons Living Below the Poverty Level (%)[1]	10.7	8.7
Top 3 Industries[1]	E (25.1%), R (11.2%), Ag (9.4%)	Ag (27.5%), E (23.5%), R (10.9%)

1 U.S. Census Bureau, 2019
2 U.S. Census Bureau, 2018a
3 U.S. Census Bureau, 2018b
4 Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: Ag = Agriculture, Forestry, Fishing, and Hunting, and Mining; E = Educational, Health and Social Services; R = Retail Trade

6.1.2 Demographic Impacts and Mitigation

Bowman Wind anticipates that the Project will be socioeconomically beneficial to the local population and will not impact long-term population trends or interfere with existing or adjacent land uses.

The Project will be socioeconomically beneficial to landowners, local governments, and communities by providing increased income to landowners receiving lease payments which could raise the per capita income in Bowman County. Bowman Wind requested comments from respective landowners on the Project's design in order to minimize impacts to family farms and ranches to the extent practicable, and any economic losses are anticipated to be minor in comparison to additional income provided by the Project.

Long-term beneficial impacts to the tax base of Bowman County, as a result of the construction and operation of the Project, will have an additional positive impact on the local economy in this area of North Dakota. In addition to the creation of jobs and personal income, the Project will pay an Electric Generation Tax of $2.50 per kilowatt times the rated capacity of a turbine and one half of one mill per kilowatt-hour generated by the Project (NDCC Chapter 57-33.2-04). Bowman Wind will pay approximately $18.8 million in taxes to Bowman County and approximately $9.3 million to the State General Fund over the 30-year life of the Project.

Non-local construction workers would need temporary housing during the period of construction; Bowman Wind anticipates that a majority of construction workers would be non-local due to rural location in southwest North Dakota. According to the U.S. Census Bureau's 2018: American Community Survey 5-year Estimates, Selected Housing Characteristics, approximately 371 vacant housing units may be present in Bowman County. This number of vacant housing units would be sufficient to house non-local workers during the period of construction. Furthermore, demand for lodging could provide a temporary increase in revenue in the area.

Construction of the Project could also provide temporary revenue increases in the area through increased demand for food services, fuel, and general supplies. Personal income could also be generated by circulation and recirculation of dollars paid out by the Project as business expenditures and state and local taxes.

The proposed Project could increase demand on the Bowman County labor force and for local housing during construction; however, the construction period is only temporary. Overall, Bowman Wind anticipates that the Project will be socioeconomically beneficial to the local population and will not impact long-term population trends. Further, the Project would not result in relocation of residences. In accordance with Bowman County requirements the Project will maintain a distance of at least 2,640 feet between turbines and existing occupied participating and nonparticipating residences unless a variance is granted. The Project also will comply with the Commission's sound avoidance requirement and the County's sound and shadow flicker requirements. Therefore, no additional mitigation measures are anticipated to be required.

6.2 Land Cover and Use

The following sections describe the existing land cover and uses in the Study Area and Project Area, potential impacts from construction and operation of the Project, and proposed mitigation measures.

6.2.1 Existing Conditions

6.2.1.1 Land Cover

The Study Area is located in a rural setting of North Dakota and is predominantly comprised of shrub/scrub lands, grasslands, and cultivated land. Bowman Wind reviewed U.S. Geological Survey (USGS) National Land Cover Data (NLCD) to determine land cover classification types present within the Study Area and the Project Area. The results of this review are presented in Table 6-2-1. The predominate NLCD land cover classification in the Study and Project Areas is shrub/scrub, followed by grassland/herbaceous, and cultivated cropland; collectively, these land cover classifications comprise about 95 percent of the Study and Project Areas. Figure 6, Land Cover, depicts the land cover classifications within the Study and Project Areas.

Table 6.2-1
Land Cover Types and their Relative Abundance in the Project Area

	Study Area		Project Area	
Land Cover	Acres	Percent	Acres	Percent
Shrub/Scrub	47,270.4	45.3	18,178.1	43.1
Grassland/Herbaceous	30,711.5	29.4	13,443.8	31.9
Cultivated Crops	21,880.9	21.0	8,575.4	20.3
Developed	2,164.6	2.1	827.9	2.0
Hay/Pasture	1,599.2	1.5	887.6	2.1
Emergent Herbaceous Wetlands	245.7	0.2	85.1	0.2
Open Water	199.7	0.2	77.1	0.2
Woody Wetlands	112.3	0.1	--	--

Table 6.2-1
Land Cover Types and their Relative Abundance in the Project Area

Land Cover	Study Area		Project Area	
	Acres	Percent	Acres	Percent
Deciduous/Evergreen/Mixed Forest	100.5	0.1	54.0	0.1
Barren Land	11.6	< 0.1	0.4	<0.1
Total	**104,296.4**	**100.0**	**42,143.6**	**100.0**

Source: 2016 NLCD (Yang et al., 2018)

6.2.1.2 Land Use and Ownership

Land in the Study and Project Areas is predominantly used for agricultural production and livestock grazing with some areas of oil and gas production, primarily in the southwestern portion of the Project Area. A variety of federal- and state-owned lands are present within Study Area and Project Area. Table 6.2-2 provides the total acres of federal- and state-owned lands in each of these areas and Figure 7, Public Lands and Easements depicts these features.

Table 6.2-2
Land Ownership in the Study and Project Areas

Agency	Acres in Study Area	Acres in Project Area
Bureau of Land Management		
Grazing Allotments	3,899.3	2,753.5
BLM Owned	357.3	0.0
State of North Dakota		
Private Lands Open to Sportsmen	7,864.9	1,296.6
North Dakota State Lands	4,400.1	--
Surface Trust Lands	4,397.4	--
Mineral Rights Trust Lands	18,227.0	7,757.4

Source: USGS, 2018; NDTL, 2019.

In North Dakota and other western states, the Bureau of Land Management (BLM) issues grazing allotments to ranchers to allow livestock grazing on public lands (BLM, Undated). In addition to public lands under the jurisdiction of the BLM, allotments may include private lands, state lands, and lands under the jurisdiction of other federal agencies. There are four Grazing Allotments in the Study Area, all of which occur on private land: Antler (787.7 acres), Cold Turkey Creek (2,637.3 acres), Kalina (235.2 acres), and Rattlesnake Butte (239.2 acres). Of these four grazing allotments, two are within the Project Area, the Cold Turkey Creek and Kalina Grazing Allotments.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) administers the Conservation Reserve Program (CRP). Agricultural landowners may voluntarily enroll their land into the CRP, essentially taking the land out of production for a given timeframe to protect wildlife and water resources in exchange for annual payments. Most often, lands enrolled in the CRP are not identifiable using publicly available data. Bowman Wind is coordinating with the local and State NRCS and Farm Service Agency (FSA) office and the local landowners to identify any areas of CRP land in the Project Area; to date, no CRP parcels have been identified.

The US Fish and wildlife Service (USFWS) manages Waterfowl Production Areas (WPAs) to protect breeding, forage, shelter, and migratory habitat for waterfowl or wading birds, such as ducks, geese, herons, and egrets. WPAs provide opportunities for viewing wildlife and intact ecosystems. There are no WPAs within the Study Area. The nearest WPA is northeast of the Project Area in Hettinger County.

The USFWS manages National Wildlife Refuges (NWRs) that are part of a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats. NWRs protect some of the country's most iconic ecosystems and the fish and wildlife that rely on them. There are no NWRs in the Study Area; the nearest NWR is the Stewart Lake NWR north of the Project Area in Slope County.

The USFWS holds some easements on private lands that have wetlands and/or grassland habitat. A grassland easement is a legal agreement that pays landowners to keep their land in grass. Land covered by a USFWS grassland easement may not be cultivated and mowing, haying, and grass seed harvesting must be delayed until after July 15 each year. Similarly, the wetland easement program pays landowners to permanently protect wetlands. Wetlands covered by a wetland easement cannot be drained, filled, leveled, or burned. When these wetlands dry up naturally, they can be farmed, grazed, or hayed. A USFWS wetland easement protects the wetland basin of a parcel; however, the upland area outside the wetland is not covered by the easement. These are permanent agreements between the USFWS and all present and future landowners (USFWS, 2010a and b). There are no USFWS grassland or wetland easements in the Study Area.

In North Dakota, Private Land Open to Sportsmen (PLOTS) lands are private lands open to public use for hunting and bird watching (NDGF, 2019a). PLOTS lands are administered through an agreement between the NDGF and individual landowners. Approximately 7,865 acres of PLOTS lands are present within the Study Area. Within the Project Area, approximately 1,296.6 acres of PLOTS lands are present; these PLOTS lands are located in northwestern Hart Unorganized Territory, east-central Adelaide Township, and northern Amor Township. Additional details about public use of PLOTS lands is provided in Section 6.8 – Recreational Resources. No NDGF-managed Wildlife Management Areas (WMAs) are present within the Study and Project Areas. The nearest WMA is approximately ten miles southeast of the Project Area.

Bowman Wind reviewed publicly available information to identify North Dakota Department of Trust Lands (NDTL) within the Study and Project Areas. Trust lands are managed by the NDTL on behalf of the Board of University and School Lands (Board; NDTL, 2019). Bowman Wind identified 4,397.4 acres of surface trust lands within the Study Area. Surface trust lands typically generate income through leasing these parcels for grazing or other agricultural uses. Leases for rights-of-way and mining uses are also common on surface trust lands. No surface trust lands are within the Project Area. Mineral rights trust lands within the Study and Project Areas total 18,227.0 acres and 7,757.4 acres, respectively. Mineral rights trust lands typically generate income through leases for oil and gas, coal, potash, and other mineral extraction.

There are water wells, oil and gas wells, and oil and gas storage tanks within the Study and Project Areas. There are 20 domestic/stock/industrial/observational water wells in the Study Area; of these eight are within the Project Area. There are a total of 167 oil and gas wells and 47 storage tanks in the Study Area; 99 of these oil and gas wells and 6 storage tanks are within the Project Area.

No concentrated residential developments are present with the Study or Project Areas though scattered farmsteads are present in both areas. There are 61 residences or farmsteads within the Study Area and 20 within the Project Area.

6.2.1.3 Zoning

According to the Bowman County Zoning Map, on file at the Office of the County Auditor, the Project Area is within the Agricultural District in Bowman County. As defined in Section 6.11 of the Bowman County Zoning Ordinance, development and operation of a wind energy facility in Bowman County requires a Wind Energy Facility Siting Permit from the county (Bowman County, 2020). Bowman Wind is coordinating with Bowman County and plans to file its Wind Energy Facility Siting Permit application in April 2021.

6.2.2 Land Cover and Use Impacts and Mitigation

Construction of the Project will result in the conversion of a portion of the land within the Project Area from existing land uses to a renewable energy resource for the life of the Project. In addition, temporary land use impacts associated with construction will occur from use of staging and laydown areas and installation of underground collection and communication lines. These temporary land use impacts will cease following construction and these areas will be returned to pre-construction land uses. Table 6.2-3 presents the anticipated impacts on NLCD land cover categories as a result of construction and operation of the Project.

Table 6.2-3
Summary of Land Cover Impacts (acres)

Land Cover Type	Impacts	
	Temporary	Permanent
Cultivated Crops	419.9	51.9
Grassland/Herbaceous	490.3	30.9
Shrub/Scrub	349.9	14.3
Developed (all categories)	61.7	8.2
Hay/Pasture	30.0	1.4
Emergent Herbaceous Wetlands	0.6	--
Deciduous/Evergreen Forest	0.1	--
Woody Wetlands	0.2	--
Total	**1,352.7**	**106.7**

Source: 2016 NLCD (Yang et al., 2018)

Construction of the Project will temporarily impact approximately 1,352.7 acres of land; of this approximately 25.7 percent of the impacts will occur on land categorized as shrub-scrub in the NLCD data, 36.2 percent of the impacts will occur on land categorized as herbaceous, and 30.0 percent will occur on land categorized as cultivated crop land. Impacts related to construction workspaces at turbine sites and access roads, installation of collection lines, and use of crane paths and laydown yards will be temporary and will terminate with the completion of construction. Impacts from turbines, access roads, O&M facility, permanent met towers, Project substation, and battery storage facility will be long-term and will require a conversion of existing land uses to a renewable energy source for the life of the Project. The Project will impact approximately 106.7 acres or less of land based on calculations from turbine locations, associated access roads, O&M

facility, permanent met towers, the Project substation, and the battery storage facility during the life of the Project. Bowman Wind has collocated linear facilities (access roads, crane paths, and collection lines) to the extent practicable. Bowman Wind has also prioritized siting linear facilities along field edges and parcel lines and with landowner input. In some cases, the linear facilities have a longer distance to maximize collocation and traverse previously disturbed areas. To the extent practicable, linear facilities have been sited along edges and to minimize overall length in unbroken grassland areas.

Bowman Wind does not anticipate the conversion of 106.7 acres of land to a renewable energy source will impact broader existing land use patterns. Operation of the Project would not preclude use of the land in the Project Area for grazing and other agricultural uses. The Project would not conflict with the existing development plans of state, local, or private entities within the Project Area as the Project generally avoids developed areas.

Bowman Wind has designed the Project to avoid BLM-managed grazing allotments to the extent practicable. The Project will not affect the Antler, Kalina, or Rattlesnake Butte Grazing Allotments. Based on preliminary design, up to six turbines (three proposed and three spare) would be placed on the Cold Turkey Creek Grazing Allotment (privately owned), along with access roads to the turbines and a permanent met tower. The permanent impact from construction and operation of these Project components would be 6.2 acres. Additionally, 78.2 acres will be temporarily disturbed during construction. After construction within the Cold Turkey Creek Grazing Allotment is complete, Bowman Wind will restore and revegetate areas of temporary impact and use of the parcel as a grazing allotment will be allowed to continue. The area of permanent impacts constitutes a less than one percent impact on the Cold Turkey Creek Grazing Allotment, which would be a minor impact on use of this parcel for livestock grazing.

Bowman Wind is coordinating with local and state NRCS and FSA offices and landowners to identify areas of CRP land that may be present in the Project Area; to date no parcels enrolled in the CRP have been identified in the Project Area. If CRP land is identified as a result of this continued coordination, and if CRP land cannot be avoided, Bowman Wind will work with the agencies to determine seeding specifications for the reclamation of temporarily disturbed land or payment requirements for any permanent impact from Project facilities.

Because there are no USFWS managed areas or easements within the Study Area, the Bowman Wind Project will not impact these resources.

Approximately 1,297 acres of PLOTS lands are present within the Project Area. Bowman Wind has designed the preliminary Project layout to avoid permanent impacts to PLOTS land (turbines, access roads, permanent met towers, O&M facility, Project substation, and battery storage facility). Additionally, per the Bowman County Ordinance, Bowman Wind has incorporated a 0.25-mile turbine setback from PLOTS lands. Bowman Wind has also sited temporary crane paths and the laydown yards to avoid PLOTS lands. However, underground collection lines will cross three PLOTS parcels, resulting in 46.0 acres of temporary impacts on these parcels. One of the PLOTS parcels is also hosting a temporary met tower; this temporary met tower will be removed when the wind farm is operational. After the underground collection lines have been installed on these parcels, Bowman Wind will restore the PLOTS lands as near as practicable to pre-construction conditions.

The Project will not impact NDTL-managed surface trust lands as these lands are not present within the Project Area. However, there are 19 turbines sited on NDTL-managed mineral trust

lands. The Project would permanently impact 17.2 acres of mineral trust lands from placement of turbines and access roads and temporarily impact 289.1 acres of mineral trust lands during construction of turbines, access roads, permanent met towers, crane paths, and collection lines.

Bowman Wind has designed the Project to avoid impacts on domestic, stock, industrial, and observational water wells and oil and gas wells and storage tanks. Additional discussion of potential impacts and mitigation measures for operating oil and gas wells within the Project Area, are discussed in Section 6.11 Geologic and Groundwater Resources.

As noted in Section 6.2.1.3, Bowman Wind is coordinating with Bowman County and plans to file its Wind Energy Facility Siting Permit application in April 2021. Bowman Wind has designed the Project to comply with the applicable permitting requirements (Bowman County, 2020).

6.3 Public Services

The following sections describe existing public services in the Study Area, potential impacts, and proposed mitigation.

6.3.1 Existing Conditions

Data identifying public services and infrastructure in the Study Area, including transportation rights-of-way (ROWs), known transmission lines, and telecommunication facilities, was gathered and analyzed to assess potential Project impacts. No missile silos were identified within the Study Area. Specific categories of public infrastructure are discussed below. Figure 8, Infrastructure depicts existing public infrastructure in the Study and Project Areas.

6.3.1.1 Local Services

The majority of public services and infrastructure are located in the cities of Bowman and Rhame, located within 5 miles east and west of the Project Area respectively. Bowman contains a hospital and ambulance service and regional airport. Both Bowman and Rhame contain police and fire services, public schools, businesses, and churches. The Project Area is located in a rural part of North Dakota mainly used for agricultural and pastoral purposes (Figure 6, Land Cover).

6.3.1.2 Electrical Service

Electrical service in the Study Area is provided by Slope Electric Cooperative, Basin Electric Power Cooperative, and the Montana-Dakota Utilities Company. Transmission infrastructure includes overhead electrical distribution and transmission lines. Additionally, small underground and overhead distribution lines are present going to farmsteads and oil production facilities.

6.3.1.3 Roads

The major highway intersecting the Study Area is U.S. Highway 12, which bisects the northern portion of the Study Area and connects the City of Bowman and Town of Rhame. Other roadways in the Study Area include well maintained gravel surfaced county roadways and two-track trails used for agricultural and oil field purposes. New permanent and improved access roads will be necessary for the Project. A compact gravel road will provide construction and service access to each turbine location. Permanent access roads will be approximately 16 feet wide.

NDDOT traffic counts have been conducted for us Highway 12 in the Study Area. In 2020 the annual average daily traffic (AADT) volume was 930 for daily traffic and 205 for truck traffic (NDDOT, 2021). Additional traffic counts have occurred on the county major collectors (major county roads) that run north-south in the Project Area approximately six miles apart: CMC0623 (Griffin Road) had an AADT of 55 in 2006 and CMC0619 (Rhame Road) had an AADT of 155 in 2017. On other roadways in the Study Area, traffic results from oil and gas exploration and production, agricultural purposes, and rural residence access.

6.3.1.4 Railroads

There is a Burlington Northern Santa Fe (BNSF) railroad parallel to the north side of US Highway 12 that bisects the northern portion of the Study Area in an east-west direction. Similar to US Highway 12, the railroad provides service to the City of Bowman and Town of Rhame.

6.3.1.5 Water Supply

Rural water is supplied to the Study Area by Southwest Water Authority Rural Water District. It is common for rural residences in the area to utilize private wells for alternative uses, such as agriculture. According to North Dakota State Water Commission (NDSWC) data, there are 20 domestic/stock/industrial/observational water wells in the Study Area; of these 8 are within the Project Area.

6.3.1.6 Microwave, Telephone, TV, and Radio Communications

Bowman Wind commissioned a communication tower study by Evans Engineering, which identified four communication tower structures in the 2020 Project Area (Appendix C – Telecommunication Studies). These four tower structures are registered with the Federal Communications Commission (FCC); one is a microwave tower, one is a land mobile tower, and two are communication towers (see Figure 9, Microwave Beam Path). There are no amplitude modulation/frequency modulation (AM/FM) radio towers in the Project Area. Bowman Wind notes there may be additional communications antennas within the Project Area, however, because these structures are typically less than 200 feet in height, they are not required to be registered with the FCC.

The microwave tower is located adjacent to the Rhame substation. There is one microwave beam path in the northern portion of the Project Area that extends northwest to another microwave tower several miles northeast of the Project Area.

The Evans Engineering study also identified two television stations that have a predicted FCC primary off-the-air service signal over at least a portion of the Project Area (Appendix C – Telecommunication Studies). Both television stations are based in Dickinson, North Dakota and are considered “conventional” – they serve a wide geographic area and are typically an affiliate of a major broadcast network.

6.3.2 Public Service Impacts and Mitigation

The following subsections discuss potential impacts and proposed mitigation.

6.3.2.1 Local Services

Impacts to local services in and around the Project Area are not anticipated; therefore, no mitigation is required.

Construction and operation of the Project is not expected to impact the availability of emergency services. Bowman Wind will coordinate with emergency services providers to determine appropriate safety precautions and standards, and develop an Emergency Response Plan to implement these precautions and standards. If emergency services are required during construction or operation of the Project, the law enforcement, fire departments, ambulance services, and hospitals near the Project Area would be adequate to address Project-related emergency service needs without negatively impacting the availability of these services for the local populace.

6.3.2.2 Electrical Service

The proposed Project will help meet regional demand for electricity, and as a result the Project will have a positive effect on the electrical services in the region. Additionally, Bowman Wind will power its O&M facility with a distribution line from Basin Electric.

6.3.2.3 Roads

Existing roadways within the Project Area will be utilized to the extent feasible; however, construction of new access roads will be required to provide access to the proposed tower locations. Newly constructed permanent access roads will be approximately 16 feet wide. Access roads will be constructed in locations which minimize impacts to the environment and/or existing land uses and will support the size and weight of maintenance vehicles. Following construction, the temporarily affected areas will be restored to pre-constructions conditions, to the extent practicable.

During the construction phase, temporary impacts are anticipated on some public roads within the Project Area. Roads will be affected by the transportation of equipment to and from the Project Area and between Project facilities. Due to construction equipment and increased traffic over approximately 8 months of construction, there is potential for road surface impacts such as potholes and rutting and improvements such as intersection widening to facilitate equipment and deliveries. Some roads may also be expanded along specific routes as necessary to facilitate the movement of equipment. Construction traffic will use the existing county, state, and federal roadway system to access the Project Area and deliver construction materials and personnel.

Construction activities will increase the amount of traffic using local roadways, and may temporarily affect traffic numbers in the area, but such use is not anticipated to result in adverse traffic impacts. During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the Project Area, as well as private vehicles used by construction personnel. Truck access near the Project Area is generally served by U.S. Highway 12 in the northern portion of the Project Area and U.S. Highway 85 approximately four miles east of the Project Area. Specific additional truck routes will be dictated by the location required for delivery.

Bowman Wind's road use will comply with all applicable federal, state, and local laws. Haul road permits will be acquired from townships, Bowman County and NDDOT, as necessary. Bowman Wind will negotiate road use and maintenance agreements with Bowman County and the

townships, if needed. Bowman Wind will work with Bowman County and applicable townships to develop construction traffic plans and follow recommended mitigation.

After construction is complete, traffic impacts during the operations phase of the Project will be minimal. Operation and maintenance activities will not noticeably increase traffic in the Project Area, as these activities tend to be sporadic and spread out within the Project Area. A small maintenance crew driving through the area in pickup trucks on a regular basis will monitor and maintain the wind turbines as needed. There would be a slight increase in traffic for occasional turbine and substation repair, but traffic function will not be impacted as a result. Furthermore, the availability of existing roadways throughout the Project Area will allow access roads to turbines to extend from existing public roads directly to the turbines, thereby minimizing impacts on adjacent agricultural land.

6.3.2.4 Railroads

In two locations, collection lines will need to be bored underneath the BNSF railroad. Bowman Wind will coordinate with the railroad for a crossing agreement for each crossing. There will not be any direct impacts to the BNSF railroad.

6.3.2.5 Water Supply

Water use during construction will provide dust control and water for concrete mixes. One temporary batch plant may be needed to supply concrete for construction of the Project. The batch plant may be able to use rural water service, but is more likely to require well water.

The O&M facility will likely require a new private well water supply. Water usage during the operating period will be similar to household volume; less than five gallons per minute. Bowman Wind will coordinate with the Southwest Water Authority Water District with respect to use of a potable water supply, as necessary. All applicable permits will be obtained for installation of a water well for the O&M facility. Use of water for operations will be negligible. The Project will not require the appropriation of surface water or permanent dewatering.

The water supply for residents within the Project Area is not anticipated to be permanently affected by the proposed Project. Project facilities have been sited to avoid water wells.

6.3.2.6 Microwave, Telephone, TV, and Radio Communications

Bowman Wind will coordinate with utility companies to determine utility locations and will comply with North Dakota One-Call requirements.

Construction and operation of the Project are not expected to impact communication systems, AM/FM radio, and microwave beam paths. Because of their height, modern wind turbines have the potential to interfere with existing communications systems licensed to operate in the United States. The required separation distance based on the characteristics of the communication systems varies depending on the type of communication antennas that are installed on the tower. Turbines sited more than 450 meters from a land mobile tower will not interfere with the tower's transmitter; turbines sited within 450 meters of land mobile towers require additional review for potential transmitter interference. There are two turbines within 450 meters of a land mobile tower, therefore, Evans Engineering evaluated potential interference based on the tower's height and wavelength at the operating frequency and the length of the turbine's rotor blades (Evans Engineering assumed the larger turbine blade for this analysis 79 meters or 158 rotor diameter).

Based on land mobile tower and turbine specifications, Evans Engineering's recommended turbine setback distance from the land mobile tower within 450 meters of a turbine is 150 meters (see Appendix C – Telecommunication Studies for detailed analysis). Currently, the closest turbine to a communication tower is 1,239 feet (378 meters). As such, impacts to communication systems are not anticipated.

Similarly, while there is one microwave tower in the 2020 Project Area and one beam path, Bowman Wind has sited the Project's turbines in a manner that avoids the identified microwave beam path and communication systems (see Figure 8, Infrastructure). As such, impacts to microwave beam paths are not anticipated.

As part of the telecommunications studies, Evans Engineering coordinated with the National Telecommunications and Information Administration (NTIA) to identify potential interference with federal telecommunications. The NTIA is currently reviewing the turbine layout and Project Area presented in this Application; Bowman Wind anticipates a response by the end of March 2021. The NTIA reviewed a previous turbine layout and project area and stated that no agencies had issues with Project placement in response to a Bowman Wind review request in February 2020 (see Appendix D – Agency Correspondence). Bowman Wind anticipates a similar response for the turbine layout and Project Area in this Application.

Construction and operation of the Project are also not expected to impact landline phone service.

Construction of wind turbines has the potential to impact television reception as a result of an obstruction in the line of sight between digital antennas at residences and the television station antennas. Based on the Evans Engineering analysis of licensed television stations that transmit in the Project Area, two off-the-air signal television stations currently serve the Project Area. The Evans Engineering study concluded that the Project may result in degraded reception of television signals to residences if Project facilities cause obstruction in the line of sight between the television station antennas and the residence. However, modern digital television receivers have undergone significant improvements to mitigate the effects of signal scattering, which may limit the likelihood that disruptions to digital television would occur. Television reception at residences relying on cable or satellite television service will not be impacted by construction or operation of the Project. If residences that rely on antennas experience signal disruption, Bowman Wind will coordinate with the residence to mitigate the disruption. Potential solutions include relocating the antenna to a different location in the household, installing a better outside antenna (with higher gain), or switching to satellite or cable television.

6.4 Human Health and Safety

The following sections describe existing conditions, potential impacts, and proposed mitigation for human health and safety.

6.4.1 Existing Conditions

6.4.1.1 Air Traffic

The FAA regulates federal airspace. Due to their height, wind turbines may have an effect on airports and navigable airspace, both public and military. The FAA evaluates the proposed Project based on aeronautical compatibility and identifies potential issues related to military training areas and routes. Ellsworth Air Force Base (Ellsworth) is located approximately 130 miles south of the Project Area, east of Rapid City, South Dakota. The Powder River Training Complex is airspace

for training missions associated with Ellsworth in northwest South Dakota, northeast Wyoming, southeast Montana, and southwest North Dakota, including a portion of Bowman County.

The Bowman Regional Airport is the nearest public-use airport to the Project Area and is located approximately 2.5 miles southeast of the Project Area. The Bowman Regional Airport serves a variety of general aviation users including general aviation, air taxi, and military (AirNav.com, 2020). There are no private airstrips in the Project Area.

6.4.1.2 Electromagnetic Fields

The term electromagnetic field (EMF) refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from the voltage or electrical charges, and magnetic fields arise from the flow of electricity or current that travels along transmission lines, power collection (feeder) lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors (wire). EMF can occur indoors and outdoors, and there are no discernible health impacts from power lines (NIEHS, 1999).

The source of EMF for the Project will be from electrical collection lines and wind turbines. EMF from electrical collection lines, transmission lines, and transformers dissipates rapidly with distance from the source (NEIHS, 2002). Generally speaking, higher-voltage electrical lines produce higher levels of EMF at the source before dissipating with distance. There is no federal standard for transmission line electric fields. There are presently no North Dakota regulations pertaining to magnetic field exposure.

6.4.1.3 Hazardous Materials/Hazardous Waste

The land within the Project Area is rural and used for agricultural production with some oil and gas production wells and storage tanks present throughout. Potential hazardous materials associated with agricultural activities include petroleum products (fuel and lubricants), pesticides, and herbicides. Older farmsteads may also have lead-based paint, asbestos shingles, and polychlorinated biphenyls in transformers. Trash and farm equipment dumps are common in rural settings. Potential hazardous materials associated with oil and gas wells can include, but are not limited to, releases of petroleum products and chemicals which may potentially have adverse effects to human health or the environment.

Bowman Wind reviewed the U.S. Environmental Protection Agency's (EPA) Facility Registry Service (FRS) to identify sites that are listed on the Comprehensive Environmental Response, Compensation, and Liability Information System (also known as Superfund sites); Resource Conservation and Recovery Act (RCRA) Treatment, Storage, and Disposal; RCRA hazardous waste generators; the Assessment, Cleanup, and Redevelopment Exchange System; and the Leaking Underground Storage Tank—American Recovery and Reinvestment Act database (EPA, 2020). Bowman Wind also reviewed the North Dakota Department of Environmental Quality (NDDEQ) Underground Storage Tank (UST) Program database to identify UST or leaking USTs (LUSTs) in the Project Area (NDEQ, 2021).

Table 6.4-1 presents the FRS Interests that were identified within the Study and Project Areas as a result of this review. No Superfund sites were identified within the Study or Project Areas.

Table 6.4-1
U.S. Environmental Protection Agency Facility Registry Service Interests in the Study and Project Areas

EPA FRS Interest Category	Study Area	Project Area
Department of Homeland Security – Chemical Security Assessment Tool Reporter	1	1
Enforcement/Compliance Activity	1	--
Risk Management Plan Reporter	1	1
Small-quantity Hazardous Materials Generator	1	1
State Master	9	4
Tier 2 Hazardous Materials Reporter	18	9
Toxic Substances Control Act Reporting	4	3
Not Currently Classified in any Hazardous Waste Universe	1	1
Total	**36**	**20**

Source: EPA, 2020

Most of the FRS interests that were identified are related to oil and gas production facilities in the Study and Projects Areas (e.g., gas plants, compressor stations) that are captured under multiple FRS categories. Other facilities were identified in the FRS records that are not related to oil and gas production such as the Bowman Landfill, Box K Ranch, and the Plains Rhame Truck Station.

Review of the NDDEQ UST and LUST database identified three inactive USTs and no LUSTs within the Study Area and no USTs or LUSTs in the Project Area (NDEQ, 2021). However, based on landowner outreach and aerial photography, Bowman Wind is aware of 99 oil and gas wells and 6 associated storage tanks that are present within the Project Area.

In addition to the research described above, and as part of the Project financing process, an ASTM-conforming Phase I Environmental Site Assessment (Phase I ESA) will be conducted for the Project Area. The Phase I ESA will identify known recognized environmental conditions or historical recognized environmental conditions that may require additional action prior to or during construction.

6.4.1.4 Security

The Study and Project Areas are generally rural areas located between and south of the City of Bowman and the Town of Rhame; no cities or towns are located within the boundaries of the Study or Project Areas.

6.4.2 Human Health and Safety Impacts and Mitigation

The following sections describe existing conditions for air traffic, electromagnetic fields, hazardous materials/hazardous waste, and security.

6.4.2.1 Air Traffic

Bowman Wind has coordinated with the Bowman Regional Airport, the FAA, and the Department of Defense and the Department of the Air Force prior to construction to understand potential impacts.

The Bowman Regional Airport provided a letter of approval for a preliminary layout within the Project Area. The FAA will review the Bowman Wind turbine layout. Turbines over 500 feet tall have a lengthier review timeline, but regardless of turbine height, the FAA approval is a "Determination of No Hazard." Further, Bowman Wind will appropriately mark and light the turbines to comply with FAA requirements and, as mentioned in Section 4.1.1.6, Bowman Wind is coordinating with the FAA on implementation of an ADLS.

The Department of Defense and Department of the Air Force signed an agreement to mitigate any potential adverse impact and to minimize potential risks to national security while allowing the Bowman Wind to proceed with construction and development (Appendix D – Agency Correspondence). There are no ICBM sites in Bowman County or the adjacent counties; these sites are generally located north of Lake Sakakawea.

The permanent met towers will be freestanding with no guy wires. The existing temporary meteorological towers are fully painted in seven alternating bands of orange and white with two sets of marker balls on the top guy lines per FAA for increased visibility. The existing temporary meteorological towers will be removed after the Project is operational.

6.4.2.2 Electromagnetic Fields

Levels of EMF from the Project will be considerably below accepted guidelines. Project-specific EMF levels were not modeled for the 34.5 kV electrical collection lines; however, several studies have documented EMF exposure of various high voltage transmission lines. The NIEHS provides typical EMF levels for power transmission lines (NIEHS, 2002). For 115-kV transmission lines, the lowest voltage with typical EMF levels reported in the study, electric fields directly below the transmission line were reported at 1.0 kV/m before dissipating to 0.5 kV/m at 50 feet (approximate edge of ROW). A Canadian study of collection lines at a wind facility measured EMF (magnetic fields) of the Project's 27.5-kV collection lines, slightly lower voltage than the electrical collection lines proposed for the Project. This study found magnetic fields associated with buried electrical collection lines to be within background levels at one meter above ground (McCallum et al., 2014). EMF from underground electrical collection lines dissipates very close to the lines because they are installed below ground within insulated shielding. The electrical fields are negligible, and there is a small magnetic field directly above the lines that, based on engineering analysis, dissipates within 20 feet on either side of the installed cable.

Research on the potential influence of EMF on organisms and human health has been conducted over many decades to understand basic interactions of EMF with biological organisms and cells, and to investigate potential therapeutic applications. In the 1970s, questions arose about potential adverse health effects from EMF and health conditions, including cancer. Over the past 40 years, considerable additional research has been conducted to address uncertainties in those studies and to determine if there was any consistent pattern of results from human, animal, and cell

studies that would support such an association[16,17,18,19.] The quantity and complexity of the research has led scientific and government health agencies to assemble multidisciplinary panels of scientists to conduct weight-of-evidence reviews and arrive at conclusions about the possible effects associated with EMFs.

Overall, the published conclusions of these scientific review panels have been consistent. None of the panels concluded that either electric fields or magnetic fields are a known or likely cause of any adverse health effect at the long-term, low exposure levels found in the environment. As a result, no standards or guidelines have been recommended to prevent this type of exposure. No impacts due to EMF are anticipated and no mitigation specific to EMF is proposed.

6.4.2.3 Hazardous Materials/Hazardous Waste

Bowman Wind does not anticipate that hazardous waste sites will be encountered within the Project Area during construction. As noted above in the description of existing resources, Bowman Wind will conduct an ASTM-conforming Phase I ESA of the Project Area prior to the start of construction. The Phase I ESA will identify known recognized environmental conditions or historical recognized environmental conditions that may require additional action prior to or during construction. During construction, if hazardous waste sites are encountered, construction will be suspended, and Bowman Wind will contact the North Dakota Department of Environmental Quality (NDDEQ) immediately to determine appropriate next steps.

Bowman Wind will acquire a North Dakota Pollutant Discharge Elimination System (NDPDES) Permit for the Project and develop a Storm Water Pollution Prevention Plan (SWPPP) as part of the NDPDES permit. Hazardous materials used for the construction of the Project will be contained according to the NDPDES Permit. Hazardous materials used for maintenance during operation of the Project will be stored inside a building or surrounded by a containment area to prevent contamination from spills. Bowman Wind will not install USTs for the Project. On-site storage of turbine petroleum products in the O&M facility will be minimal and these materials will be stored aboveground. If oil storage will exceed 1,320 gallons, Bowman Wind will prepare a Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Project.

[16] The NIEHS assembled a 30-person Working Group to review the cumulative body of epidemiologic and experimental data and provide conclusions and recommendations to the U.S. government (NIEHS, 1999).

[17] The International Agency for Research on Cancer (IARC) completed a full carcinogenic evaluation of EMF in 2002 (IARC, 2002).

[18] The International Commission on Non-Ionizing Radiation Protection (ICNIRP), the formally recognized organization for providing guidance on standards for non-ionizing radiation exposure for the World Health Organization, published a review of the cumulative body of epidemiologic and experimental data on EMF in 2003. The ICNIRP released exposure guidelines in 2010 that updated their 1998 exposure guidelines. For both guidelines, they relied heavily on previous reviews of the literature related to long-term exposure, but provided some relevant conclusions as part of their update process (ICNIRP, 2010).

[19] The Swedish Radiation Protection Authority (SSI), which became the Swedish Radiation Safety Authority (SSM) in 2009, evaluated current studies in several reports, using other major scientific reviews as a starting point (SSI, 2007 and 2008; SSM, 2009, 2010, 2013, 2014, 2015, 2018).

6.4.2.4 Security

Bowman Wind does not anticipate that construction and operation of the Project will impact the security of surrounding residents or communities. During operation of the Project, all facilities, including turbine access doors and the Project substation, will be locked and have appropriate warning signage. Additionally, a chain-link fence will be installed around the Project substation and battery storage facility.

6.5 Sound

The following sections describe existing sound conditions, potential impacts, and proposed mitigation.

6.5.1 Existing Conditions

The Project is located in a rural setting in southwestern North Dakota. Sound contributors in the Project Area include farm machinery, roadway traffic and oil facilities and activity. Sound levels in rural settings typically range from 35 to 45 decibels (decibels using the A-weighted scale [dBA]).

6.5.2 Sound Impacts and Mitigation

Sound is generated by wind turbines due to turbulence at the blade tips, from mechanical systems in the hub or nacelle (which radiates throughout the structure), and from transformers at the base of the turbine mast. Sound increases with wind speed until maximum blade rotational speed is reached, which usually occurs when wind speeds reach 8-10 meters per second at the turbine hub.

State regulations require that wind turbines be sited such that sound levels within 100 feet of an inhabited residence or community building do not exceed 45 dBA. Bowman County applies the same noise standard, but only to non-participating residences. Bowman Wind conducted a sound analysis for the Project. The sound analysis assumed that: (i) all primary and spare wind turbine locations will be used (i.e., all 85 turbine positions), (ii) the turbines will be operated at a wind speed resulting in the loudest noise possible being emitted, and (iii) a 2 dBA uncertainty factor is added to each turbine emission. Additionally, as an industry best practice, Bowman Wind included the Project substation (transformer) and battery storage facility in the sound modeling; the Commission and Bowman County sound level limits are specific to wind turbines. For purposes of modeling, Bowman Wind assumed low noise trailing edge (LNTE) blades on all 85 turbines. However, these LNTE blades will not be required at all turbines to meet the noise standard. Bowman Wind has not yet selected the subset of 74 turbines to be constructed or the final turbine model. This modeling resulted in no residences or community buildings experiencing noise levels above 44 dBA within 100 feet of the residence or community building. Bowman Wind will update the sound analysis after the final turbine locations and model have been selected. The Sound Analysis is located in Appendix E – Sound Analysis Report.

6.6 Visual

The following sections describe existing conditions, potential impacts, and proposed mitigation for the visual environment, including potential effects of shadow flicker.

6.6.1 Existing Conditions

The following sections describe existing aesthetic conditions and shadow flicker.

6.6.1.1 Aesthetics

The topography of the Project Area is gently rolling with elevations ranging from 2,940 to 3,440 feet (896 to 1,048 m) above sea level. Elevations are highest in the central portion of the Project Area. The landscape can be classified as rural open space.

Viewsheds in this area are generally broad and uninterrupted, with only small scattered areas where they are interrupted by trees or topography. The settlements in the vicinity are residences and farm buildings (inhabited and uninhabited farmsteads) scattered along rural county roads. The area is also shaped by a built environment. Horizontal elements, such as highways and county roads, are consistent with the long and open viewsheds in the area. Vertical elements such as transmission lines and distribution lines are the tallest and often the most visual feature on the landscape. Oil and gas development is also very prevalent within the Project Area. Temporarily erected oil and gas drilling rigs reach approximately 100 feet above ground level. The pump jacks that are placed over the drilled hole are significantly shorter, 25 to 30 feet at maximum height. The oil and/or saltwater storage tanks on oil production pads are 25 feet at maximum height. The Project Area also contains four communication towers up to 100 feet in height. No visually sensitive areas, such as National Parks, exist in or are directly adjacent to the Study Area.

6.6.1.2 Shadow Flicker

Shadow flicker occurs when the rotating blades of a wind turbine are directly between an observer and the sun, causing alternating light and shadow. Shadow flicker intensity and frequency at a given receptor are determined by a number of interacting factors including sun angle and sun path, turbine and receptor locations, cloud cover and degree of visibility, wind direction, wind speed, obstacles, contrast, and local topography. This effect decreases and ultimately disappears with distance from the turbine and is also eliminated by obstacles between the observer and the turbine, such as trees or terrain. Generally, this distance is 1,500 feet because the shadow, at this distance, is sufficiently diffused that it's not seen as a solid obstruction. Shadow flicker is predictable, and it can be minimized through turbine site selection. Shadow flicker is harmless to humans, though it may be considered by some to be an annoyance (Appendix F – Shadow Flicker Analysis Report).

6.6.2 Visual Impacts and Mitigation

Visual and aesthetic impacts would result from construction of the proposed Project.

6.6.2.1 Aesthetics

Measuring the aesthetic value of a specific landscape is difficult and may vary based on an individual's personal values, experiences, or preferences. The degree of visual contrast will vary based on the viewpoint distance and location in relation to the Project. Given the oil and gas

development in the Project vicinity, there are several structures (oil and gas wells, transmission, communication towers) visible within the Study Area.

The introduction of Project facilities have the potential to alter the existing visual resource where they are most perceptible. During construction, visual impacts associated with the Project facilities would include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, and machinery and tool storage. Other visual effects could result from the removal or alteration of vegetation that may currently provide a visual barrier, or changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture. The degree of visual contrasts will vary based on the viewpoint distance and location in relation to the Project.

During operation, visual impacts associated with wind energy facilities in the Project Area include the presence of wind turbine structures, movement of the rotor blades, shadow flicker, turbine marker lights, and other lighting on control buildings; and other ancillary structures, roads, vehicles, and workers conducting maintenance activities. Visual impacts will vary depending on the viewer's proximity and orientation to the turbines (i.e., a residence within the Project Area vs. outside the Project Area and the direction a residence faces relative to wind turbines), obstructions such as tree lines, the viewer's duration in the Project Area (i.e., a resident vs. a car passing through the Project Area), and the viewer's personal preferences.

Additionally, the FAA requires obstruction lighting or marking of structures more than 200 feet above ground to provide safe air navigation, which is synchronized flashing of red lights for wind turbines (FAA, 2005). As described in Section 6.4, Bowman Wind will coordinate with the FAA on potential implementation of ADLS radar(s), which is consistent with the Commission's requirements in NDAC Chapter 69-06-11. Furthermore, the use of a minimum setback of 2,640 feet between turbines and occupied structures is anticipated to alleviate some of the direct visual impacts to adjacent residents by reducing the intensity of the lights through distance buffers.

Bowman Wind will implement the following additional mitigation measures for visual resources:

- Wind turbines will exhibit visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers.
- Collection cables or lines on the site will be buried in a manner that minimizes additional surface disturbance (e.g., collocating them with access roads, where feasible).
- For ancillary buildings and other structures, low-profile structures will be chosen whenever possible to reduce their visibility.
- Turbine foundations and roads have been designed to minimize and balance cuts and fills.
- Lighting for facilities will not exceed the minimum required for safety and security, and full-cutoff designs that minimize upward light pollution will be selected. Bowman Wind will comply with applicable light-mitigating technology requirements.

6.6.2.2 Shadow Flicker

Bowman County has a requirement of 30 hours of shadow flicker per year for non-participating occupied residences unless a waiver is signed. A shadow flicker analysis was completed for all

known occupied residences within one mile of the 2020 Project Area (143 receptors) using the windPRO software (Appendix F – Shadow Flicker Analysis Report). All 85 wind turbine locations were modeled, even though not all 85 turbine positions will be constructed. All residences are expected to experience below 30 hours per year of shadow flicker.

WindPRO calculates the number of hours per year as well as the maximum minutes per day during which a given receptor could realistically expect to be exposed to shadow flicker from nearby wind turbines. The maximum shadow flicker (hours per year) is 14.0 for participating residences and 13.5 for non-participating residences. Additionally, 119 of the 124 non-participating residences have zero hours of modeled shadow flicker.

Overall, modeled shadow flicker is generally low at all residences due in part to the 2,640-foot residence setback (the Project minimum setback for occupied residences). Additionally, non-participating residences have less shadow flicker due to the Bowman County requirement that turbines are setback at least 2.5 times the rotor diameter from non-participating property. Receptors that experience shadow flicker will typically only experience it when the sun is low in the sky, and when certain meteorological and operational factors are present. If a receptor does experience shadow flicker, it most likely will be only during a few days per year from a given turbine, and for a total of only a fraction (typically less than one percent) of annual daylight hours.

Bowman Wind has sited turbines to minimize impacts to residences. Based on the results of the Project's shadow flicker modeling, no mitigation is currently proposed.

6.7 Cultural and Archaeological Resources

The following sections describe existing cultural and archaeological resources, potential impacts, and proposed mitigation.

6.7.1 Existing Conditions

Bowman Wind received a response from the State Historical Society of North Dakota (SHSND) to its Project introduction letter on May 13, 2020. In its letter, SHSND recommend that Bowman Wind conduct a Class I Literature Review and a Class III Intensive Cultural Resources Pedestrian Survey of all previously un-surveyed areas that may be affected by the Project. The SHSND recommended that the area of potential effect (APE) subject to the Class III Pedestrian Survey be defined as any ground surface area that has the potential to be disturbed by any construction or installed activities associated with the Project.

Additionally, the SHSND recommended a Class II Architectural History Survey within a two-mile visual APE of the turbine array. The two-mile visual APE for the Class II Architectural History Survey includes documentation of all buildings, structures, and objects 45 years of age or older from the Project's anticipated in-service date.

Bowman Wind hired Quality Cultural Resource Services, Inc. (QCRS) to conduct the background literature review and surveys recommended by the SHSND. QCRS conducted a Class I Literature Review of the Project Area plus a two-mile buffer from the Project facilities at the SHSND in September 2019. The review included geospatial site data from the North Dakota State Historic Preservation Office (SHPO) supplemented by in-person records review. QCRS also reviewed the National Register of Historic Places (NRHP) and National Historic Landmark databases. The literature review identified 48 previous inventories that have been conducted within and within two

miles of the Project facilities. In addition, 74 previously recorded cultural resources were identified within and within two miles of the Project facilities.

QCRS conducted a Class III Intensive Cultural Resources Pedestrian Inventory of 21,608 acres within the Project Area between April and November 2020. The Class III survey area was designed to cover the potential layouts under review for the Project at the time of survey; the current proposed layout for the Project is within the area surveyed. The Class III inventory resulted in identification of 287 previously undocumented cultural sites and 14 site updates. Of the 303 cultural sites identified, 127 are recommended as eligible for or unevaluated, but potentially eligible for listing in, the NRHP; avoidance is recommended for all 127 of these cultural sites. The remaining 176 cultural sites are not recommended as eligible for listing in the NRHP and avoidance is not recommended.

QCRS also conducted a Class II Architectural History Survey of the Project Area and a two-mile radius from the Project facilities in May 2020. The survey methodology conformed to the North Dakota SHPO guidelines for considering indirect effects of wind turbine projects and included documentation of all buildings, structures, and objects 45 years of age or older from the Project's anticipated in-service date (SHSND, 2020). The Class II survey resulted in identification of two historic architectural sites within two miles of the Project layout, both of which are recommended as potentially eligible for listing in the NRHP. In addition, two previously recorded but unevaluated historic architectural sites were revisited and evaluated during the Class II survey; neither of these sites are recommended as eligible for listing in the NRHP.

QCRS survey report, which includes detailed information on the methodologies and results of the Class I, Class III, and Class II surveys, is provided in Appendix G.

6.7.2 Cultural and Archaeological Resources Impacts and Mitigation

Ground disturbing activities during construction of the Project have the potential to impact known or unknown cultural resources. Because the Project involves the construction and operation of wind turbines, if historic architectural resources are present in or adjacent to the Project Area, the presence of wind turbines could affect the visual setting of these resources.

Bowman Wind has sited the Project facilities to avoid archeological sites identified and recommended for avoidance as a result of the Class I Literature Review and Class III Pedestrian Survey. Therefore, the Project would not affect historic properties eligible for or listed in the NRHP.

None of the four historic architectural resources identified as a result of the Class II Architectural History Survey will be directly affected by construction or operation of the Project. QCRS notes in its report that the visual setting of these resources already includes modern infrastructure such as transmission lines and oil and gas production facilities; therefore, the wind turbines associated with the current Project would be similar to existing modern developments already present within the visual setting of these resources. For this reason, QCRS recommends that the Project will have no adverse effect on historic architectural resources.

Class I, II, and III survey work for the Project is complete and the survey report and site forms were submitted to the SHSND for review in March 2021 and coordination between Bowman Wind and the SHSND is ongoing.

Bowman Wind has prepared an Unanticipated Discoveries Plan (UDP) for the Project (Appendix G). The UDP details a process for prompt communication and action regarding the discovery of

previously unknown archaeological resources or human remains, should they be encountered during construction. The UDP was submitted to the SHSND for review in March 2021 with the Class I, II, and III report.

6.8 Recreational Resources

The following sections describe existing recreational resources in the Study Area, potential impacts, and proposed mitigation.

6.8.1 Existing Conditions

As noted in Section 6.2.1, there are 7,865 acres of PLOTS lands in the Study Area and 1,296.6 acres of PLOTS lands in the Project Area. PLOTS lands are private lands open to public use for hunting and bird watching that are administered through an agreement between the NDGF and individual landowners. PLOTS lands in the Project Area are located in northwestern Hart Unorganized Territory, east-central Adelaide Township, and northern Amor Township. While PLOTS lands are open to public use for walk-in activities such as hunting and bird watching, activities such as horseback riding, camping, and animal baiting, all-terrain vehicle or snowmobile use, and dog training are prohibited without prior authorization from the landowner. Additional restrictions, such as no hunting when unharvested crops are present, may also be imposed at the landowner's discretion. Hunting on PLOTS lands is only allowed during state-defined hunting seasons, most of which occur in the spring or fall of each year (NDGF, 2019b).

Defined as a recreation area in the Bowman County Zoning Ordinance, there is a shooting range in the northeast corner of the Project Area. There are no other designated recreation areas, public or private parks, or designated trails located in the Project Area.

6.8.2 Recreational Resources Impacts and Mitigation

Approximately 1,297 acres of PLOTS lands are present within the Project Area. Bowman Wind has designed the preliminary Project layout to avoid permanent impacts to PLOTS land (turbines, access roads, permanent met towers, O&M facility, Project Substation, and Battery Storage Facility). Additionally, per the Bowman County Ordinance, Bowman Wind has incorporated a 0.25-mile turbine setback from PLOTS lands. Bowman Wind has also sited temporary crane paths and the laydown yard to avoid PLOTS lands. However, underground collection lines will cross three PLOTS parcels, resulting in 46.0 acres of temporary impacts on these parcels. One of the PLOTS parcels is also hosting a temporary met tower; this temporary met tower will be removed when the wind farm is operational. After the underground collection lines have been installed on these parcels, Bowman Wind will restore the PLOTS lands as near as practicable to pre-construction conditions. Impacts on public use of PLOTS lands could occur if the period of active construction overlaps with the hunting season. Because the impacts on PLOTS land are limited to collection lines, construction impacts will be limited to a few days on each parcel. Should installation of the collection lines occur during a hunting season, the parcel will be closed to hunting for safety and reopen after construction is complete. Bowman Wind will coordinate with landowners to install proper signage at the PLOTS entrances to inform the public of the temporary closures.

Bowman Wind has sited turbines more than one-quarter mile from the shooting range, consistent with the Bowman County Ordinance. As such, no impacts are anticipated, and no mitigation is proposed.

6.9 Effects on Land-Based Economies

The following sections describe existing conditions, potential impacts, and proposed mitigation for agriculture and woodlands.

6.9.1 Existing Conditions

The following sections describe existing agriculture and woodlands in the Study and Project Areas.

6.9.1.1 Agriculture

According to the USDA's 2017 Census of Agriculture, there are 341 farms operating in Bowman County with an average farm size of 2,086 acres (USDA, 2017). Livestock accounts for a larger percentage of total market value of agricultural products sold annually compared to crop sales, at $55 million vs. $20 million, respectively. Cattle and sheep and lambs are the dominant livestock raised in Bowman County and wheat and forage are the dominant agricultural crops by acreage. A discussion of prime farmland in the Study and Project Areas is presented in Section 6.10.

6.9.1.2 Woodlands

As noted in Table 6.2-1, areas classified as Deciduous/Evergreen/Mixed Forest in the NLCD data are present within the Study and Project Areas. Approximately 0.1 percent of the total Study and Project Areas fall into this category. Trees and wooded areas within the Study and Project Areas consist of wooded draws and planted hardwood shelterbelts that provide wind protection around farmsteads or between cropland fields. Because shelterbelts are narrow, they often are not identified in NLCD data. Therefore, Bowman Wind conducted a detailed desktop analysis to map these features, which are also identified as avoidance areas in Section 69-06-08-01(3) of the NDAC. Based on this detailed assessment, there are approximately 138 acres of woodlands in the Project Area.

6.9.2 Land-Based Economies Impacts and Mitigation

The following sections describe impacts and proposed mitigation to agriculture and woodlands.

6.9.2.1 Agriculture

Construction of the Project could cause minimal, temporary impacts to agricultural land from soil compaction and rutting, accelerated soil erosion, crop damage, temporary disruption to normal farming activities, and introduction of noxious weeds to the soil surface. However, the Project will repair and restore temporary impacts and will not significantly impact use of land for agricultural production. As demonstrated by other wind energy projects in North Dakota, agricultural practices continue during construction and operations.

Bowman Wind prioritized siting the Project in previously disturbed agricultural land (i.e., land identified as cultivated crop land and hay/pasture in the NLCD data – see Table 6.2-2). The Project will impact 53.3 acres of agricultural land for the life of the Project. Additionally, approximately 450 acres would be temporarily disturbed during construction. During operations, landowners may continue to plant crops and graze livestock near and up to the turbine pads and access roads after these facilities are installed. In some instances, row crop production will be

impacted by requiring new maneuvering routes around the turbine structures for agricultural equipment.

Row crop production and livestock grazing within the footprint of access roads would be impacted for the life of the Project. However, access roads are designed in such a way that they do not unnecessarily impede agricultural use beyond the footprint of the access road. For example, an access road is designed either at the field edge or sufficient distance from the field edge to allow agricultural equipment adequate room for operation (i.e., planting, maintaining, harvesting). This allows for continued farming in the area around the access road. Additionally, Bowman Wind reviewed the layout with each landowner to discuss siting concerns, particularly related to agricultural activities. The Project substation, O&M facility, and battery storage facility would be fenced, but agricultural production and livestock grazing would be allowed to continue beyond the fenced area.

The loss of agricultural land for operation of the Project will reduce the amount of land that can be cultivated in the Project Area; however, less than one percent of the Project Area will be converted to non-agricultural land use (i.e., wind turbines, access roads, substation, O&M facility, and battery storage facility). This represents minimal impact to agricultural land in the Project Area and will not significantly alter agricultural production in the Project Area or Bowman County.

After construction of the Project is complete, farming and livestock grazing will be allowed to continue on all land surrounding the permanent Project facilities. Up to 53.3 acres of agricultural land (see Table 6.2-2) in the Project Area will be impacted for the life of the Project, which will not result in the loss of any agriculture-related jobs or a net loss of income. Long-term benefits would be seen in the form of profits associated with lease payments from the Project. This additional income would also be reflected as an increase to the county tax base. Additional money brought into the community would likely result in increased spending at local businesses and improvements to the communities and counties.

6.9.2.2 Woodlands

Trees are sparsely located throughout the Project Area and Bowman Wind has designed the Project to minimize tree removal to the extent possible. If tree removal is necessary, Bowman Wind will coordinate with landowners regarding tree removal and replacement and will follow the Commission's tree and shrub mitigation specifications. Any impacts on trees and woodlands from the placement of wind turbines and associated facilities for the Project would be minor in nature considering only 138 acres of woodlands were identified within the Project Area, which represents 0.3 percent of the total Project Area. Bowman Wind will continue to evaluate options to avoid impacts to trees. One access road will cross several tree rows; Bowman Wind will work to microsite the access road between tress within the shelter belt to minimize impacts. Additionally, Bowman Wind will minimize temporary impacts to trees by utilizing irregular shaped workspaces around turbines (i.e., rectangular instead of circular) and bore collection lines under tree lines and woodlots to avoid impacts.

6.10 Soils

The following sections describe existing soil conditions in the Study Area, potential impacts, and proposed mitigation.

6.10.1 Existing Conditions

Soil characteristics within the Study Area and Project Boundary were assessed using the Soil Survey Geographic Database (SSURGO) database (Soil Survey Staff, 2019). The SSURGO database is a digital version of the original county soil surveys developed by NRCS for use with geographic information system (GIS). It provides the most detailed level of soils information for natural resource planning and management. Soil maps are linked in the SSURGO database to information about the component soils and their properties (USDA NRCS, 2020).

There are 205 soil types found within the Study Area and 188 within the Project Area (Soil Survey Staff, 2019). Due to the quantity of soil types, they are provided separately in Appendix H – Soil Types for the Bowman Wind Project. Farmland classifications, including prime farmland, are described below.

Farmland Classification

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating) (USDA NRCS, 2020).

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate State agencies, typically in association with local soil conservation districts or other local agencies.

Table 6.10-1 lists the soils considered prime farmland and soils of statewide or local importance within the Study Area and Project Boundary. Figure 10, Prime and Unique Farmland depicts the distribution of prime farmland, prime farmland if drained, and farmland of statewide importance within the Project Area.

Table 6.10-1 Farmland Classifications within Study Area and Project Area

Farmland Classification	Study Area (acres)	Percentage of Study Area	Project Area (acres)	Percentage of Project Area
Prime Farmland	4,179.2	4.0	1,671.0	4.0
Farmland of Statewide Importance	31,377.4	30.1	13,174.0	31.3
Not Prime Farmland	68,739.5	65.9	27,298.4	64.8
TOTAL	**104,296.1**	**100.0**	**42,134.4**	**100.0**

Source: Soil Survey Staff, 2019

6.10.2 Soils Impacts and Mitigation

Surface disturbance caused by construction of the wind turbines and infrastructure improvements would result in the soil surface becoming more prone to erosion and the use of heavy equipment could result in soil compaction. However, any such impacts to site soils will be localized and BMPs will be implemented to minimize these impacts. These BMPs may include the use of erosion and sediment control during and after construction, noxious weed control, segregating topsoil from subsurface materials, reseeding of disturbed areas, the use of construction equipment appropriately sized to the scope and scale of the Project, ensuring access road grades fit closely with the natural terrain, proper on-site disposal of soil cuttings from turbine foundation construction and maintaining proper drainage. Silt fencing would be utilized in areas under construction as needed to control erosion and storm water runoff. Surface flows would be directed away from cut-and-fill slopes and into ditches that discharge to natural drainages. All roads, turbine pads, and trenched areas would be regularly inspected and maintained to minimize erosion.

Less than one percent of the total land in the Project Area that could be considered prime farmland or farmland of statewide importance will be impacted for the life of the Project. As such, the acreage of prime farmland and farmland of statewide importance removed from use for the life of the Project will have a negligible impact on agricultural production.

Table 6.10-2
Summary of Permanent Impacts to Prime Farmland (acres)

Prime Farmland Classification	# Turbines	Acres[2]
Prime Farmland[1]	2	2.6
Farmland of Statewide Importance	33	45.8
Not Prime Farmland	50	58.3
Total	**85**	**106.7**

[1] This includes soils classified as prime farmland or prime farmland if the limiting factor is mitigated.
[2] Acreage of impacts includes all permanent facilities (turbines, access roads, Project substation, O&M facility, and battery storage facility).

Existing access roads will be used to the extent practicable to prevent further soil disturbance and fragmentation on the landscape. Additionally, all areas of temporary disturbance will be reclaimed with vegetation consistent with the surrounding vegetation types including a native seed mixture. To minimize the impacts of surface water runoff which could impact sediment reaching aquatic habitat, BMP's in accordance with a SWPPP will be implemented including use of silt fencing to control erosion and storm water runoff and directing surface flow away from cut-and-fill slopes and into ditches that discharge to natural drainages. All roads, turbine pads, and trenched areas will be regularly inspected and maintained to minimize erosion. In addition, if more than 1,320 gallons of oil storage occurs on-site during construction, the Project will complete and implement a SPCC Plan.

6.11 Geologic and Groundwater Resources

The following sections describe existing geologic and groundwater resources, potential impacts, and proposed mitigation. Figure 11, Geologic and Groundwater Resources depicts the existing geologic and groundwater resources in the Study and Project Areas.

6.11.1 Existing Conditions

The Study Area is located in a region of North Dakota known as the Missouri Slope, an area of sandstone and shale that was largely unaffected by glaciers that covered the eastern half of North Dakota. The area has an irregular topography with the occasional butte rising above the landscape. Surface geology within the Study Area is predominately composed of three formations: Bullion Creek, Slope, and Ludlow all of which are characterized by sediment between 300 and 600 feet in thickness (Figure 11, Geologic and Groundwater Resources).

The geology of western North Dakota, including Bowman County, has created a rich environment for oil and gas development. Existing oil and gas development infrastructure within the Project Area consist of above ground facilities such as well pads and tank batteries, and underground flowlines and gathering lines. Bowman Wind is in the process of communicating and coordinating with oil and gas companies regarding the Project layout. There are 99 oil and gas wells and 6 associated storage tanks within primarily the southwest portion of the Project Area.

According to the publicly available Sole Source Aquifer GIS database and the North Dakota GIS Hydrography layer, there are no aquifers in Bowman County (ND State Water Commission, 2021). There are 20 domestic/stock/industrial/observational water wells in the Study Area; of these 8 are within the Project Area. Four of these wells are for stock ponds, three are associated with farmsteads, and one is a capped observation well.

6.11.2 Geologic and Groundwater Impacts and Mitigation

Bowman Wind does not anticipate any impacts to bedrock during construction or operation of the Project as bedrock within the Project Area is at depths much greater than proposed foundation depths of four-to-six feet deep. Similarly, Bowman Wind does not expect any impacts to groundwater resources as there are no aquifers in the Project Area and the Project facilities have been designed to avoid water wells.

Water use during construction will provide dust control and water for concrete mixes. One temporary batch plant may be needed to supply concrete for construction of the Project. The batch plant may be able to use rural water service but is more likely to require well water. The water source will be determined prior to construction when a contractor is selected to construct the Project.

The O&M facility will likely require a new private well water supply. Water usage during the operating period will be similar to household volume; less than five gallons per minute. Use of water for operations will be negligible. The Project will not require the appropriation of surface water or permanent dewatering.

Bowman Wind continues to coordinate with oil and gas companies regarding the Project layout. Bowman Wind's Project design takes the identified locations of the facilities into account so that no problems arise during construction or operations of the Project. Additionally, Bowman Wind sited turbines at least one rotor diameter (158 meters) from all existing and active above ground oil and gas wellhead and tank battery locations. Prior to and during construction, Bowman Wind will continue to coordinate with oil and gas companies in or near the Project Area to allow for the continued development of both the mineral and surface estates.

6.12 Surface Water and Floodplain Resources

The following sections describe existing surface water and floodplain resources in the Study Area, potential impacts, and proposed mitigation. Figure 12, Water Resources depicts the existing water resources in the Study and Project Areas.

6.12.1 Existing Conditions

The Study Area is located in primarily in two watersheds: the Upper Little Missouri in the western portion of the Study Area and the North Fork Grand in the eastern half of the Study Area. Additionally, a small portion of the Middle Little Missouri watershed basin occurs in the northern portion of the Study Area; this watershed is not present in the Project Area. These watersheds are within the western mixed-grass/short-grass prairie region. This region contains few natural wetland basins, but small creeks and streams are present (Figure 12, Water Resources). Wetlands in this area are typically associated with creeks and streams instead of isolated "potholes."

Based on 2019 statewide Federal Emergency Management Agency (FEMA) data, there are 95 acres of 100-year floodplain in the Project Area (Figure 12, Water Resources). These floodplains are associated with Spring Creek and an unnamed tributary of Spring Creek in the northern portion of the Project Area and Cold Turkey Creek in the central southeast portion of the Project Area.

6.12.2 Surface Water and Floodplain Resources Impacts and Mitigation

Project facilities have been designed to avoid or minimize impacts on surface water resources to the extent practicable. Wind turbines will be built on uplands to avoid surface water resources in the lower elevations to the extent practicable. Access roads have been designed to avoid crossing streams and other surface waters. Some collection lines and crane paths will cross streams during construction of the Project.

Construction of Project facilities (such as underground electrical collector lines, access roads, crane paths, turbine pads, Project substation, O&M facility, and battery storage facility) will impact land, and therefore could potentially impact surface water runoff within the Project Area. Ground-disturbing construction activities also have the potential to cause sedimentation. These impacts are expected to be minimal and would only occur during construction. These impacts will be avoided and/or minimized through use of BMPs. In addition, if, during construction, more than 1,320 gallons of oil storage occurs on-site, the Project will complete and implement a SPCC Plan.

The Project will comply with EPA regulations regarding storm water runoff, including the creation of a SWPPP. This plan will address the construction-related, temporary measures and permanent restoration methods to slow storm water runoff and avoid sediment reaching streams and rivers. Silt fencing will be utilized in areas under construction, as needed, to control erosion and storm water runoff. Surface flows will be directed away from cut-and-fill slopes and into ditches that discharge to natural drainages. All roads, pads, and trenched areas will be regularly inspected and maintained to minimize erosion.

The Project will not permanently impact floodplain areas.

6.13 Wetlands

The following sections describe existing wetlands in the Study Area, potential impacts, and proposed mitigation.

6.13.1 Existing Conditions

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated much of the year). Wetland types include marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.

Wetlands within the Project Area were identified using the National Wetlands Inventory (NWI). There are 638 acres of wetlands in the Project Area, most of which are associated with creeks and streams (Figure 12, Water Resources).

In addition, field wetland delineations were completed September 14-16, 2019, May 11-15, 2020, September 22-28, 2020, and October 21, 2020 to determine if these wetlands fall under U.S. Army Corps of Engineers (USACE) jurisdiction. Wetlands were delineated within a survey corridor that included any ground surface area that has the potential to be disturbed by any construction or installed activities associated with the Project. The field delineation identified 584 acres of wetlands within the survey corridors.

6.13.2 Wetlands Impacts and Mitigation

The Project has been designed to avoid permanent impacts to delineated wetlands. Turbines and met towers will be constructed on higher ground within the Project Area to maximize the wind resource, and as such, will not permanently impact wetlands. Additionally, the preliminary design of the O&M facility, Project Substation, and battery storage facility are also designed to avoid permanent impacts on delineated wetlands. One access road will cross a wetland complex associated with a stream resulting in 0.02 acres of permanent impacts to a delineated wetland. Bowman Wind has designed this access road to cross the wetland at a location that minimizes the length and overall impact. The access road will be designed with a culvert to maintain wetland function.

Temporary impacts to wetlands may occur from the use of temporarily widened access roads and crane paths, installation of collection lines, and workspaces used during turbine construction. Temporary impacts associated with the use of temporary access roads and crane paths will be minimized by the use of matting during construction. Installation of underground utilities is expected to minimize temporary impacts to wetlands through the use of horizontal drilling or where possible make them coincident with other temporary impacts (e.g., crane paths). Based on preliminary design, there will be up to 3.6 acres of temporary impacts to delineated wetlands.

The Project has communicated with the USACE, North Dakota Regulatory Office, as part of pre-construction due diligence. The USACE noted that if the Project results in work over, in, or under navigable waters (Section 10 of the Rivers and Harbors Act) or the discharge of dredged or fill materials into water of the United States (Section 404 Clean Water Act), a Section 10 and/or Section 404 permit will need to be acquired from the North Dakota Regulatory Office. No Section 10 waters are located in the Project Area. Bowman Wind anticipates that impacts to USACE jurisdictional waters will be permitted under the Nationwide Permit program.

6.14 Vegetation

Construction of a wind farm will temporarily disturb vegetative cover. Operation of the Project will remove the permanent footprint of facilities from a vegetative to impervious surface (i.e., gravel). The following sections describe existing vegetation, potential impacts, and proposed mitigation.

6.14.1 Existing Conditions

The Project is within the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (EPA, 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. As shown in Table 6.2-1, based on NLCD data, approximately 45 percent of the Study Area and 43 percent of the Project Area are shrub/scrub, grassland/herbaceous covers approximately 29 percent of the Study Area and 32 percent of the Project Area, and cultivated crops make up 21 and 20 percent of the Study Area and Project Area. Additionally, Bowman Wind conducted specific grassland assessments related to grassland breeding birds and potential displacement. Therefore, it is discussed in Section 6.15. Woodlands comprise less than 1 percent of the total Project Area and are discussed in Section 6.9, Effects on Land-Based Economics.

NDCC Ch. 4.1-47 identifies 13 noxious weed plant species: absinth wormwood (*Artemisia absinthium*), Canada thistle (*Cirsium arvense*), dalmation toadflax (*Linaria dalmatica*), diffuse knapweed (*Centaurea diffusa*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia esula*), musk thistle (*Carduus nutans*), Palmer amaranth (*Amaranthus palmeri*), purple loosestrife (*Lythrum salicaria*), Russian knapweed (*Acroptilon repens*), spotted knapweed (*Centaurea maculosa*), yellow toadflax (*Linaria vulgaris*), and salt cedar (*Tamarix* spp.). Cities and counties are also able to list additional noxious weeds for control within their jurisdiction. Bowman County has not listed any additional species than the State.

6.14.2 Vegetation Impacts and Mitigation

The Project will impact 100.0 acres of vegetation, over half of which is agricultural (cultivated crops and grassland/herbaceous; see Table 6.2-3) for the life of the Project. There are an additional 8.2 acres of permanent impacts to land classified as developed. Construction of the Project will temporarily impact 1,297 acres of vegetation. Following construction, the temporarily disturbed areas will be re-vegetated with a seed mixture consistent with the surrounding vegetation and free of noxious weeds. Once re-vegetated, these areas will be available for their present use (e.g., cultivation, grazing, and prairie).

Bowman Wind has minimized disruptions to vegetative communities to the extent practicable by coordinating the location of roads with landowners and utilizing existing roads, driveways, edge of field lines, or other previously disturbed areas for proposed facility access road locations to the extent possible. Bowman Wind has also collocated linear facilities (crane paths, collection lines, and access roads) as much as possible.

Bowman Wind will seek to locate subsurface utilities adjacent to access roads or as otherwise reviewed with landowners.

Bowman Wind will develop and implement a Noxious Weed Management Plan that will identify and establish the procedures to prevent the introduction and spread of noxious weeds during construction and ongoing operations.

6.15 Wildlife

Bowman Wind conducted numerous wildlife studies over the course of two years to evaluate, avoid and minimize potential impacts to species of concern from Project development and operation. The wildlife surveys summarized in Table 6.15-1 below were conducted in coordination with NDGF and USFWS and consistent with the voluntary USFWS Wind Energy Guidelines (USFWS 2012) and Eagle Conservation Plan Guidance (ECPG; 2014).

Table 6.15-1 Summary of Wildlife Studies at Bowman Wind Project [1]

Survey Type	Study Period	Reference
Avian Use Surveys	August 2017 − July 2018	LeBeau et al. 2020a
Avian Use Surveys	August 2018 − July 2019	LeBeau et al. 2020b
Raptor Nest Survey and Monitoring	March, June 2018	SWCA Environmental Consultants (SWCA) 2018a
Prairie Grouse Lek Monitoring	April 2018	SWCA 2018b
Prairie Dog Colony Mapping	June 2018, March 2019	SWCA 2018c, EEI 2019a
Grassland Assessment	August 2018	SWCA 2018d
Raptor Nest Check Survey	October 2018	Chodachek 2019a
Raptor Nest Survey	March, May 2019	EEI 2019b
Prairie Grouse Lek Monitoring	April 2019	Chodachek 2019b
Northern Long-Eared Bat Habitat Assessment	September 2019	Chodachek and Bishop-Boros 2019
Grassland Assessment	May 2020 and October 2020	Chodachek and LeBeau 2020
Bat Acoustic Monitoring	July 2020 − October 2020	Bishop-Boros and Chodachek 2020

[1] Bowman Wind has been conducting wildlife studies for the Project since 2017; based on the results of the studies, and in coordination with agencies, the Project Boundary has evolved over time to minimize potential impacts to wildlife. The various assessment areas, Project boundaries, and results of each survey listed in this table are discussed in detail in the BBCS for the Project (Appendix I) and are also summarized in the sections below.

As is further discussed in Section 9.0, Bowman Wind has received input and comments on study results from USFWS, NDGF, and North Dakota Parks and Recreation (NDPR) related to wildlife species and habitat. Specifically, the USFWS provided information related to federally listed species (discussed in Section 6.16), eagles, birds of conservation concern, and other migratory birds. NDGF expressed concerns about the potential for negative impacts on native habitats as a result of the Project. In particular, the NDGF expressed concern about areas of unbroken grassland and species of concern including greater sage-grouse, sharp-tailed grouse, golden and bald eagles, bats, and whooping cranes that may occur in the Project Area. The NDPR further noted the following rare animal species were identified within or near the Project Area as a result of a North Dakota Natural Heritage biological conservation database review: black-tailed prairie dog, Ord's kangaroo rat, northern mockingbird, and Brewer's sparrow. The NDPR deferred further comment on the Project's potential to affect these species to the NDGF and the USFWS. The black-tailed prairie dog and Brewer's sparrow are discussed further below. No additional comments were received from NDGF or USFWS regarding the Ord's kangaroo rat or northern mockingbird.

6.15.1 Existing Conditions

The following sections describe avian and mammalian species, including bat species, identified during studies as occurring in the Project Area.

6.15.1.1 Avian Species

Migratory Birds

The Migratory Bird Treaty Act (MBTA) was enacted in 1918 for the purpose of prohibiting the use of birds and bird parts in the millinery industry. Under the MBTA, it is illegal "to pursue, hunt, take, capture, kill … possess, offer for sale, sell … purchase … ship, export, import …transport or cause to be transported… any migratory bird, any part, nest, or eggs of any such bird …" (16 United States Code [USC] 703). The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 Code of Federal Regulation [CFR] 10.12). The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

Further, the 1988 amendment to the Fish and Wildlife Conservation Act mandates that the USFWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973." As a result of this mandate, the USFWS created the Birds of Conservation Concern (BCC) list (USFWS, 2008). The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions and coordinating consultations in accordance with Executive Order 13186. The Project is located within Bird Conservation Region (BCR) 17 (Badlands and Prairies), which includes 28 BCC species.

As discussed in Sections 6.2 and 6.14, the predominant vegetation cover types in the Project Area are shrub/scrub (43.1 percent) and grassland/herbaceous (31.9 percent), which support both migratory and resident bird species for resting, foraging, and breeding activities.

Bowman Wind completed two years of baseline general avian use surveys to evaluate potential impacts to MBTA-protected species. Fixed-point avian use surveys to quantify avian use of the Project Area were completed from August 2017 to July 2019. The objective of these surveys was to evaluate species composition and seasonal and spatial use of the Project Area by birds, with a particular focus on eagles and species of concern. Survey methods were developed in accordance with recommendations outlined in the Wind Energy Guidelines (WEG; USFWS, 2012), Appendix C(1)(a) of the ECPG (USFWS, 2013), December 2016 Final Eagle Rule (USFWS, 2016) and recommendations from USFWS and the NDGF.

For the first year of study, no federally listed threatened or endangered species were observed during avian use surveys. The most commonly observed small birds were horned lark, western meadowlark, and Lapland longspur, comprising 25, 20, and 14 percent of small bird observations, respectively. The most commonly observed large bird was Canada goose (80.0% of large bird observations); most of these observations occurred during the migration season in October and November. Nine identified diurnal raptor species were observed during surveys; Swainson's hawk and northern harrier were the most common non-eagle raptor species observed. There were fifteen observations of bald eagles and 72 observations of golden eagles during surveys. In

addition, five Species of Conservation Priority (ferruginous hawk, Swainson's hawk, chestnut-collared longspur, Brewer's sparrow, and lark bunting) were recorded during surveys. Overall, species diversity was low, with thirteen unique large bird species and 29 unique small bird species observed during the first year of avian surveys.

During the second year of the avian use surveys, there were also no federally listed species observed. Similar to the first year of avian surveys, the most commonly observed small birds were horned lark (25.0% of observations) and western meadowlark (19.9%); red-winged blackbird (14.2%) was the third most frequently observed small bird during the second year instead of Lapland longspur. Also similar to the first year of avian surveys, Canada goose was the most commonly observed large bird (45.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 10% of large bird observations recorded. Northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28) were the most common non-eagle raptor species observed. Fifteen bald eagle, 47 golden eagle, and two unidentified eagle observations were made during surveys or incidentally. In addition, eight Species of Conservation Priority (ferruginous hawk, marbled godwit, Swainson's hawk, Wilson's phalarope, Baird's sparrow], chestnut-collared longspur, grasshopper sparrow, and lark bunting) were recorded during surveys. More species were observed in the second year of avian surveys with 37 large bird species and 38 small bird species recorded.

Of the 28 BCC species included in BCR 17 (Badlands and Prairies), the following eight species were observed in the Project Area during avian use surveys: Baird's sparrow, bald eagle, Brewer's sparrow, chestnut-collared longspur, ferruginous hawk, golden eagle, grasshopper sparrow, and marbled godwit.

Raptors and Eagles

Bowman Wind's coordination with the USFWS regarding the Project included a meeting with the USFWS in July 2017 to discuss and receive input on the Tier 1/Tier 2 and Stage 1 risk reviews completed in accordance with the USFWS Land-based Wind Energy Guidelines (2012) and Eagle Conservation Plan Guidance (ECPG; 2014), and to discuss Tier 3 study plans to assess site-specific issues of concern. As a result of these discussions with USFWS, Bowman Wind conducted raptor and eagle nest aerial surveys in March 2018 and completed additional follow-up ground monitoring at specific nest locations in June and October 2018. Additional raptor nest survey work was completed in 2019. Surveys in both years were completed for the Project Area at the time of the survey (both of which included the current Project Area) and associated one-mile buffer for raptors and 10-mile buffer bald and golden eagles.

Raptors

In 2018, raptor nest surveys identified four occupied non-eagle raptor nests in the current Project Area (eagles are discussed separately below). The occupied nests included one great horned owl and three unknown species. In 2019, six occupied non-eagle raptor nests were identified in the current Project Area; these nests were either great horned owl or ferruginous hawks. In both years, additional occupied and non-occupied raptor nests were identified west and south of the current Project Area (see the BBCS for more information).

Eagles

Under authority of the Bald and Golden Eagle Protection Act (BGEPA; 16 USC 668–668d), bald eagles and golden eagles are afforded additional legal protection. The BGEPA prohibits the take,

sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof (16 USC 668). The BGEPA also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" (16 USC 668c), and includes criminal and civil penalties for violating the statute. The term "disturb" is defined as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury to an eagle, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior (50 CFR 22.3).

Known nest data obtained from the NDGF and USFWS prior to surveys included 30 known eagle nest locations within the 10-mile survey buffer of the 2018 and 2019 Project boundaries. None of the 30 known eagle nests were located within the Project Area. Of those 30 known eagle nest locations provided by the agencies within the 10-mile survey buffer, only nine were located during aerial surveys.

No bald or golden eagle nests were identified within the Project Area during aerial surveys in 2018 and 2019. In 2018, no bald eagle nests were recorded at all during aerial surveys. There were eleven golden eagle nests identified outside the Project Area, four occupied and seven unoccupied. The nearest occupied golden eagle nest is located 7.7 miles west of the 2020 Project boundary. In 2019, one occupied bald eagle nest was recorded along the Little Missouri River west of the Project Area, and two occupied golden eagle nests were recorded also west of the Project Area (different than the confirmed occupied golden eagle nests in 2018).

In addition to conducting surveys for eagle nests, per recommendations from the NDGF and USFWS, Bowman Wind also conducted surveys for black-tailed prairie dogs, which are a known potential prey source for eagles. Based on aerial photography, ground-based surveys, and aerial surveys (concurrent with the 2019 raptor nest survey) between 2018 and 2019, there were two active black-tailed prairie dog colonies in the 2020 Project Area ranging in size of 4 to 28 acres.

Prairie Grouse Species

Ground-based grouse lek monitoring surveys were completed to document greater sage-grouse and sharp-tailed grouse lek activity at known lek locations in 2018 and 2019. NDGF provided lek location data prior to surveys. The NDGF data indicated no known greater sage-grouse leks in the 2020 Project Area and one sharp-tailed grouse lek in the northeast corner of the 2020 Project Area. In both survey years, the sharp-tailed grouse lek in the Project Area was inactive. The NDGF data indicated four greater-sage grouse leks within approximately one mile of the Project Area; however, all four leks were inactive during surveys. Active sage grouse and sharp-tailed grouse leks were observed near the South Dakota border approximately seven miles south of the Project Area (Appendix I – BBCS).

In addition, NDGF conducted greater sage-grouse lek surveys in April 2019 and April 2020 near the Project (Kolar, 2020). Lekking activity was recorded by NDGF in 2019 and 2020 at a sage-grouse lek approximately 0.8 mile west of the Project Area; Bowman Wind surveyed this lek in 2019 and did not observe any lekking activity.

6.15.1.2 Mammals

Common mammals that may occur within the Project Area include white-tailed deer, coyote, red fox, raccoon, badger, striped skunk, three-lined ground squirrel, and western harvest mouse. All of these species can be found throughout North Dakota and do not require special habitat types.

All of these species are habitat generalists whose ranges coincide with the Project Area. If Project construction were to impact these species' habitat, these species could readily relocate to adjacent unaffected areas and continue to thrive.

6.15.1.3 Bat Species

To characterize bat activity in the Project Area, Bowman Wind installed acoustic stations on two temporary met towers within the Project Area from July 8 through October 28, 2020. A total of 976 bat passes were recorded during 216 detector-nights. The majority (approximately 67 percent) of the bat passes were classified as high frequency bat passes, which is representative of species such as eastern red bat, little brown bat, and western small-footed bat. The remaining bat passes were low-frequency passes, which is representative of species such as big brown bat, hoary bat, and silver-haired bat. The detection software picked up potential calls from the northern long-eared bat (NLEB) on three of the 216 detector-nights; however, qualitative identification of these calls, conducted by a qualified biologist, determined that the calls were not produced by the NLEB.

The average bat activity rate was relatively low compared to other projects in the Midwest that have completed similar studies of bat activity. Overall, weekly bat activity increased from less activity at the beginning of the survey to a peak in late July and early August, with a secondary peak in late August. These peaks are correlated with bat migration periods.

Bowman Wind also conducted a NLEB Desktop Habitat Assessment to identify potentially suitable NLEB summer habitat (roosting and foraging) within the Project Area. The assessment found that no potentially suitable summer NLEB habitat exists within the Project Area, due to insufficient size of forested areas present.

Based on the bat activity data and NLEB Desktop Habitat Assessment, bat species likely use the Project Area for foraging or during migration; potential hibernacula (usually a cave or mine that provides a constant temperature and protection for winter hibernation) and roosting sites are not known to occur in the Project Area or vicinity.

6.15.2 Wildlife Impacts and Mitigation

6.15.2.1 Avian Species

<u>Migratory Birds</u>

Birds may be impacted directly or indirectly as a result of the construction and operation of wind facilities. Direct impacts may result from collision with operating turbines and from the clearing and construction of the Project. Indirect impacts on birds may occur through displacement or avoidance of habitat. While direct impacts can be readily observed and quantified, indirect effects are more difficult to quantify. Few recent studies are available in comparable landscapes that provide both pre- and post-construction data from which to draw correlative inferences about potential impacts to birds.

In both years of pre-construction avian surveys, Canada goose was the most often observed large bird species. These observations occurred during spring migration; it is unlikely that Canada goose or other waterfowl nest in the Project Area due to lack of suitable wetland habitat (such as is characteristic of the Prairie Pothole Region in central and eastern North Dakota). While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl

fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project. The most commonly observed small birds during two years of surveys were horned lark and western meadowlark. These species are typical of this region and are also widespread and abundant.

Overall, the species composition, seasonal abundance, and spatial use patterns documented during avian surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region.

Grassland Breeding Birds

Over the progression of three plus years of agency coordination and consultations, Bowman Wind discussed with the USFWS and NDGFD ways to address their concerns regarding potential impacts to unbroken native grasslands. Based on this agency coordination, Bowman Wind conducted extensive localized wildlife and vegetation surveys to evaluate and inform siting decisions to avoid and minimize potential impacts. In addition, Bowman Wind has committed to using the best available science to calculate offsets for any remaining potential displacement to grassland birds.

Bowman Wind is voluntarily implementing avoidance and minimization measures for unbroken grasslands, as there are no local, state, or federal requirements for or prohibitions against development on grasslands. As was previously detailed, Bowman Wind revised the proposed Project boundary and reduced the final Project area from 102,316 acres to 61,325 acres. Doing so shifted the proposed Project to the north, thereby avoiding large, intact unbroken grasslands in the southern extent of the original proposed Project boundary. Other avoidance and minimization measures included focusing leasing efforts on more actively managed agricultural lands (cropland and hay/pasture), placing access roads along section lines and within agricultural fields to minimize further fragmentation, and moving the vast majority of turbines to active agricultural fields. Lastly, Bowman Wind will use approved native seed mixes (as appropriate and where final approval is granted by the landowner) to restore temporary impact areas associated with construction activities.

In coordination with the USFWS and NDGF, Bowman Wind discussed the use of peer reviewed or other model processes that analyzed potential impacts to localized wildlife and vegetation communities. Currently, the Shaffer et al. 2019 model is the best available scientific method for determining potential displacement impacts to grassland birds. However, the application of the Shaffer et al. 2019 model is not directly applicable to the Bowman Wind site. The primary reason is that the Shaffer and Buhl 2016 study, which was used to inform the Shaffer et al. 2019 model, occurs in (1) a different vegetation ecoregion of North Dakota and South Dakota, and (2) wholly within undisturbed native grassland tracts. Therefore, the bird composition and densities that inhabited the mixed grass prairie area analyzed for the Shaffer and Buhl 2016 study are different when compared to the Bowman Wind Project Area. The Project occurs in a drier region of North Dakota, within a mixed grassland scrub vegetation ecoregion, and turbine locations are primarily sited in actively managed agricultural lands. Thus, the observed bird densities and species composition at the Project site are different those in the Shaffer and Buhl 2016 study. In addition,

the C. Loesch, USFWS, grassland habitat data layer is the primary data input for the Shaffer and Loesch GIS model. The C. Loesch, USFWS, grassland habitat data is a coarse scale raster layer that also includes the designation of suitable and unsuitable grassland designations. Even with these primary differences, which are likely to overstate potential displacement to grassland birds at the Project site, Bowman Wind decided to use the Shaffer et al. 2019 model as the basis for calculating potential displacement and to facilitate discussions with USFWS and NDGF.

Upon learning that the NDGFD does not distinguish the C. Loesch, USFWS, unsuitable grassland data from suitable grassland data in their internal analyses, Bowman Wind completed another micro-siting exercise to further revise its methodology and further avoid and minimize potential impacts to unbroken grasslands. The layout presented in this Application only contains four turbine locations on unbroken grasslands. Bowman Wind also updated the resulting grassland bird displacement calculations, and incorporated the results into the Bowman Wind BBCS document. Lastly, as was previously detailed in prior agency consultation meetings, Bowman Wind has committed in the BBCS to use averted loss to voluntarily offset potential impacts, which is one of the key principles of the Shaffer et al. 2019 peer-reviewed paper. To meet this commitment, Bowman Wind plans to acquire unbroken grassland conservation easements for the life of the Project.

Raptors and Eagles

Raptor nests identified in the Project Area include great horned owl and ferruginous hawks, both of which build stick nests in trees. Bowman Wind has designed the layout to minimize tree clearing and potential impacts to these nests. Additionally, Bowman Wind has sited turbines at least one-quarter of a mile from identified active, occupied raptor nests.

Based on the eagle nest surveys, there are no bald or golden eagle nests in the Project Area. Bald eagles were recorded using the Project during spring, fall, and winter, which suggests bald eagles are using the area for foraging and not for breeding. Bald eagle prey resources such as waterfowl and prairie dogs can be found within the Project and bald eagles will likely scavenge on livestock carcasses and wildlife carrion when available. Spatial use was similar over two years of surveys, which indicates the potential presence of a prey base, but the lack of major water features and preferred nesting habitat suggests that the Project is not likely to attract bald eagles in large numbers.

Golden eagles were recorded during all seasons, with the highest use during winter and fall, suggesting increased use of the Project during the migration periods and winter. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat for golden eagles. Although nesting habitat is limited within the Project, primary prey resources, including black-tailed prairie dogs, lagomorphs, and livestock (including sheep and cattle) are located within the Project. Golden eagle use was slightly more concentrated in the northern and central regions of the Project, which is likely due to the presence of prey (prairie dog colonies in northern region) and greater topographic relief of the Medicine Pole hills in the central region providing foraging opportunities. Based on the presence of foraging habitat and availability of potential prey resources, golden eagle use within the Project is likely to occur year-round, which is typical for this region. There are two active black-tailed prairie dog colonies within the Project Area that may serve as a potential prey source. Bowman Wind has sited turbines at least 500 feet from active prairie dog colonies.

Bowman Wind is currently preparing an Eagle Conservation Plan to address potential operational risks to bald and golden eagles. Bowman Wind plans to reinitiate consultation with the USFWS Region 6 Migratory Bird group to voluntarily pursue an eagle take permit for the Project.

Prairie Grouse

No prairie grouse activity was documented within the Project at known lek sites. However, sharp-tailed grouse were observed during avian use surveys conducted within the Project Area suggesting potential suitable breeding and nesting habitat exists within the Project Area. Similar to other breeding birds that rely on intact native grasslands for nesting, potential impacts to unbroken native grasslands and grassland dependent species such as sharp-tailed grouse can be minimized through siting of turbines, roads, and other infrastructure in previously disturbed lands. Bowman Wind has minimized siting turbines in unbroken grassland; 81 of 85 turbines are sited in broken grassland or other previously disturbed habitats to minimize impacts to sharp-tailed grouse. Additionally, the closest turbine to a sharp-tailed grouse lek is 0.6 miles; this lek was unoccupied in both years of lek surveys.

The lack of greater sage-grouse observations and very limited breeding activity at one known lek suggests it is unlikely that greater sage-grouse will use the land within the Project Area to satisfy their life requirements (foraging, nesting, wintering). If use of the Project were to occur it would be isolated to remaining intact sagebrush habitats within close proximity of leks. Bowman Wind has buffered the active NDGF greater sage-grouse lek 0.8-mile west of the Project Area by two miles to minimize impacts to this species. Siting wind energy infrastructure >0.93 mi from occupied/active leks and in a manner that does not bisect leks minimizes the potential for adverse impacts to sage-grouse breeding activity (LeBeau et al. 2017b). NDGF expressed concern about turbines within greater sage grouse Priority Conservation Area (PCA), which partially extends into the western portion of the Project Area. Based on the best available science for grouse, impacts from wind energy development are not expected to extend beyond one mile from infrastructure. Therefore, Bowman Wind's placement of infrastructure in areas with existing fragmentation and at least 2 miles from leks is not expected to impact the local sage-grouse population (LeBeau et al. 2017a,b). Connectivity between habitats is also not expected to be impacted given that the infrastructure located within the PCA is in the eastern-most extent and in areas with existing fragmentation, so affects to the local sage-grouse population and their habitats (if any) have already occurred. Considering all of the information outlined above, Bowman Wind believes it has sited Project infrastructure to avoid and minimize potential impacts to any local, remnant sage-grouse populations.

Bowman Wind has also prepared a BBCS based on the results of surveys and agency recommendations, which outlines specific mitigation measures that Bowman Wind has implemented during Project layout and design, or plans to implement during construction and operation to avoid and minimize potential impacts on birds (Appendix I), including but not limited to the following:

Project Layout and Design

- To reduce the potential for bird strikes with electric lines, all Project collector lines will be buried underground.
- Tree clearing, in general, will be minimized by utilizing existing roads and minimizing the size of clearings needed around turbines, to the maximum extent

practicable. This measure will minimize potential disturbance to nesting birds as well as minimize conversion of natural areas to Project facilities (habitat loss).

Construction

- Wildlife friendly erosion measures will be used during construction to minimize entrapment and potential mortality of small animals and reptiles.
- All employees and contractors working on the site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species and protected species.

Operation

- Lighting will be minimized, and/or downward projecting lights or motion sensor-activated lights will be installed as practicable to minimize attractants to birds/bats.
- Lighting that does not escape the nacelle will be used, or nacelle lights will be turned off at night as practicable to minimize attractants to birds/bats.
- Wildlife carrion and livestock carcasses in proximity to the turbines will be reported for removal as practicable. This measure reduces the attractiveness of the Project to avian scavengers and prey species.

Additionally, Bowman Wind will conduct post-construction fatality monitoring surveys, which will be developed in coordination with the USFWS and NDGF. And lastly, Bowman Wind plans to acquire unbroken grassland conservation easements for the life of the Project as a voluntary offset for potential grassland breeding bird impacts.

6.15.2.2 Mammals

Ground clearing activities associated with construction of the turbines and associated facilities would result in the direct conversion of habitat for ground-dwelling wildlife. The white-tailed deer, coyote, red fox, raccoon, badger, striped skunk, three-lined ground squirrel, and western harvest mouse discussed in the previous section are habitat generalists and can readily relocate to adjacent unaffected areas and continue to thrive.

Turbines and access roads have been sited to avoid wooded draws and shelterbelts to the extent practicable and tree removal will be minimal. To minimize degradation of habitat, Bowman Wind will reclaim all areas of temporary disturbance with vegetation consistent with the surrounding vegetation types and approved by the landowner. The Project will work with NRCS on an appropriate seed mixture for reclamation and will restore vegetation as approved by the landowner. Additionally, tree impacts will be mitigated, as approved by the landowner and consistent with the Commission's tree and shrub mitigation specifications.

6.15.2.3 Bat Species

Potential impacts to bat species from the construction and operation of the Project include direct impact due to collision and indirect impacts due to roosting habitat loss (tree removal). Turbines and access roads have been sited to avoid wooded draws and shelterbelts to the extent practicable and minimal tree removal is expected.

To minimize degradation of habitat, Bowman Wind will reclaim all areas of temporary disturbance with vegetation consistent with the surrounding vegetation types and approved by the landowner. The Project will work with NRCS on an appropriate seed mixture for reclamation and will implement as approved by the landowner. Additionally, tree impacts will be mitigated, as approved by the landowner and consistent with the Commission's tree and shrub mitigation specifications.

Overall, risk of mortality to bats in the Project Area is likely to be greatest on nights during fall migration, when bat migration rates are the highest. During the fall migration, weather conditions that are most conducive to higher mortality rates occur with warm temperatures (greater than 50 degrees Fahrenheit) and low wind speeds (less than 6.5 m/s) (Baerwald et al., 2009, Arnett et al., 2010, Good et al., 2011, Cryan and Brown 2007). In addition, risk is higher on the first night following the passage of a low-pressure system when the prevailing wind shifts from a southerly to a northerly direction (Cryan and Brown 2007, Good et al., 2011).

Bat activity was relatively low throughout the study period and peaked from late July through August which is consistent with the timing of peak fatalities for most wind energy facilities in the US (AWWI, 2018). Fatality rates at the Project are likely to be similar to fatality rates from nearby wind projects, especially if habitat is similar. The nearest publicly available wind energy facility is the Prairie Winds ND1 wind facility (PW ND1), located approximately 167 miles (268 kilometers) northeast of the Project, which has similar land cover dominated by cattle ranching followed by farming. PW ND1 reported a relatively low bat fatality rate (2.13 bat fatalities/MW/study period; Derby et al. 2011). Due to similarity in land cover and given its proximity in North Dakota, the Project may have similarly low bat fatality rates. However, since the Project will have fewer, larger MW turbines, it is uncertain how that factor may influence fatality rates per MW in comparison to PW ND1 (Electric Power Research Institute 2020).

As discussed in Section 6.15.2. Bowman Wind has prepared a BBCS that will be implemented during construction and operation of the Project (Appendix I). The BBCS documents Bowman Wind's compliance with relevant wildlife laws and regulations and has been developed in a manner that is consistent with the USFWS Land-Based WEG (USFWS, 2012a). The BBCS documents the measures to be implemented during siting, construction, and operations that avoid and minimize impacts to bats by the Project. As indicated in the BBCS, Bowman Wind will conduct post-construction fatality monitoring surveys, which will be developed in coordination with the USFWS and NDGF.

6.16 Rare and Unique Natural Resources

The following sections describe existing conditions, potential impacts, and proposed mitigation for rare and unique natural resources.

6.16.1 Existing Conditions

The following sections describe federally listed species, state listed species, and associated critical habitat.

6.16.1.1 Federally Listed Species

Under the Endangered Species Act (ESA) of 1973, 50 CFR Part 402, an endangered species is one which is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future. A proposed species is one that is officially proposed in the Federal Register to be listed under Section 4 of the ESA.

The USFWS has one year after a species is proposed for listing under the ESA to make a final determination whether to list a species as threatened or endangered. A candidate species is a plant or animal for which the USFWS has sufficient information on its biological status and threats to propose it as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. While candidate species are not legally protected under the ESA, it is within the spirit of the ESA to consider said species as having significant value and being worth protecting. Finally, critical habitat includes specific areas that are occupied by a species at the time of listing or unoccupied areas that are considered essential to the conservation of a species. Critical habitat must contain physical or biological features essential to conservation of the species and may require special management considerations or protection.

According to the USFWS Information for Planning and Consultation (IPaC) website, federally listed species that may occur in Bowman County include the NLEB and whooping crane.

Northern Long-eared Bat (*Myotis septentrionalis*)

The NLEB (*Myotis septentrionalis*) was listed by USFWS as threatened on May 4, 2015 (USFWS, 2015d); the USFWS published a final 4(d) rule for the species on January 14, 2016 (USFWS, 2016a). The USFWS determined that designating critical habitat for the species was not prudent (USFWS, 2016b). The NLEB is rare in North Dakota and has only been identified in a few locations. The annual life history of the NLEB includes an inactive period when the species is hibernating and an active period when the species forages, raises its young, and breeds. NLEB hibernation begins in October and November and ends in March and April (USFWS, 2016a). In April, the species emerges from its hibernacula and migrates to summer roosting habitat. During the summer, adult females form breeding or maternity colonies that are variable in size, ranging from a few individuals to as many as 60 adults (Caceres and Barclay, 2000; WDNR, 2015). The pup season occurs between June 1 and July 31 (USFWS, 2016a). Males typically roost alone (Lacki and Schwierjohann, 2001). During the summer, the NLEB roosts commonly in both live and dead trees and both under bark and in crevices or cavities, suggesting that the species is a habitat generalist (Timpone et al., 2010).

As noted in Section 6.15.1 above, acoustic bat surveys were conducted within the Project Area from July 8 to October 28, 2020. Surveys were completed at two sites in habitat representative of potential turbine locations. Qualitative analysis of the acoustic data did not detect NLEB at either site.

Whooping Crane (*Grus americana*)

The whooping crane (Grus americana) was first listed as endangered in the United States in 1967. As these actions predated the ESA of 1973, the species was grandfathered into the ESA of 1973, and critical habitat was designated in 1978. Whooping cranes that are part of the Aransas-Wood Buffalo National Park (ABNP) population are federally endangered in North Dakota (USFWS, 2012).

The central flyway of the ABNP population's migratory route passes over a large portion of western and central North Dakota. Whooping cranes are diurnal during migration and stop frequently to feed and rest; large groups of up to 20 birds have been known to stop and use the same stopover sites (Canadian Wildlife Service and USFWS, 2007). Riverine habitats often provide high-quality foraging and roosting habitat; whooping cranes typically use sites in unobstructed channels away from human disturbance (Armbruster, 1990).

In North Dakota, the whooping crane is not present year-round; they are only present during the twice-yearly migration between winter grounds and summer nesting sites (i.e., late April to June 15 and September 15 to November 15).

In correspondence dated April 29, 2019, the USFWS confirmed that the Project is located outside of the 95 percent migration corridor (i.e., the 220-mile band where 95 percent of all whooping crane sightings have occurred) and noted that species-specific studies were not required to further evaluate risk from Project construction on the whooping crane. The USFWS further noted, however, that whooping cranes are known to move through western North Dakota beyond the established migration corridor. The NDGF also commented that although risk may be low within the Project Area, a review of the Whooping Crane model of predicted use of landscapes was recommended for the Project.

6.16.1.2 State Species of Concern

The State of North Dakota does not have a state threatened and endangered species list; instead, the NDGF maintains a list of Species of Conservation Priority (SCP; Dyke et al., 2015). Species are classified into three levels according to their conservation need. Level I species are the highest level of conservation priority. Level II species are of a moderate level of conservation priority. Level III species are also of a moderate level of conservation priority, but are thought to be peripheral or non-breeding in North Dakota (Dyke et al., 2015).

As noted in Bowman Wind's BBCS (Table 2.1, Appendix I), there are 24 SCP birds with potential to occur within the Project Boundary. As noted in Section 6.15.1 above, nine of these species were recorded within the Project Area during avian use surveys.

According to the North Dakota State Wildlife Action Plan, there are four SCP bat species with potential primary or secondary range in the Project Area: big brown bat (Level I), little brown bat (Level I), Townsend's big-eared bat (Level I), and NLEB (Level I). Only the little brown bat was recorded during acoustic surveys for the Project.

The black-tailed prairie dog is also a SPC (Level I) species. As noted in Section 6.15.1, Bowman Wind conducted prairie dog colony surveys and identified two active prairie dog colonies within the 2020 Project Area.

6.16.2 Rare and Unique Natural Resources Impacts and Mitigation

The following sections describe potential impacts to federally listed species, state listed species, and associated critical habitat.

6.16.2.1 Federally Listed Species

Impacts and mitigation for federally listed species identified for the Project are discussed below.

Northern Long-Eared Bat

Suitable habitat for the NLEB is limited in the Project Area. The species is forest-dependent and requires trees for roosting and foraging in summer. The NLEB desktop habitat assessment found the assessment area contained limited isolated forested hedgerows, none of which were of sufficient size to constitute suitable NLEB summer habitat. Based on the negative acoustic survey results (see Sections 6.15.1 and 6.16.1), it is not likely that NLEBs are roosting in the Project

Area; and therefore, would not be harmed by tree clearing or operating turbines. Per the final 4(d) Rule for the NLEB (USFWS, 2016b), the Project will not result in prohibited incidental take because Bowman Wind will not be clearing known maternity roost trees or trees within 150 feet of known maternity roost trees between June 1 and July 31 and will not remove trees within 0.25 mile of a known hibernacula at any time of the year.

Whooping Crane

Based on the USFWS' database of whooping crane sightings in North Dakota through spring 2016, only one whooping crane has been documented within 20 miles of the Project Area within the past 40 years. Thus, the likelihood of a whooping crane using the Project Area as stopover habitat during migration is low. Further, potential whooping crane habitat in North Dakota has been identified by the USFWS's Habitat and Population Evaluation Team in Bismarck. Per Niemuth et al. (2018) and the associated model, the Project Area does not encompass areas of high relative probability of landscape-level habitat use by migrating whooping crane. Although the occurrence of whooping cranes in the Project Area is unlikely, if whooping cranes use sites within or near the Project during migration, Bowman Wind will avoid impacts to whooping crane by implementing the general conservation measures for birds presented in the Project's BBCS (Appendix I). Although unlikely because the Project is located outside the whooping crane migration corridor, if a whooping crane is sighted in the Project Area during construction, Bowman Wind will stop construction within one mile until the whooping crane has left the area.

6.16.2.2 State Species of Concern

Impacts to State SCP would be similar to those identified in Section 6.15.2 for wildlife. Data collected for the Project mostly indicate development of the current Project boundary is unlikely to trigger substantial impacts to small or large bird populations, including SCP. Impacts to raptor SCP are likely to be low based on the relatively low number of observations during surveys and stable populations in the region. Impacts to other migratory bird SCP may be minimized by limited surface disturbance to intact grasslands habitats. Impacts to shorebird species are likely to be low based on the relatively low number of observations and the very limited amount of open water within the Project Area. Bowman Wind has minimized siting turbines in unbroken grassland; 81 of 85 turbines are sited in broken grassland or other previously disturbed habitats to minimize impacts to State SCP species.

Mitigation measures that would apply to SCP are also described in Section 6.15.2.

6.17 Summary of Impacts and Mitigation

Table 6.17-1 provides a summary of Project impacts and proposed mitigation.

Table 6.17-1
Summary of Impacts

Resource	Potential Impact	Proposed Mitigation	Section
Demographics	Profits to landowners from part ownership in the Project may increase per capita income within the Project Area. No long-term changes to demographics are anticipated.	No mitigation is proposed.	6.1
Land Use, Ownership, and Management	The Project will convert approximately 108 acres of land in the Project Area into a renewable, alternative energy source for the life of the Project. The proposed Project would also result in approximately 1,353 acres of temporary impacts. The Project will also impact 6.2 acres on private land that the BLM uses for grazing allotments. Lastly, there will be 46.0 acres of temporary impacts on PLOTS lands.	Lease payments will be made to landowners for placement of Project facilities. After construction, Bowman Wind will restore and revegetate areas of temporary impact and land use will continue, including on the Cold Turkey Creek grazing allotment and PLOTS land.	6.2
Public Services	Construction of the Project will temporarily increase traffic on haul roads. Additionally, electric, telephone, and fiber optic lines may be impacted during construction.	Local utility companies will be contacted prior to construction. Bowman Wind will utilize North Dakota One Call prior to construction to identify existing utilities. Roadways will be returned to pre-existing conditions unless otherwise requested by County authorities during coordination. All applicable road permits will be obtained from Bowman County and townships. Bowman Wind will enter into a road use and maintenance agreement with Bowman County and applicable townships, if needed.	6.3

Table 6.17-1
Summary of Impacts

Resource	Potential Impact	Proposed Mitigation	Section
Human Health and Safety	No adverse impacts are anticipated	Wind turbines have been setback at least 2,640 feet from occupied residences and collection lines will be buried to a depth of at least four feet. The Project will also meet the Commission's sound avoidance requirements and Bowman County's shadow flicker requirement.	6.4
Sound	A sound assessment was completed, and sound levels are modeled below 45 decibels within 100 feet of residences and community buildings.	NA	6.5
Visual	The Project will have visual and potential aesthetic impacts. A detailed shadow flicker analysis was performed and indicated that the maximum modeled shadow flicker is 14.0 hours/year.	Use of setbacks and minimum Federal Aviation Administration lighting and marking requirements are anticipated to minimize visual impacts. Bowman Wind does not propose any mitigation for shadow flicker as all residences are well below 30 hours per year.	6.6
Cultural and Archaeological Resources	Identified cultural resources sites recommended for avoidance will be avoided; no historic properties will be affected.	A Class III Pedestrian Survey has conducted and wind turbines, access roads, and associated facilities have been sited to avoid known/existing archaeological sites. In addition, Bowman Wind has completed an Unanticipated Discoveries Plan. If cultural resources are discovered during construction or operation, work shall immediately be stopped, the affected site secured, and State Historical Society notified.	6.7
Recreational Resources	Collection lines crossing three PLOTS parcels will result in 46.0 acres of temporary impact.	Should installation of the collection lines occur during a hunting season, the parcel will be closed to hunting for safety and reopen after construction is complete.	6.8
Land Based Economics	Conversion for the life of the Project and temporary conversion of land that would consist of agricultural land.	Areas of temporary disturbance will be revegetated or available for agricultural purposes, following construction. Economic loss to producers due to land conversion will be minor in comparison to additional income provided by wind farm.	6.9

Table 6.17-1
Summary of Impacts

Resource	Potential Impact	Proposed Mitigation	Section
Soils	May cause soil surface to become more prone to wind and water erosion and may result in soil compaction and the spread of noxious weeds.	Erosion and sediment control measures will be utilized during and after construction including segregation of topsoil, noxious weed control and the use of construction equipment appropriately sized for the scope of work. Additionally, Bowman Wind will verify that access road grades fit closely with the natural terrain, soil cuttings are properly disposed of, and proper damage is maintained.	6.10
Geologic and Groundwater Resources	No adverse impacts anticipated.	No mitigation proposed.	6.11
Surface Water and Floodplain Resources	No adverse impacts anticipated.	The Project will use Best Management Practices such as silt fence, straw wattles, earth berms, and/or culverts to avoid or minimize impacts.	6.12
Wetlands	One access road will cross a wetland complex associated with a stream resulting in 0.02 acres of permanent impacts to a delineated wetland. Bowman Wind has designed this access road to cross the wetland at a location that minimizes the length and overall impact. The access road will be designed with a culvert to maintain wetland function. Temporary impacts to wetlands may occur from the use of widened access roads and crane paths, installation of collection lines, and workspaces temporarily used during construction.	Any impacts to U.S. Army Corps of Engineers jurisdictional waters will be permitted and mitigated for in accordance with Section 404 of the Clean Water Act.	6.13
Vegetation	The Project will result in temporary and permanent vegetation impacts.	Following construction, temporarily disturbed areas outside cultivated cropland will be re-vegetated with a seed mixture consistent with the surrounding vegetation and free of noxious weeds.	6.14

Table 6.17-1
Summary of Impacts

Resource		Potential Impact	Proposed Mitigation	Section
Wildlife	Mammals	The Project will impact potential habitat for ground dwelling mammals and increased potential for bat strikes with turbine rotors.	The Project has been designed to avoid wooded areas and shelterbelts to the extent practicable and minimal tree clearing is expected. Tree impacts will be mitigated, as approved by the landowner and consistent with the Commission's tree and shrub mitigation specifications. Bowman Wind includes a BBCS as Appendix I that outlines proposed mitigation measures that will be implemented.	6.15.1.2, 6.15.1.3, 6.15.2.2, 6.15.2.3
	Avian Species	The Project may result in impacts to avian species through increasing the potential for bird strikes with the turbine rotors and habitat impacts to grassland breeding birds.	The Project has been sited to minimize impacts to raptors and eagles, prairie grouse, and grassland breeding birds by siting Project facilities in previously disturbed habitats to the extent practicable. All collection lines will be buried to avoid potential for bird strikes. Temporarily disturbed areas will be re-vegetated with a seed mixture consistent with the surrounding vegetation and free of noxious weeds. Tree impacts will be mitigated, as approved by the landowner and consistent with the Commission's tree and shrub mitigation specifications. Bowman Wind plans to acquire unbroken grassland conservation easements for the life of the Project as a voluntary offset for grassland breeding bird impacts. Bowman Wind includes a BBCS as Appendix I that outlines proposed mitigation measures that will be implemented.	6.15.1.1, 6.15.2.1

Table 6.17-1
Summary of Impacts

Resource		Potential Impact	Proposed Mitigation	Section
Rare and Unique Natural Resources	Threatened and Endangered Species	Suitable habitat for NLEB is limited in the Project Area and the Project Area is outside the whooping crane migration corridor. Both federally listed species have low potential to occur in the Project Area.	Tree impacts will be mitigated, as approved by the landowner and consistent with the Commission's tree and shrub mitigation specifications. Although unlikely because the Project is located outside the whooping crane migration corridor, if a whooping crane is sighted in the Project Area during construction, Bowman Wind will stop construction within one mile until the whooping crane has left the area. Bowman Wind includes a BBCS as Appendix I that outlines proposed mitigation measures that will be implemented.	6.16
	State Species of Concern	Impacts to state species of concern would be similar to those for wildlife.	The Project has been sited to minimize impacts to State SCS by siting Project facilities in previously disturbed habitats to the extent practicable. All collection lines will be buried to avoid potential for bird strikes. Temporarily disturbed areas will be re-vegetated with a seed mixture consistent with the surrounding vegetation and free of noxious weeds. Tree impacts will be mitigated, as approved by the landowner and consistent with the Commission's tree and shrub mitigation specifications. Bowman Wind includes a BBCS as Appendix I that outlines proposed mitigation measures that will be implemented.	6.16.1.2, 6.16.2.2

7.0 IDENTIFICATION OF POTENTIAL PERMITS/APPROVALS

The potential permits or approvals that may be required for the construction and operation of the Project are shown in Table 7.0-1. Copies of agency correspondence to date are provided in Appendix D.

Table 7.0-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Applicability to the Project	Status
Federal			
U.S. Army Corps of Engineers	Federal Clean Water Act Section 404	Dredging or filling jurisdictional waters of the United States.	To be prepared prior to construction, if necessary.
U.S. Fish and Wildlife Service	Review for Threatened and Endangered Species	Consultation on potential impacts to species protected under the Endangered Species Act (ESA)	Bowman Wind has been coordinating with USFWS since 2017.
Environmental Protection Agency	Spill Prevention Control and Countermeasure Plan	Required if any facility associated with the Project (substation) has oil storage of more than 1,320 gallons	To be prepared prior to construction, if necessary.
Federal Aviation Administration	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	• Construction or alteration of structures standing higher than 200 feet above ground level • Construction or alteration of structures near airports; 14 Code of Federal Regulations (CFR) 77.13 provides details • Siting within radar line of-sight of an air defense facility	Anticipated filing April 2021.
	Notice of Actual Construction or Alteration (Form 7460-2)	Supplemental notice provided to FAA in advance of beginning construction.	To be provided in advance of or after commencing construction, as appropriate.
	Marking & Lighting Recommendations	Required for approval of ADLS	7460-1 filing will include standard red/white synchronized lights but the FAA filings will be modified to request approval of ADLS after receiving the ADLS design and prior to construction.
Federal Communications Commission (FCC)	Radio Station Authorization/License	Typically required for operation of communications tower associated with ADLS.	If needed, prior to operation of ADLS communications tower.

Table 7.0-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Applicability to the Project	Status
	Registration	Typically required for communications tower associated with ADLS.	Prior to construction/installation of ADLS communications tower.
State of North Dakota Approvals			
North Dakota Public Service Commission	Certificate of Site Compatibility	Construction of energy conversion facility with greater than 0.5 MW nameplate capacity.	In progress.
North Dakota Department of Environmental Quality	North Dakota Pollutant Discharge Elimination System (NDPDES) General Permit for Stormwater Discharge Related to Construction (includes Storm Water Pollution Prevention Plan)	For stormwater discharges from construction activities with disturbances greater than one acre.	To be obtained prior to construction activities for which the permit is required.
	401 Water Quality Certification	Required for filling in jurisdictional waters of United States.	To be obtained prior to construction activities for which the permit is required.
North Dakota State Water Commission, Office of the State Engineer (SWC/OSE)	Temporary Water Permit	A temporary water permit is required for all temporary uses of water, except in cases when both the amount of water to be impounded, diverted, or withdrawn is less than 12.5 acre-feet (4,073,137 gallons) and the use is domestic, livestock, fish, wildlife, or other recreational uses.	If needed, prior to activity subject to permit.
	Conditional Water Permit	A conditional water permit is required for all uses of water (where the use period will exceed 12 months), except in cases when both the amount of water to be impounded, diverted, or withdrawn is less than 12.5 acre-feet (4,073,137 gallons) and the use is	If needed, prior to activity subject to permit.

Table 7.0-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Applicability to the Project	Status
		domestic, livestock, fish, wildlife, or other recreational uses.	
SWC/OSE; Water Resource District	Drainage Permit	Required before draining a pond, slough, lake or sheetwater, or any series thereof, that has a watershed area (i.e., drainage area) of 80 acres or more.	If needed, prior to activity subject to permit.
North Dakota Highway Patrol	Oversize/Overweight Permit	Required to transport oversize/overweight loads on state maintained roads.	To be obtained prior to transport of oversize/overweight loads.
North Dakota Department of Transportation	Utility Occupancy Permit(s)	Required to install electrical lines within state owned right-of-way (ROW).	Prior to installation of electrical lines within state-owned ROW.
	Highway Access Permit(s)	Required to provide driveway access to state owned ROW.	Prior to installation of access/approach.
	Temporary Modification Permits	Temporary modifications to state-owned ROW.	Prior to installation of temporary modifications.
North Dakota State Electrical Board	Wiring Certificate and Inspection Approval	Installation of electrical facilities.	If needed, prior to activity subject to permit.
North Dakota Department of Trust Lands (NDTL)	Site Plan Approval	Required for construction of Project facilities on NDTL-managed lands.	To be obtained prior to construction.
North Dakota State Historic Preservation Office (SHPO)/State Historical Society of North Dakota (SHSND)	Cultural and Historic Resources Review and Review of State and National Register of Historic Sites and Archeological Survey	Consultation required in connection with other agency permitting requirements, such as the PSC.	Class I, II, and III survey work for the Project is complete and the survey report and site forms were submitted to the SHSND for review in March 2021.
Local Approvals			
Bowman County	Wind Energy Facility Siting Permit	Required for a wind energy facility rated at fifty kilowatts nameplate capacity or more.	Anticipated filing May 2021.
	Approach Permits	Installation of approach	To be obtained prior to

Table 7.0-1
Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Applicability to the Project	Status
		roads.	installation of approaches, as needed.
	Alternate Energy Construction Permit	Construction of infrastructure.	Prior to construction
	Haul Road Permits	Using local roadways for haul roads.	To be obtained as necessary prior to use of haul roads.
	Utility Crossing Permits	Encroaching on roadways.	To be obtained prior to construction work in roadway ROW.
Townships	Approach Permits	Installation of approach roads.	To be obtained prior to installation of approaches, as needed.
	Haul Road Permits	Using local roadways for haul roads.	To be obtained as necessary prior to use of haul roads.
	Utility Crossing Permits	Encroaching on roadways.	To be obtained prior to construction work in roadway ROW.
Local Public Health Unit	Septic system permits/approvals	May be required for installation of septic system.	To be obtained prior to construction of the septic system, if necessary.

8.0 FACTORS CONSIDERED

The Siting Act (see NDCC Section 49-22-09) lists the following factors to guide the Commission in assessing and designating the site for the proposed facility.

8.1 Public Health, Welfare, Natural Resources, and the Environment

The preceding sections of this Application provide the research and investigations relating to the Project's potential impacts on public health and welfare, natural resources, and the environment. In addition, Section 6.17 provides a summary of impacts and proposed mitigation measures to minimize these impacts.

8.2 Minimizing Adverse Environmental Effects

Bowman Wind has utilized or will utilize the most current technologies available to site, construct, and operate the Project so as to optimize wind resources, while minimizing potential adverse environmental impacts. Mitigation and minimization measures associated with various resources are identified in their corresponding sections within Section 6.0, Environmental Analysis.

8.3 Potential for Beneficial Uses of Waste Energy

Because wind energy does not create waste energy, there would be no use of waste energy associated with this Project.

8.4 Unavoidable Adverse Environmental Effects

Unavoidable adverse environmental effects are described for each resource category in Section 6.0. Unavoidable permanent ground disturbance will include the conversion of land to a renewable energy generation resource and alteration of the visual landscape through construction and lighting of turbines for the life of the Project. Any additional acreage that will be temporarily impacted during construction will be restored to its original condition to the extent practicable following construction. Bowman Wind selected its site so as to minimize unavoidable environmental impacts and will implement appropriate mitigation measures throughout Project development.

8.5 Alternatives to the Proposed Site

As discussed in Section 1.3.3, Bowman Wind analyzed various siting options for the Project within an up to 160 square mile area. Bowman Wind selected the proposed Project Area based on agency coordination, site-specific studies, landowner coordination, wind resource assessment, transmission availability, and engineering considerations. As sited, the Project minimizes potential environmental and land use impacts, and Bowman Wind believes that the proposed site is the best location for the Project.

8.6 Irreversible and Irretrievable Commitment of Natural Resources

With a renewable energy project, such as the proposed Project, there are relatively few irreversible and irretrievable commitments of natural resources. Project construction activities are expected to be the primary source of the irreversible and irretrievable commitment of natural resources. Natural resources will be used in the fabrication and preparation of construction

materials, such as concrete, steel, and aggregate, and the vehicles traveling to and from the site during construction will use hydrocarbon fuel. While these materials may not be retrievable after use, these materials are not in short supply, and their use will not have an adverse effect on the availability of these resources. Further, the anticipated benefits will balance the irretrievable commitment of resources for the Project.

8.7 Direct and Indirect Economic Impacts

The direct economic impacts resulting from the Project will be primarily positive. The Project will result in land use conversion; however, the majority of the Project Area will still be available for agricultural practices and landowners will be compensated for the land occupied by the wind turbines and associated facilities.

The Project may also indirectly benefit economies in surrounding communities due to wages and salaries paid to local hires and increased spending at local businesses. Further, long-term benefits to the Bowman County tax base resulting from the Project will improve the local economy.

8.8 Existing Development Plans of the State, Local Government, and Private Entities at or in the Vicinity of the State

No conflicts with the existing development plans of state, local, or private entities within the Project Area are anticipated. The Project will comply with applicable provisions of the Bowman County Zoning Ordinance.

8.9 Effect of Site on Cultural Resources

Wind turbines, access roads, and associated facilities will be sited to avoid archaeological sites and traditional cultural properties; historic resources have also been considered. If additional cultural resources are discovered, Bowman Wind will work with SHSND to avoid or mitigate impacts. Bowman Wind has prepared an Unanticipated Discoveries Plan, for approval by SHSND. The plan details a process for prompt communication and action regarding the discovery of previously unknown cultural resources or human remains, should they be encountered during construction. See Section 6.7 for further discussion of cultural resource survey efforts and SHSND consultation.

8.10 Effect of Site on Biological Resources

Efforts have been and will continue to be made to avoid or minimize impacts to biological resources during and after construction. Wildlife impacts are anticipated to be minimal; however, the potential for avian and bat collisions with the wind turbines exists. The site is designed to minimize impacts to avian and bat species. In coordination with the USFWS and NDGF, Bowman Wind has developed a BBCS that outlines specific mitigation measures that Bowman Wind has implemented during Project layout and design, or plans to implement during construction and operation to avoid and minimize potential impacts to wildlife.

9.0 AGENCY COMMENTS

In May 2020, Bowman Wind sent Project notification letters to 34 federal, state, and local agencies, including the agencies and officers designated for notice pursuant to NDAC Section 69-06-01-05. The Project notification letters included a description of the Project and a map of the Project Area. A summary of the agency responses received as of March 2021 is provided below. Copies of agency correspondence are provided in Appendix D.

9.1 U.S. Department of Defense and Ellsworth Air Force Base

In 2017, Bowman Wind filed a preliminary turbine layout with the FAA for Determinations of No Hazard. Based on this filing, the Air Force identified potential mission impacts associated with the Project. Ellsworth Air Force Base (Ellsworth) is located approximately 130 miles south of the Project Area, east of Rapid City, South Dakota. The Powder River Training Complex is airspace for training missions associated with Ellsworth in northwest South Dakota, northeast Wyoming, southeast Montana, and southwest North Dakota, including a portion of Bowman County. In March 2018, Bowman Wind met with Department of Defense and Ellsworth Air Force Base (mitigation response team) to discuss the Project and potential mitigation. Bowman Wind continued coordination with the mitigation response team throughout 2018, 2019, and 2020 and entered into an agreement with the Department of Defense and Department of the Air Force on November 5, 2020 to mitigate potential effects of Project turbines on airborne doppler radar. The agreement establishes geographic coordinates (a box larger than and more general than the Project Area included in this Application) in which the Project can be developed. The location, height, and number of turbines within the boundary can be altered but cannot exceed the maximum height (700 feet at tip height) or the maximum number of turbines (100). The agreement also outlines curtailment measures for training purposes and national security purposes. Pursuant to the agreement, Bowman Wind has sited the Project within the box defined in the agreement and will not exceed both turbine height and turbine positions. During operations, Bowman Wind will curtail turbines in coordination with the Department of Defense and Department of the Air Force as outlined in the agreement.

9.2 U.S. Department of Commerce, National Telecommunications and Information Administration

Evans Engineering, on behalf of Bowman Wind, coordinated with the National Telecommunications and Information Administration (NTIA) to identify potential interference with federal telecommunications. The NTIA is currently reviewing the turbine layout and Project Area presented in this Application; Bowman Wind anticipates a response by the end of March 2021. The NTIA reviewed a previous turbine layout and project area and stated that no agencies had issues with Project placement in response to a Bowman Wind review request in February 2020. Bowman Wind anticipates a similar response for the turbine layout and Project Area in this Application.

9.3 U.S. Army Corps of Engineers, North Dakota Regulatory Office

The USACE responded to Bowman Wind's Project introduction letter on May 28, 2020 to acknowledge receipt of the notification letter, assign an identification number to the Project, and to provide information regarding the potential permitting process for the Project including requirements under Section 404 of the Clean Waters Act and standards for aquatic resource

delineation reports. Bowman Wind anticipated wetland impacts will be temporary, and will be authorized under a Nationwide Permit.

9.4 Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office and North Dakota Game and Fish)

Bowman Wind began coordinating with the USFWS and NDGF in 2017 during early Project development. Meetings and iterative reviews with USFWS between 2017 and February 2021 helped to identify species-specific survey needs for the Project, as well as impact avoidance, minimization, monitoring, and adaptive management measures. In addition, this early coordination along with the results of the Tier 1, 2, and 3 studies were used to refine the Project Area and design of the preliminary layout for Project facilities. These meetings included in-person and/or virtual meetings as well as substantive information sharing via email. A summary of these meetings is below.

June 20, 2017 NDGF and USFWS Agency Meeting
Bowman Wind met with the USFWS and NDGF to discuss the proposed Project. The purpose of the meeting was to introduce the Project, discuss and receive input on the Tier 1/Tier 2 and Stage 1 risk reviews completed in accordance with the USFWS Land-based Wind Energy Guidelines (2012) and Eagle Conservation Plan Guidance (ECPG; 2014), and agree on Tier 3 study plans to assess site-specific issues of concern. A number of Tier 3 wildlife surveys were agreed to along with a commitment to share the results with both agencies consistent with the USFWS WEGs and ECPG (see Table 6.15-1 in Section 6.15).

January 30, 2018 NDGF and USFWS Agency Meeting
Bowman Wind met with the USFWS and NDGF to update the agencies on the status of the Project, provide updates on the Tier 3 wildlife surveys initiated after the June 20, 2017 meeting, and to agree on specifics for any additional Tier 3 studies recommended by each agency. During the meeting, the NDFG recommended that Bowman Wind delineate all areas of previously unbroken native grasslands that are larger than 160 acres, using a combination of available data and field verification. The goal of this survey work would be to inform siting of Project facilities to avoid and minimize impacts to these tracts, and to enable quantification of impacts where necessary to inform potential offset strategies. Based on this NDGF recommendation, Bowman Wind hired SWCA Environmental Consultants (SWCA) to complete a desktop assessment to map all unbroken grasslands greater than 160 acres within the Project area.

April 05, 2018 NDGF Email Communication
In early 2018, Bowman Wind used the results of the SWCA desktop unbroken grassland mapping survey to inform the revision of the proposed Project boundary. The results of the SWCA survey were used to identify potentially sensitive areas within the original proposed Project area. Based on this information, Bowman Wind expanded the proposed Project boundary to the north to avoid large portions of the southern area, which contained large tracts of contiguous unbroken native grasslands. The boundary adjustment shifted the Project onto more actively managed agricultural lands (i.e., annually planted), thus avoiding impacts to unbroken grasslands and moving turbines onto previously disturbed lands. The revised Project boundary was shared with the NDGF on April 05, 2018. The NDGF provided additional shapefiles of various wildlife data to incorporate into additional planned surveys for those areas of the revised Project boundary.

July 5, 2018 USFWS Meeting

Bowman Wind discussed with the USFWS whether to conduct bat surveys, including specifically for the federally-listed NLEB. The USFWS provided guidance on potential risk at the Project site and the applicability of the Endangered Species Act Section 4d Rule. The USFWS did not recommend that Bowman Wind conduct acoustic or mist netting work to assess risk. Rather, the USFWS recommended that Bowman Wind complete an assessment of potentially suitable NLEB summer habitat to evaluate any potential for summer risk and identify areas that may warrant further management and siting considerations, which Bowman Wind agreed to do.

October 9, 2018 USFWS Meeting

Bowman Wind met with the USFWS in Pierre, South Dakota to update the agency on the changes to the Project boundary since the June 2017 agency meeting, review survey results, and agree on next steps in accordance with the USFWS 2012 Land-Based WEGs and 2013 ECPG. The meeting was held with the Pierre South Dakota USFWS ecological staff and office due to the retirement of Kevin Shelley from the Bismarck, North Dakota ecological office. Based on the year 1 eagle use data and estimated modeled take, it was discussed that it may be appropriate for the Project to consider pursuing a voluntary Eagle Take Permit. The USFWS also discussed their preference to minimize impacts to unbroken grasslands to potentially reduce fragmentation and indirect effects on grassland birds, but that is not required by any local, state, or federal regulation.

October 26, 2018 USFWS Meeting

Bowman Wind initiated agency coordination with the USFWS Region 6 Migratory Bird Division to discuss the ECPG level surveys completed to date and indicate its intent to develop an Eagle Conservation Plan and pursue a voluntary Eagle Take Permit.

March 14, 2019 NDGF Agency Meeting

Bowman Wind conducted additional NDGF agency consultation to discuss the potential to site Project infrastructure on lands under contract for the PLOTS program. Also, during this meeting, the NDGF recommended the potential application of the Shaffer et al. 2019 (Estimating offsets for avian displacement effects of anthropogenic impacts) model as a tool to calculate voluntary offsets associated with turbines and potential grassland nesting bird displacement. Bowman Wind committed to investigating the use of the Shaffer et al 2019 model as a voluntary offset measure for potential grassland breeding bird displacement. Lastly, Bowman Wind also committed to apply the NDGF recommended overarching policy of avoidance, minimization, restoration, and mitigation to unbroken grasslands as part of the siting of wind turbines associated with the Project.

May 26, 2020 NDGF and USFWS Email Communication

Bowman Wind sent an email to the NDGF and USFWS to introduce the voluntary mitigation offset concept that was being evaluated and would be a focus for the upcoming May 28, 2020 meeting. Bowman Wind explained that they planned to evaluate voluntary offsets through application of the Shaffer et al. 2019 model. As part of evaluating the voluntary offsets for potentially displaced grassland nesting birds, Bowman Wind anticipated using a combination of locally collected untilled grassland data and two years of avian use surveys to better inform key parameters within the Shaffer et al. 2019 model, including species composition, relative bird density, and potential displacement levels. The local data would better inform these model parameters, as the Bowman Wind Project is in a different grassland community type and also has a different mixture of grassland birds when compared to the study sites associated with the Shaffer and Buhl 2016 [Effects of wind-energy facilities on grassland bird distributions] study that helped inform the Shaffer et al. 2019 model.

May 28, 2020 NDGF and USFWS Agency Meeting

Bowman Wind met with the USFWS and NDGF to update both agencies on the planned North Dakota Public Service Commission permit application, changes to the Project boundary, review field survey results associated with the 2012 USFWS WEGs and 2013 ECPG, and discuss next steps. The meeting focused on Bowman Wind's analysis of potential impacts to unbroken grasslands and the potential displacement of grassland birds, as documented in Shaffer and Buhl 2016 at other wind project sites.

Bowman Wind explained that it first utilized the data layers provided by C. Loesch, USFWS, related to the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. 2019. Within these layers, defined "suitable" and "unsuitable" areas for grassland nesting birds are identified. Bowman Wind placed turbines and infrastructure, to the extent practicable, in "unsuitable" habitat. In addition, Bowman Wind presented the results of the Shaffer et al. 2019 model application using 70 turbine locations and considering five different scenarios derived from the Shaffer – Loesch GIS model.

The NDGF and USFWS raised concerns about the direct placement of primary turbine locations on unbroken grasslands. Bowman Wind indicated it planned to further analyze turbine model and placement options to further avoid and minimize potential impacts. Additionally, Bowman Wind stated that it planned to gather additional site-specific data to better inform the model. The data would include landowner information and a field survey by Western EcoSystems Technology, Inc. (WEST) to identify unbroken native grasslands within the "suitable" habitat layer provided by C. Loesch, USFWS. This data would be shared with the agencies once the field survey effort was completed and would be used for the final estimate of potential breeding bird displacement. Additionally, Bowman Wind committed to following one of the key "averted-loss" tenets of Shaffer et al. 2019 peer-reviewed paper, which is to offset indirect displacement of grassland birds by protecting existing native landscapes or other valuable habitat through voluntary easements.

July 31, 2020 NDGF and USFWS Agency Meeting

Bowman Wind met with the USFWS and NDGF to discuss a number of design measures that had been incorporated into the turbine layout that avoided and minimized potential impacts to unbroken grasslands as compared to the prior layout (Layout 043) presented during the May 20, 2020 meeting with the agencies. The NDGF and USFWS had raised concerns at the May 28, 2020 meeting about the direct placement of primary turbine locations on unbroken grasslands. Based on that input, Layout 050 was developed, which significantly reduced impacts, with only two of the proposed 70 turbine locations placed within mapped suitable habitat from the data provided by C. Loesch. Bowman Wind committed to continue to explore layout options that would further reduce potential impacts. In parallel, Bowman Wind detailed that it was in the process of conducting a turbine technology review to see if larger commercially-available or potential future turbine options may be viable for the Project site. Lastly, Bowman Wind committed to providing an update to both agencies upon completion of the final layout along with incorporation of the voluntary grassland bird displacement offsets into the Project-specific BBCS.

December 16, 2020 NDGF and USFWS Agency Meeting

Bowman Wind met with USFWS and NDGF to provide an update on the North Dakota Public Service Commission permit application timeline, the turbine technology review, layout modifications, and grassland bird displacement offset calculations. Bowman Wind had evaluated whether a larger nameplate capacity turbine model (i.e., 5.2 megawatt) may be suitable for the Project. Based on the evaluation, using a larger megawatt turbine model was not an option because technology suitable for the site's higher wind speeds, topography, wind shear, and

turbine spacing needs is not currently available. Therefore, based on the turbine technology currently under consideration, and incorporation of applicable siting criteria and site-specific data, Bowman Wind had developed a layout consisting of 85 proposed turbine locations. Bowman Wind discussed Layout 054, which was included 85 proposed locations for up to 74 2.82 megawatt turbines, with the remaining 11 locations to be used as alternates/spares.

As was previously detailed, Bowman Wind had retained WEST to conduct an unbroken grassland desktop and field assessment for the Project. The unbroken grassland assessment included historical aerial photography review, input from landowners, and field surveys to identify unbroken grasslands within a 400-meter radius of 90 proposed primary and alternate turbine locations. Bowman Wind used the results of the WEST unbroken grassland assessment to map unbroken grasslands within the suitable breeding habitats designated in the C. Loesch dataset (same data set used to inform earlier turbine placement to avoid and minimize impacts). Based on the updated unbroken grassland data, five (5) of the 90 turbine locations initially analyzed were located on unbroken grasslands within suitable habitat. As a result, Bowman Wind eliminated those five (5) turbine locations from further consideration, resulting in the 85 proposed turbine locations in Layout 054. Bowman Wind explained that potential displacement to grassland birds had been significantly reduced from the two previous layouts detailed during the May 28, 2020 and July 31, 2020 meetings. Bowman Wind also indicated that it planned to use the WEST mapped unbroken grassland dataset within the suitable habitat layer to determine potential voluntary offsets.

December 21, 2020 Bowman Wind Email Communication

Bowman Wind provided the WEST unbroken grassland data assessment and 85 primary and spare turbine locations associated Layout 054 to the USFWS and NDGF, along with the updated narrative describing the use of the Shaffer – Loesch GIS model that incorporated the WEST updated unbroken grassland field data to calculate potential grassland bird displacement impacts.

February 04, 2021 NDGF Email Communication

Bowman Wind received an email from the NDGF asking to setup a meeting to go over their analysis of Layout 054.

February 16, 2021 NDGF and USFWS Agency Meeting

During the meeting, the NDGF presented the results of its analysis. NDGF explained that it used aerial photography to digitize potential unbroken grasslands and implemented a 300-meter buffer to calculate potential displacement impacts to grassland birds. This was a divergence from the methodology Bowman Wind had previously presented and believed was collectively agreed upon to site turbines (i.e., combining updated site-specific grassland data with the Loesch suitable data layer) at the July 31, 2020 and December 16, 2020 meetings. Based on prior discussions, Bowman Wind had evaluated potential indirect impacts to WEST-verified unbroken grasslands with the defined C. Loesch "suitable" data layer to calculate potential grassland bird displacement and corresponding mitigation offsets. However, the NDGF indicated its analysis relied on desktop digitized grassland data to identify unbroken grasslands within 300-meters of turbines without regard to the suitable or unsuitable designation associated with the C. Loesch, USFWS, data as was previously discussed.

March 22, 2021 NDGF Email Communication

An email was received on March 10, 2021 from the NDGF requesting additional information on six turbine locations that were potentially sited within unbroken grasslands, turbines sited within the boundary of the greater sage-grouse priority conservation area as well as six turbines sited within 4 miles of an lek, and a request for the updated proposed voluntary offset acreage

calculations using the final layout 059 (i.e., use of the Shaffer et al 2019 model calculates potential displacement to grassland breeding birds). On March 22, 2021 Bowman Wind responded to the NDGF three questions and provided supporting documentation of the grassland assessment, an analysis of the avoidance and minimization measures implemented for greater sage-grouse along with a review of peer-reviewed studies detailing impacts on greater sage-grouse and other grouse species from energy development, and the voluntary offset acreage update for layout 059 that calculates the potential displacement to grassland breeding birds.

9.5 North Dakota Parks & Recreation

The NDPR responded to Bowman Wind's Project notification letter and request for Project review on June 10, 2020. In its letter, NDPR noted that the Project will not affect state park lands or Land and Water Conservation Fund recreation projects coordinated by the NDPR. The NDPR also commented on the results of its review of the North Dakota Natural Heritage biological conservation database for the Project Area. The following rare animal species were identified as a result of this review: Black-tailed Prairie Dog, Ord's Kangaroo Rat, Northern Mockingbird, and Brewer's Sparrow. The NDPR deferred further comment on the Project's potential to affect these species to the NDGF and the USFWS. Bowman Wind has sited turbines at least 500 feet from active prairie dog colonies to avoid impacts to black-tailed prairie dogs (see Section 6.15). Northern Mockingbird was not observed during two years of avian use surveys, and Brewer's Sparrow were recorded only during the first year of avian use surveys. Impacts to Northern Mockingbird and Brewer's Sparrow are anticipated to be similar to avian species in general (see Section 6.15.2.1). Impacts to Ord's kangaroo rat, a ground dwelling small mammal, are anticipated to be minimal as the species can disperse during construction. A detailed discussion of the potential Project impacts on protected species is presented in Sections 6.15 and 6.16.

9.6 North Dakota State Water Commission

The NDSWC responded to Bowman Wind's Project notification letter and request for review on June 8, 2020 and provided feedback on water resources in the Project Area that are under its jurisdiction. The NDSWC noted in its letter that no FEMA-designated floodplains are present within the Project Area and no permits related to these resources are required for the Project. Refer to Section 6.12 for a detailed discussion of potential Project impacts on these areas. The Office of the State Engineer (OSE) reviewed the Project Area and noted that surface waters are present; the OSE requested updates about any potential impacts on surface waters (i.e., watercourse, agricultural drains, and wetlands) that may occur as a result of the Project. The NDSWC also provided information regarding conditional or temporary permits for water appropriation, and the potential for NDSWC observation wells to be present within the Project Area. Bowman Wind will continue to coordinate with the NDSWC and will obtain any necessary permits prior to the start of Project construction. Bowman Wind reviewed NDSWC well data, including observation wells, stock wells, and domestic wells. There are 8 NDSWC wells in the Project Area; all wells will be avoided by Project facilities (see Section 6.11).

9.7 State Historical Society of North Dakota

Bowman Wind received a response from the SHSND to its Project introduction letter on May 13, 2020. In its letter, SHSND recommend that Bowman Wind conduct a Class I Literature Review and a Class III Intensive Cultural Resources Pedestrian Survey of all previously un-surveyed areas that may be affected by the Project. The SHSND recommended that the APE for the Class III Pedestrian Survey be defined as any ground surface area that has the potential to be disturbed

by any construction or installed activities associated with the Project. Additionally, the SHSND recommended a Class II Architectural History Survey within a 2-mile visual APE of the turbine array. The 2-mile visual APE for the Class II Architectural History Survey included documentation of all buildings, structures, and objects 45 years of age or older from the Project's anticipated in-service date. The Project has been designed to avoid impacts to cultural and architectural resources. Details about Bowman Wind's background research and survey efforts for the Project are presented in Section 6.7.

9.8 Bowman County Airport Authority

Bowman Wind met with the Bowman County Airport Authority on February 5, 2021 to review the Project layout related to the local airport's airspace. On February 8, 2021, the Bowman County Airport Authority issued an approval letter confirming the layout will not impact airspace associated with the Bowman Regional Airport. Bowman Wind notes this approval was for a prior iteration of the layout; minor turbine shifts of up to 400 feet occurred after this letter. Bowman Wind is coordinating with the Airport Authority on the layout in this Application and anticipates a similar letter of approval due to the minor turbine shifts.

9.9 Bowman County

Bowman Wind initiated coordination with Bowman County in Quarter two, 2016. Bowman Wind's coordination with the County on its Wind Energy Facility Ordinance has been ongoing since Quarter two, 2019 through Quarter 1, 2020. Bowman Wind is currently coordinating with the county on development of a Road Use Agreement (RUA). Bowman Wind shared a draft of a RUA with the county road supervisor Quarter four, 2020. In February 2021, Bowman Wind had a zoom meeting the Bowman county road supervisor and their engineering firm to discuss the draft RUA in more detail. A site visit will be made by the Bowman Wind team in the spring 2021 to locate culverts and to determine the condition of the existing roads and bridges. The RUA will be finalized and approved by the Bowman County Commissioners and up to six townships prior to the start of construction.

9.10 Public Participation

Bowman Wind has been an active part of the local community throughout the course of the development process. The Project hosted community/landowner open houses and dinners in 2017, 2018, and 2019. The Project has also hosted a booth at the Bowman County Fair to share Project information with the broader community of Bowman County. Due to the challenges and restrictions associated with the COVID-19 pandemic, Bowman Wind has shifted to virtual meetings including several rounds of site plan reviews with community groups and individual landowners to receive input on all proposed Project facilities.

10.0 QUALIFICATIONS OF CONTRIBUTORS TO SITING STUDY

Table 10.0-1
Qualifications of Contributors to Siting Study

Name and Project Role	Education and Professional Experience
Brenna Gunderson Director of Project Development Apex Clean Energy, Inc.	Brenna Gunderson is the Director of Project Development and leads a development team in the Upper Midwest region. Brenna has been a wind energy developer for fourteen years, nine of which she has worked for Apex Clean Energy. Prior to working for Apex Clean Energy, she was a Project Manager of wind development with EDP Renewables. Brenna holds a Bachelor of Arts degree in Psychology from St. Olaf College, Northfield, MN and a Master of Arts degree in Counseling and Psychological Services from St. Mary's University, Minneapolis, MN.
Scott Jansen Senior Development Manager Apex Clean Energy, Inc.	Scott Jansen is Senior Development Manager and oversees numerous wind and solar projects over four states in the Upper Midwest. Scott has been in the renewable energy sector for seven years, most recently with Apex Clean Energy. Prior to his time with Apex Clean Energy Scott was a Development Manager with RES Americas and worked as an independent consultant. He also has fifteen years real estate development experience across Wisconsin and Michigan, being licensed in WI, MI, and MO.
Ryan Henning Vice President of Environmental Affairs Apex Clean Energy, Inc.	Ryan Henning oversees a team of subject matter experts to provide environmental compliance, implementation, and management of a substantial pipeline of commercial scale wind, solar, distributed energy, and battery storages projects located throughout the United States. Extensive established technical expertise for the resolution of environmental conflicts through permitting, baseline wildlife studies, and agency interaction for the development, construction, and operation of renewable energy projects and transmission lines. Manages and oversees implementation of USFWS Wind Energy and Eagle Conservation Plan Guidelines, Section 10 Habitat Conservation Plans, Bald and Golden Eagle Protection Act Eagle Conservation Plans and National Environmental Protection Act reviews and any required and applicable local, state, and federal environmental compliance permitting. Energy projects successfully permitted and constructed in Kansas, Nevada, Texas, Arizona, California, Wisconsin, Washington, Colorado, South Dakota, North Dakota, Michigan, Wyoming, Oregon, Alaska, and Canada.
Nathan Lehman Senior Engineer Apex Clean Energy, Inc.	Nathan Lehman is a Senior Engineer and focuses on wind project analysis and design for all of Apex Clean Energy's SPP portfolio. Nathan has been focused on project design and power performance testing for Apex for five years, and prior to that worked as the Field Operations Manager for three years for a MET tower company based in Wyoming. Nathan holds a Bachelor of Science and Engineering degree in Earth Systems Science and Engineering from the University of Michigan and a Master of Science degree in Mechanical Engineering from the University of Wyoming.

Table 10.0-1
Qualifications of Contributors to Siting Study

Name and Project Role	Education and Professional Experience
Josh Martin Environmental Permitting Specialist Apex Clean Energy, Inc.	Josh Martin is an environmental permitting specialist with Apex Clean Energy. Josh holds a Bachelor of Science degree in Geographic Information Science from Salisbury University in Salisbury, MD. In his role at Apex, Josh manages, analyzes, and coordinates the dissemination of environmental geospatial data throughout the Apex project portfolio. Josh specializes in modeling wind and solar infrastructure designs in relation to environmentally sensitive features in an effort to avoid and minimize impacts.
Owen Brenner GIS Analyst Apex Clean Energy, Inc.	Owen Brenner joined the Apex Clean Energy team in 2019 as a GIS Analyst where he evaluates geospatial data and existing constraints to help guide project design. Owen holds a Master of Science in Environmental Studies from the University of Virginia and a Bachelor of Arts degree in Geology from Colgate University. Prior to Apex, Owen spent 7 years with the U.S. Geological Survey collecting and analyzing geospatial data to understand shoreline erosion.
Jeremy Spaeth, PE Civil Engineer Apex Clean Energy, Inc.	Jeremy Spaeth is a licensed professional engineer who has worked in the renewable energy field for the past 5 years. Prior to recently joining Apex Clean Energy, he was a project engineer at Strata Solar for over four years. Jeremy holds a Bachelor of Science degree in Civil Engineering from the University of Wisconsin – Milwaukee. He has over 10 years of experience working professionally as a civil engineer.
Emily Carroll Real Estate Counsel Apex Clean Energy, Inc.	Emily Carroll helps negotiate and prepare land leases for wind and solar projects, easement agreements, asset purchase agreements, membership interest purchase agreements, estoppel certificates and various other real estate documents to support the financing and development of renewable energy projects for Apex Clean Energy. Prior to joining Apex Clean Energy in 2016, Emily spent over 10 years in private practice working on a wide variety of structured finance and real estate matters including acquisitions, affordable housing projects, commercial leases, low-income housing tax credit syndications, New Markets Tax Credit financings and other development projects. Emily has a B.A. from the University of Virginia and J.D. from Pennsylvania State University Dickinson School of Law.
Mollie Smith Attorney at Law Fredrikson & Byron, P.A.	Mollie Smith assists clients with wind farm, transmission line, and pipeline permitting matters in North Dakota, South Dakota, and Minnesota. At the state level, Mollie represents clients in certificate of corridor compatibility, route permit, certificate of site compatibility and rulemaking proceedings before the North Dakota Public Service Commission; energy facility permit proceedings before the South Dakota Public Utilities Commission; and certificate of need, route permit and site permit proceedings before the Minnesota Public Utilities Commission. At the local level, Mollie advises and assists clients with a variety of permitting-related matters, including obtaining conditional use/special exception permits, variances and subdivision approvals, and participating in zoning ordinance amendment processes. Mollie has a B.A. in English from Northern State University, Aberdeen, SD; a M.A. in Literature from Colorado State University, Fort Collins, CO; and a J.D. from the University of Minnesota Law School, Minneapolis, MN.

Table 10.0-1
Qualifications of Contributors to Siting Study

Name and Project Role	Education and Professional Experience
Brie Anderson Senior Project Manager/Environmental Analyst Merjent, Inc.	Brie holds a Bachelor of Science in Ecology and Field Biology with an emphasis in Wildlife Biology, and Geographic Information Systems from St. Cloud State University and a Master of Science in Geographic Information Systems from St. Mary's University of Minnesota. In her role at Merjent, Brie oversees and supports all aspects of regulatory compliance including environmental permitting and due diligence review for energy infrastructure development projects, with an emphasis on wind and solar development projects. Brie has over 13 years of experience permitting wind, solar, and transmission projects across the Midwest.
Monika H. Davis Senior Project Manager/Environmental Analyst Merjent, Inc.	Monika holds a Bachelor of Arts in Anthropology/Archaeology from the University of Minnesota. In her role at Merjent, Monika oversees and supports all aspects of regulatory compliance including environmental permitting and due diligence review for energy infrastructure development projects. Monika has over 19 years of experience permitting energy infrastructure development projects throughout the contiguous U.S.
Kate Mize Senior Environmental Analyst Merjent, Inc.	Kate holds a Bachelor of Science in Environmental Science with an emphasis in Land Use Management and Soils from the University of Minnesota. In her role at Merjent, Kate specializes in soil impact and mitigation analyses and oversight of multi-discipline field surveys for energy infrastructure development projects throughout the U.S. Kate has 16 years of experience permitting energy infrastructure development projects throughout the contiguous U.S.
Brian Schreurs Senior GIS Specialist Merjent, Inc.	Brian holds a Bachelor of Science in Geography and a Master of Science in Geography and Applied GIS from St. Cloud State University. In his role at Merjent, Brian provides GIS analysis and support for environmental impact analysis and siting/routing/feasibility studies for energy infrastructure development projects. Brian has over 20 years of experience providing GIS analysis for environmental permitting throughout the Midwest.
Dana Lodico Sound Modeling RSG, Inc.	Dana Lodico is a Director at RSG with 21 years of experience in acoustics, including 17 years of acoustical consulting experience, as well as professional experience as a civil engineer and an academic background in civil engineering and architectural acoustics. Dana has managed numerous noise studies for transportation, architectural, commercial, energy-generation, industrial, institutional, land use planning, recreation, and residential projects. Research investigations have included innovative noise barriers, quiet pavement evaluations, meteorological effects on traffic noise, noise model validation, truck noise source localization using acoustic beam forming, thermo-acoustic refrigeration design, and classroom acoustics. She is a registered professional engineer in Colorado and California and is Board Certified by the Institute of Noise Control Engineering (INCE-USA). She currently serves as Vice President of INCE-USA.

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Qualifications of Contributors to Siting Study

Name and Project Role	Education and Professional Experience
Chris Nuckols Shadow Flicker Modeling ReGenerate Consulting	ReGenerate Consulting is an independent engineering consulting agency. The principal investigator for this report, Chris Nuckols, has 20-years' engineering and management experience and 15-years' of wind and solar resource assessment experience working for renewable energy developers, owners, and OEMs, He has provided engineering support to more than 100 renewable energy projects large and small, on five continents.

11.0 REFERENCES

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Appendix A
Bowman Wind, LLC Policy Statement

Bowman Wind, LLC
March 2021

Bowman Wind, LLC Practices and Commitment to the Environment

Bowman Wind, LLC (Bowman Wind), with the assistance of Apex Clean Energy Holdings, LLC's team of environmental siting/permitting professionals and experienced third-party consultants, is committed to utilizing a data-driven approach to identify, avoid, and minimize impacts to environmental and cultural resources throughout the life of the Bowman Wind Project (Project). At each stage of Project siting and development, Bowman Wind has voluntarily conducted thorough environmental reviews following the structured, iterative, and scientific processes outlined in the U.S. Fish and Wildlife Service's (USFWS) Land-Based Wind Energy Guidelines and the USFWS Eagle Conservation Plan Guidance, among other agency guidance and recommendations. Project development will continue to involve ongoing data collection and coordination with federal, state, and local agencies to ensure that the Project complies with environmental laws and minimizes its environmental footprint to the greatest extent practicable.

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Appendix B
Bowman Wind, LLC's Ten-Year Plan

Bowman Wind, LLC
March 2021

TEN YEAR PLAN: 2020-2030
Bowman Wind, LLC

July 2020

In accordance with N.D.C.C. § 49-22-04 and N.D.A.C. Ch. 69-06-02, Bowman Wind, LLC ("Bowman Wind"), submits the following Ten Year Plan for years 2020 through 2030.

(1) A description of the general location, size, and type of all facilities to be owned or operated by the utility during the ensuing ten years, as well as those facilities to be removed from service during the ten-year period.

Bowman Wind is a Delaware limited liability company, authorized to do business in the State of North Dakota. Bowman Wind is constructing an up to 200.1 megawatt ("MW") wind energy conversion facility known as the Bowman Wind Project (the "Project"). The Project will be located southwest of the City of Bowman in Bowman County, North Dakota. The Project will interconnect to the grid at the Basin Electric Power Cooperative ("Basin Electric") Rhame 230 kilovolt ("kV") Substation, located in Bowman County, North Dakota. To interconnect the Project to the grid, Bowman Wind will construct a 230 kV generation interconnection line between the Project substation and the Rhame 230 kV Substation. The generation interconnection line will be less than one mile long and, therefore, will not be subject to the jurisdiction of the North Dakota Public Service Commission ("Commission") as a "transmission facility."

Bowman Wind plans to submit a Conditional Use Permit application to Bowman County and a Certificate of Site Compatibility application to the Commission 2020. Bowman Wind plans to begin constructing the Project in 2021, and plans for the Project to be commercially operational by the end of 2022.

Other than the proposed Project, Bowman Wind does not have any transmission or generation facilities located in North Dakota. The Project will have an estimated life of greater than 10 years. As such, Bowman Wind does not have any plans to decommission any transmission or generation facilities within the timeframe of this plan.

(2) An identification of the location of the tentative preferred site for all energy conversion facilities and the tentative location of all transmission facilities on which construction is intended to be commenced within the ensuing five years and such other information as may be required by the commission. The site and corridor identification shall be made in compliance with the criteria published by the commission pursuant to section 49-22-05.1.

As noted above, Bowman Wind is developing the above-referenced Project, and proposes to have the Project in-service by the end of 2022. The proposed Project footprint is located southwest of the City of Bowman in Bowman County, North Dakota. The Project will interconnect at Basin Electric's existing Rhame 230 kV Substation, located in Bowman County, North Dakota.

Bowman Wind has retained qualified environmental consulting firms to evaluate the proposed Project site to ensure compliance with the Commission's siting criteria, including the exclusion and avoidance area criteria referenced in N.D.C.C. § 49-22-05.1 and identified in N.D.A.C. Section 69-06-08-01. A map depicting the study area for the Project is attached as **Exhibit A**.

(3) A description of the efforts by the utility to coordinate the plan with other utilities to provide a coordinated regional plan for meeting the utility needs of the region.

Bowman Wind is in the process of identifying an offtaker for the Project's output. Energy produced by the Project may help local utilities to meet applicable renewable energy needs. Additionally, Bowman Wind and the Southwest Power Pool ("SPP") are in the process of completing studies for the potential interconnection of the Project at the Rhame 230 kV Substation. Bowman Wind is in discussions with both SPP and Basin Electric regarding the proposed interconnection and plans to enter into a generator interconnection agreement with these parties to facilitate Project interconnection to the grid.

(4) A description of the efforts to involve environmental protection and land-use planning agencies in the planning process, as well as other efforts to identify and minimize environmental problems at the earliest possible stage in the planning process.

Bowman Wind has engaged the services of qualified environmental consulting firms to study and identify avoidance and exclusion areas within the proposed Project site, in accordance with N.D.C.C. Ch. 49-22 and N.D.A.C. Section 69-06-08-01. As discussed above, Bowman Wind plans to submit a Conditional Use Permit application for the Project to Bowman County and a Certificate of Site Compatibility to the Commission in 2020.

Additionally, Bowman Wind has consulted with applicable local, state, and federal agencies and entities in connection with siting and development of the Project, including the United States Fish and Wildlife Service, the Federal Aviation Administration, the North Dakota Game and Fish Department, the State Historical Society of North Dakota, and Bowman County. Bowman Wind will continue to coordinate with agencies and entities, as appropriate, throughout the development, construction, and operation of the Project.

(5) A statement of the projected demand for the service rendered by the utility for the ensuing ten years and the underlying assumptions for the projection, with that information being as geographically specific as possible, and a description of the manner and extent to which the utility will meet the projected demands.

As discussed above, Bowman Wind is in the process of identifying an offtaker for the Project's output. Bowman Wind is actively marketing the Project to a number of potential off-takers and may sell the power in the form of a power purchase agreement ("PPA"), directly on the merchant market, or the Project could be owned directly by a utility. As an independent power producer, Bowman Wind is able to bid into a variety of markets. Utilities and other customers seeking to diversify and build their energy generation portfolios are attracted to wind energy projects because of long-term, fixed, competitive pricing, environmental benefits and

existing and potential renewable energy policies. Thus, the Project could help satisfy local, regional, or even national renewable energy demands.

Locally, in 2007, the North Dakota Legislature enacted a statutory provision adopting the national "25x'25" initiative, which establishes a goal of having not less than twenty-five percent of the total energy consumed within the United States come from renewable resources by January 1, 2025.[1] Additional renewable resources will be needed to meet the 25x'25 initiative.

Also, in 2010, the North Dakota Department of Commerce, EmPower ND Commission, published the Comprehensive State Energy Policy 2010-2025, which recommended a capacity of wind generation up to 5,000 MW by 2020.[2] The state had a total of 3,155 MW of installed wind capacity at the end of 2018.[3] With improving technology and falling costs, utilities are beginning to include renewable energy projects in their resource plans as long-term economic energy and capacity resources. In North Dakota, excellent wind resources create high capacity factor generation, reducing the cost/megawatt hour ("MWh"). In general, alternative energy sources provide lower costs per MW-hour than conventional sources.[4]

In addition to traditional local and regional utility demand for wind energy, a growing number of corporations are turning to renewable energy to save money on energy and meet sustainability goals. Corporate customers either purchase renewable energy directly or obtain renewable benefits and cost savings through financially settled contracts, sometimes called virtual PPAs. In addition, many utilities are creating "green tariffs," which allow customers to purchase up to 100% renewable energy from the utility.

Beyond the growing demand from utilities, corporations such as Apple, Google and Facebook, along with many others, have recently set goals to obtain 100% of their energy from renewables. These clean energy goals fuel the demand for corporate renewables procurement and subsequent PPAs. In fact, over 6.53 gigawatts ("GW") of renewable energy have been purchased by non-utilities as of the end of 2018.[5] That compares to 2.78 GW procured by non-utilities in 2017 and approximately 1.73 GW in 2016. These growth trends are expected to continue, and 2020 has already seen an immense demand for C&I renewable energy PPAs. United States' corporate PPA volumes in SPP have steadily increased each of the past five years, and North Dakota is in the range of 50-500 MW of cumulative operational and in-development C&I capacity, which indicates the trend of offsite C&I projects expanding to more states. These

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[1] *See* N.D.C.C. § 17-01-01.

[2] North Dakota Department of Commerce. Undated. EmPower North Dakota. Comprehensive State Energy Policy 2010-2025. Accessed online June 1, 2020. Retrieved from https://commerce.nd.gov/.

[3] U.S. Department of Energy. 2018. 2018 Wind Technologies Market Report. Accessed online June 1, 2020. Retrieved from https://www.energy.gov/eere/wind/downloads/2018-wind-technologies-market-report.

[4] Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 13.0* (November 2019), at 2.

[5] Advanced Energy Economy, *Corporate Renewable Deals 2014-2018,* available at https://businessrenewables.org/corporate-transactions/.

businesses have a rapidly growing appetite for affordable clean energy, and North Dakota wind is poised to help meet that demand.

In summary, the renewable energy produced by Bowman Wind's proposed Project will be positioned to help meet local renewable energy initiatives/goals, the regional need for renewable energy, or national C&I customer demand.

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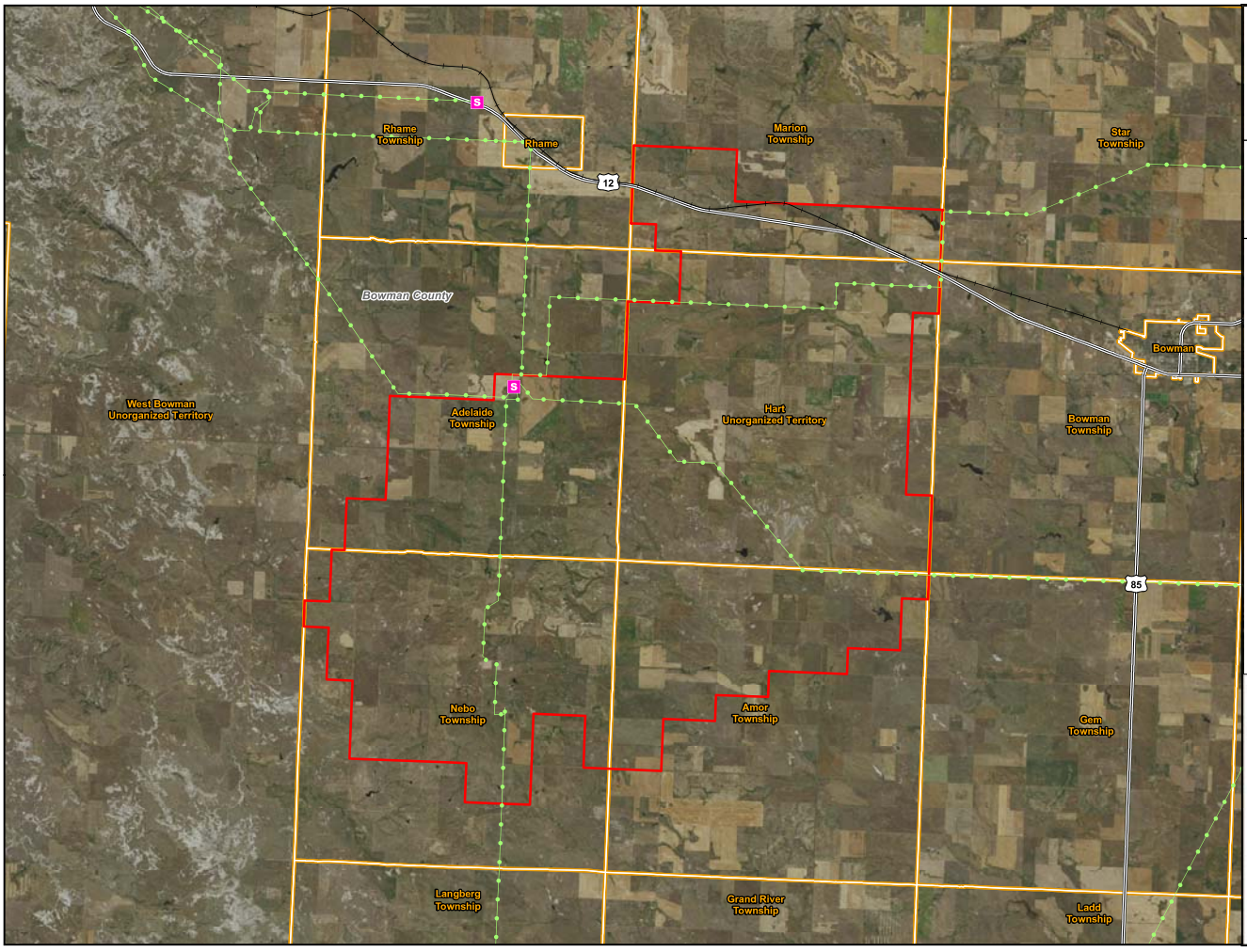

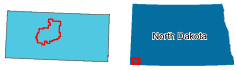

0 1 2 Miles

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Data Source: Apex, US Census, ND GIS Hub, ESRI Imagery: ND GIS 2018

- Existing Substation
- Existing Transmission Line
- City/Township
- Preliminary Project Boundary

EXHIBIT A
Preliminary Project Area

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Appendix C
Telecommunication Studies

Bowman Wind, LLC
March 2021

ENGINEERING REPORT
CONCERNING THE EFFECTS UPON
FCC LICENSED RF FACILITIES
DUE TO CONSTRUCTION OF THE
BOWMAN WIND ENERGY PROJECT
In
BOWMAN COUNTY, NORTH DAKOTA

Prepared for
Apex Clean Energy
Charlottesville, VA

Revised February 15, 2021

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I. INTRODUCTION

This engineering report describes the results of a study and analysis to determine the locations of federally-licensed (FCC) microwave and fixed station radio frequency (RF) facilities that may be adversely impacted as a result of the construction of the Bowman Wind Energy Project in Bowman County, North Dakota. This document describes impact zones and any necessary mitigation procedures, along with recommendations concerning individual wind turbine siting. All illustrations, calculations and conclusions contained in this document are based on FCC database records[1].

Frequently, wind turbines located on land parcels near RF facilities can cause more than one mode of RF impact, and may require an iterative procedure to minimize adverse effects. This procedure is necessary in order to ensure that disruption of RF facilities either does not occur or, in the alternative, that mitigation procedures will be effective. The purpose of this study is to facilitate the siting of turbines to avoid such unacceptable impact.

The Bowman wind project as currently planned involves the construction of approximately 85 wind turbines just south of the City of Rhame and just west of the City of Bowman, in western Bowman County, North Dakota. Two models of wind turbines are being considered for construction, one with a hub height of 89 meters and a rotor diameter of 127 meters (152.5 meter maximum blade tip height) and the other with a 107.5 meter hub height and a 158 meter rotor diameter (186.5 meter blade tip height). For the purpose of this report, the taller turbine was modeled.

[1] The databases used in creating the attached tables and maps are generally accurate, but anomalies have been known to occur. Generally, for wind turbine siting, an on-site verification survey is often suggested as part of the due diligence process.

Using industry standard procedures and FCC databases, a search was conducted to determine the presence of any existing microwave paths crossing the subject property, land mobile and other RF facilities within or adjacent to the identified area and broadcast signals receivable in the area. A specific turbine layout has been submitted for analysis. Accordingly, this report will address the potential conflicts that may be caused by the proposed turbines.

The following tabulation and analysis consists of four sections:

1. Microwave point-to-point path analysis[2]
2. Land mobile, public safety and other communications tower sites
3. Broadcast AM, FM and TV
4. Radar and NTIA Notification

The attached figures were generated based upon the operating parameters of the FCC-licensed stations as contained in the FCC station databases, with corrections of the antenna locations if possible and as needed.

The following analysis examines the pertinent FCC licensed services in the area for impact. This analysis assumes that all licensed services have been designed and constructed according to FCC requirements and good engineering practice. If this is not the case, the impacted facility must share responsibility with the wind project developer for the costs of any mitigation measures[3].

Each of the RF analyses is described separately in the sections that follow.

II. ANALYSIS OF MICROWAVE LINKS

An extensive analysis was undertaken to determine the likely effect of the new wind turbine farm upon the existing microwave paths, consisting of a Fresnel x/y/z axis study. The microwave paths have been overlaid on Google Earth™ maps, and the images of the microwave paths and the proposed turbines are also available in a KMZ file.

Important Note: Microwave path studies are based upon third party and FCC databases that normally exhibit a high degree of accuracy and reliability. Although Evans performs due diligence to ensure that all existing microwave facilities are represented, we cannot be responsible for errors in FCC databases that may lead to incomplete results. However, should

[2] Only point-to point microwave facilities were considered (for instance, a study of earth station facilities is not included).

[3] For instance, some microwave paths may have insufficient ground clearances as they are presently configured.

such situations occur, Evans would perform an engineering analysis to determine how the additional facilities can be accommodated or, if wind turbine structures are already built, determine a method to re-direct an impacted beam path.

For this microwave study, the 100% *First Fresnel Zone* (FFZ) was calculated for each microwave path, with the K factor at 1.333. The mid-point of a microwave path is the location where the widest (or worst case) Fresnel zone occurs. The radius *R* of the First Fresnel Zone, in meters, at the midpoint of the path is calculated for each microwave link using the following formula:

$$R \cong 8.65\sqrt{\frac{D}{F_{GHz}}}$$

where D is the microwave path length in kilometers and F_{GHz} is the frequency in gigahertz.

In general, the FFZ is defined by the elliptical three-dimensional boundary that extends between the transmitting and receiving points and whose radius at the midpoint is *R* as calculated above. This is the zone where the siting of obstructions should be avoided. Evans Engineering Solutions has identified one unique licensed microwave path from the FCC database within one mile of the project area. This microwave path is listed in Table 1 and mapped in Figures 1 and 2.

Call Sign 1	Call Sign 2	Site 1 Name	Site 2 Name	Freq. (MHz)	WCFZ (m)	Licensee
WQKW716	WQKW717	Rhame	East Rainy	6004.5-6795	27.8	Basin Electric Power Cooperative

Table 1 – Active Microwave Links in and near Bowman Project Area

As can be seen in Figures 1 and 2, this one microwave path penetrates the turbine project area, but based on the latest turbine layout, no turbine would cause obstruction to the microwave FFZ. Thus, the Bowman wind project is not expected to cause interference with any FCC-licensed microwave links.

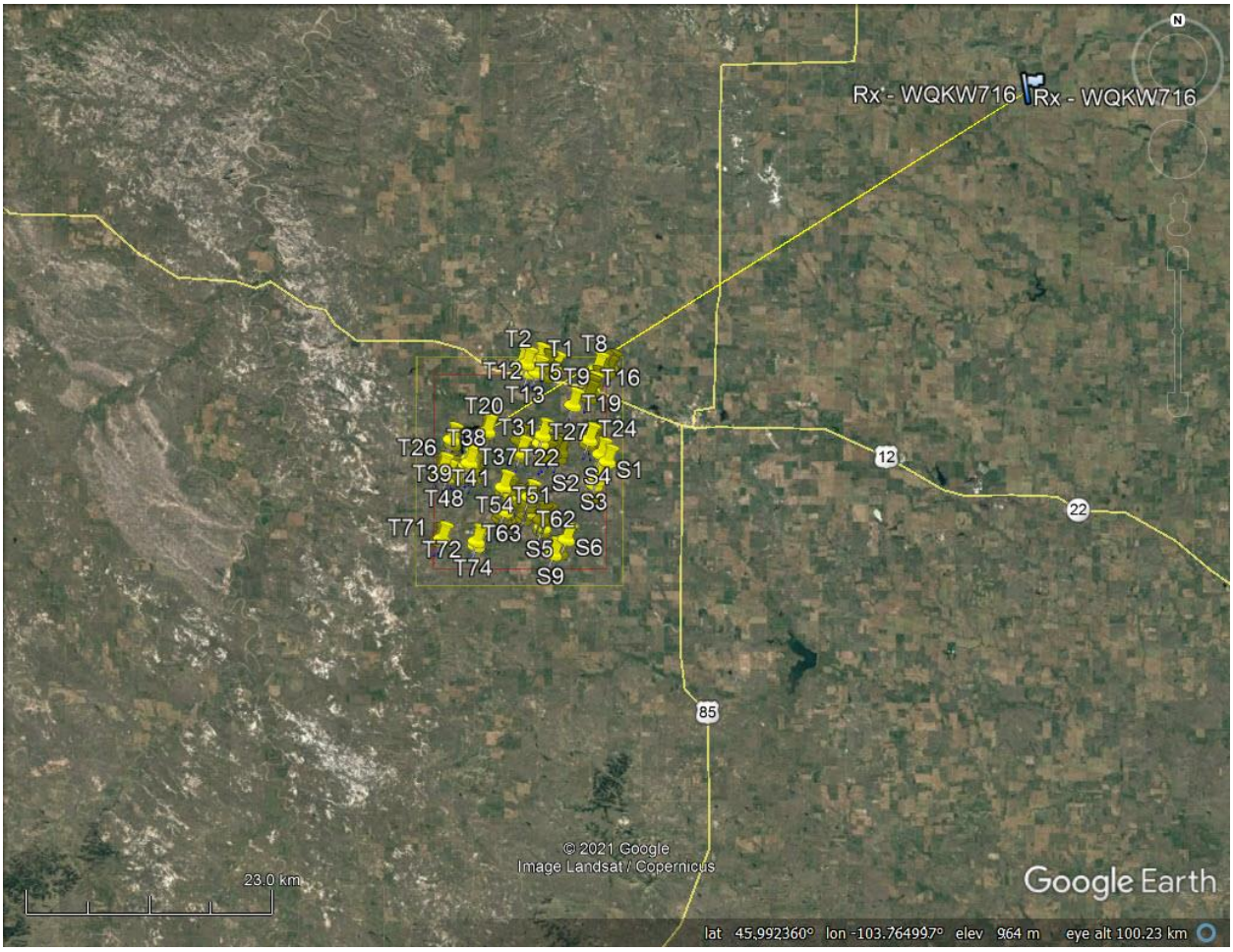

Figure 1 – Licensed Microwave Path near Bowman Project Area

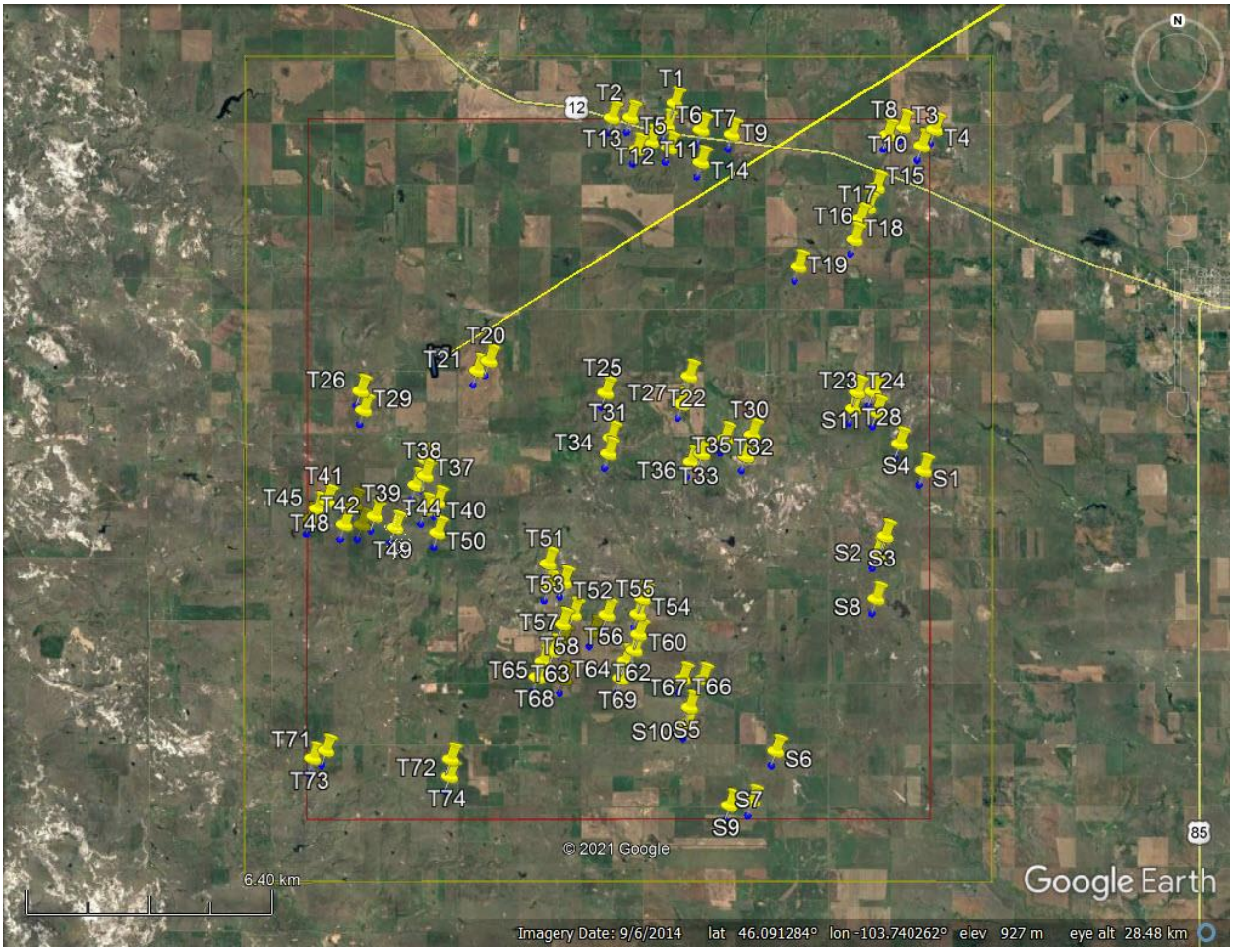

Figure 2 – Close-Up of Licensed Microwave Path near Bowman Project Area

III. ANALYSIS OF FIXED RADIO FACILITIES

3.1 Land Mobile & Public Safety Facilities

A search of the FCC's land mobile/public safety radio database revealed 12 land mobile transmitter stations that fall within the search area (about one mile beyond the project area). These land mobile stations are listed in Table 2 and mapped in Figure 3. The specifications on the land mobile stations can be found in the associated land mobile (LM) spreadsheet file.

For a wind energy project of this scope, multi-directional transmitting facilities, including land mobile stations, that are within 450 meters of a turbine site customarily should be further evaluated for the possibility of transmitter interference caused by wind turbines. Only two mobile stations, highlighted in yellow in Table 2 (both at a common antenna site), would be within this distance from a planned turbine. The turbine site nearest to these two stations, Turbine T5, is 377 meters away.

The reader is referred to the provided KMZ file for more magnification and closer inspection.

Call Sign	Location No.	Latitude (NAD-83)	Longitude (NAD-83)	Ant. Ht. (m AGL)	Freq. (MHz)	Licensee
KTN83	1	46.233611	-103.6475	6	153.98	Bowman, County of
KZN307	2	46.146667	-103.682139	9.7	151.58	Miller, Dallas
WPAP204	6	46.220445	-103.536074	9.1	453.975	Southwest Water Authority
WPKC870	5	46.233333	-103.653889	15	158.76	Bowman, County of
WPMC846	1	46.211667	-103.704639	10	153.11	Fischer, Jerome
WPMF816	1	46.234167	-103.652417	10	153.215	Fish, Allen T.
WQAC538	1	46.219861	-103.59975	3.2	160.92	BNSF Railway Company
WQJA861	1	46.219861	-103.59975	6.4	44.58	BNSF Railway Company
WQJT550	1	46.164882	-103.666315	47.9	452.4375	Basin Electric Power Cooperative
WQNK641	4	46.232611	-103.656667	14.3	44.58	BNSF Railway Company
WQPQ239	1	46.09	-103.658528	30	461.025	Continental Resources, Inc.
WQSX289	1	46.219583	-103.655944	9.1	152.3825	Bowman, Eric

Table 2 – Land Mobiles Stations within 1 Mile of Project Area

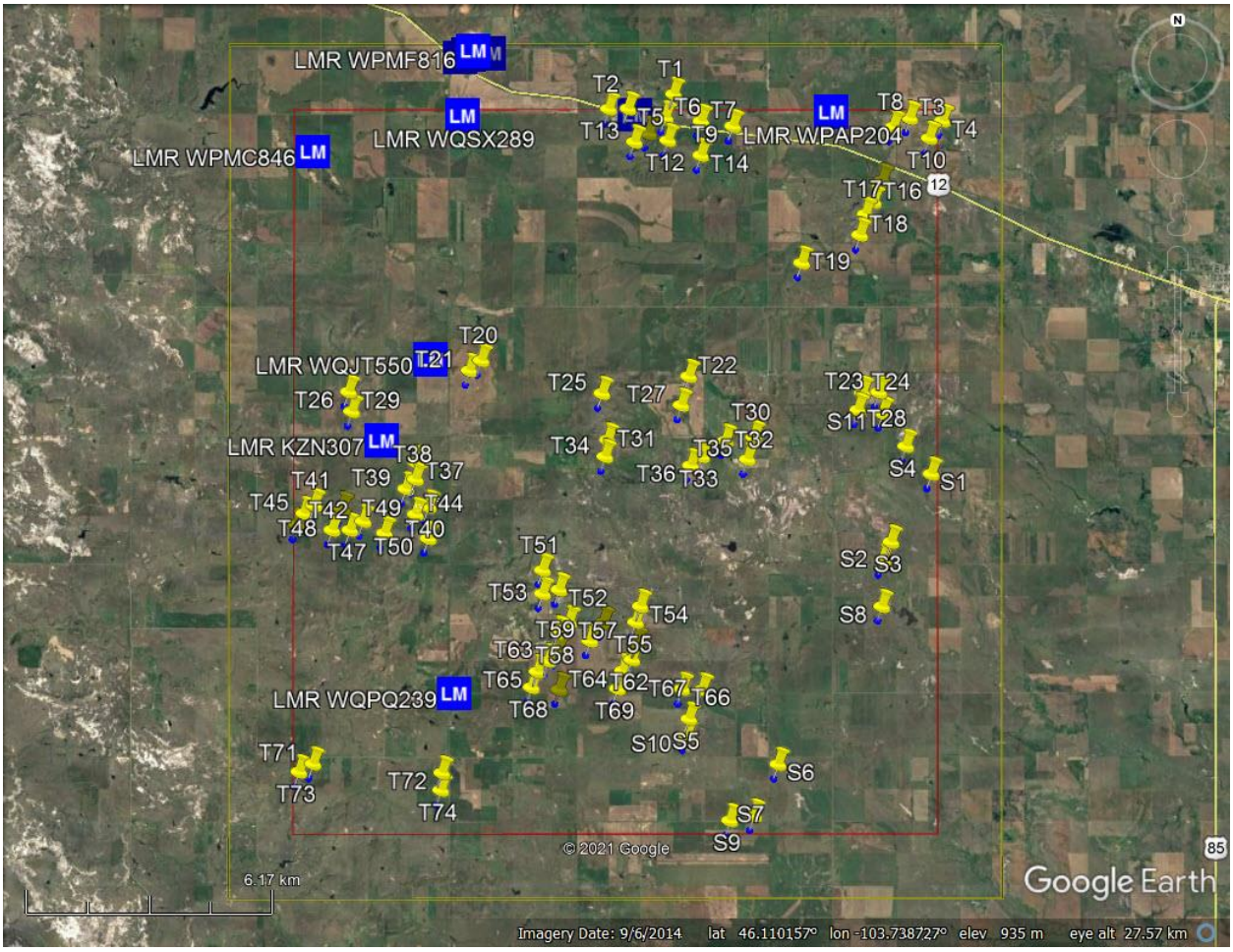

Figure 3 – Land Mobile Stations in or near Bowman Project Area

When recommending setback distances from land mobile stations, Evans Engineering Solutions makes use of the concept of the "far-field" region of a transmitting antenna. The far-field region is defined as the distance just far enough from the antenna such that the shape of the radiation pattern of the antenna doesn't change with increased distance from the antenna, unlike in the near-field (although the *strength* of the received signal in the far-field decreases with increased distance). An object near the antenna that has highly conductive properties, such as a wind turbine with a metal supporting tower, may cause distortion of the antenna's radiation pattern if it is located in the antenna's near-field. Thus, in general, a turbine should not be sited inside the edge of the far-field region of a land mobile transmitting antenna.

The distance R_{ff} to the edge of the far-field region of an antenna, also known as the Fraunhofer distance, can be calculated using the following equation:

$$R_{ff} = 2D^2/\lambda$$

where D is the length of the antenna and λ is the wavelength at the operating frequency.

Since the length of the antenna and the frequency are usually known, we can utilize this equation to establish setback distances from omni-directional[4] land mobile stations. Evans Engineering Solutions uses a modified form of the above equation, substituting "3" for "2" as the coefficient in the equation. This increases the setback 50% to provide additional protection by reducing the antenna aperture blockage presented by the wind turbine support towers.

By using worst-case assumptions of frequency and antenna length, we can arrive at a worst-case setback for the purpose of performing an initial "screening" for potential land mobile interference by wind turbines. Let us assume that a land mobile station, whether licensed or unlicensed, could operate on a frequency up to 965 MHz and utilize an antenna up to 20 feet in length (commercially available antennas that operate omni-directionally at this frequency are usually less than 10 feet long). The wavelength λ at 965 MHz is 1.02 feet. Thus, in the modified Fraunhofer equation, the turbine setback is calculated as follows:

$$R = 3(20)^2/1.02 = 1{,}176 \text{ feet}$$

Converting to metric, the worst-case setback R is 359 meters. One of the turbine models being considered for the Bowman project has rotor blades that extend out to 79 meters from the turbine tower (measured from the rotor hub to the tip of the blade). We add this length to R to get a recommended spacing from any land mobile antenna structure to the turbine tower, which

[4] "Omni-directional" transmitting stations operate with nearly equal levels of RF energy in all directions, unlike, for example, point-to-point microwave stations which transmit RF energy in one discrete direction.

becomes 438 meters. It is the practice of this firm to round up setback distances to the nearest number divisible by 25; thus, 450 meters is recommended as the setback distance between a land mobile tower and the nearest turbine. However, if a turbine is sited less than the recommended setback from a land mobile station and there are no acceptable options that would meet the setback, we then use the actual highest operating frequency and antenna length to calculate an alternative setback which, with rare exceptions, is less than the worst-case spacing.

If the locations of all the land mobile stations listed in Table 2 are positioned at the coordinates specified in their FCC licenses, only two of the land mobile stations listed are within 450 meters of any planned Bowman turbine site, based on the currently proposed layout (see Figures 3). The nearest planned turbine, T5, would be 377 meters from stations WQAC538 and WQJA861 which are located at a common site (see Figure 4). WQAC538 operates on 160.92 MHz and WQJA861 operates on 44.58 MHz.

Applying the modified Fraunhofer equation, the distances to the far-field regions of WQAC538 and WQJA861 are 63 meters and 18 meters, respectively. The larger region is distinctively seen in Figure 4 as a blue circle of 63 meters radius centered at the land mobile site. We add the maximum length of the turbine blades, 79 meters, to 63 meters to obtain a recommended spacing from the WQAC539/WQJA861 to the turbine tower, which becomes 142 meters, 150 meters when rounded to the next number divisible by 25. This is substantially less that the actual distance of 377 meters from the nearest turbine site, T5, to the land mobile site.

Therefore, based on the current project layout, and assuming that the land mobile stations in and near the project area are actually located at their licensed locations, or located farther away from turbines, no adverse impact is expected to be caused to the transmissions of land mobile or public safety stations that are licensed by the FCC.

Figure 4 – Close-Up of Land Mobile Stations WQAC538 & WQJA861 near Turbine T5

The nearest planned turbine, Turbine T5, is 377 meters from the WQAC538/WQJA861 transmitter, significantly less than the recommended setback of 150 meters.

3.2 Other Communications Sites

A search through the FCC-registered antenna structures database reveals communications towers located within 25 kilometers of the center of the proposed project area, which are listed in Table 3 and mapped in Figure 5. Many of these structures might be cellular base station towers. It is suggested, although not required, that these sites be investigated for microwave operations that are not in the FCC database, including unlicensed microwave facilities.

As mentioned previously, multi-directional transmitting facilities within 450 meters of a planned turbine customarily should be further evaluated for the possibility of turbine-related transmitter interference. The Bowman project is not expected to cause any turbine-related signal transmission problems to multi-directional transmitting facilities located at any of the tower sites listed in Table 3 and shown in Figure 5, since none are closer than 2.8 kilometers from any planned turbine[5].

Table 3 should not be considered as a complete list of antenna structures in the area, since most towers under 61 meters (200 feet) in height are not required to be registered with the FCC. An on-site visual survey is suggested to identify such towers.

FCC ASR Registr. #	Owner	Location	Latitude	Longitude	Height AGL (m)
1039982	North Dakota, State of	Bowman, ND	46-16-25.0N	103-21-04.0W	100.6
1040020	North Dakota, State of	Bowman, ND	46-10-38.0N	103-24-31.0W	15.5
1046458	BNSF Railway Co.	Bowman, ND	46-11-55.8N	103-28-23.3W	24.4
1057669	K2 Towers II, LLC	Bowman, ND	46-12-15.0N	103-23-32.0W	60.0
1057670	K2 Towers II, LLC	Bowman, ND	46-12-14.0N	103-23-33.0W	60.0
1238933	Bowman County Airport Authority	Bowman, ND	46-11-06.0N	103-25-43.6W	18.3
1264563	Bowman, County of	Bowman, ND	46-12-15.3N	103-23-34.0W	30.4
1268500	American Towers, LLC.	Bowman, ND	46-12-14.9N	103-23-31.1W	22.3
1282682	BNSF Railway Co.	Bowman, ND	46-11-39.7N	103-26-59.0W	15.2
1282683	BNSF Railway Co.	Bowman, ND	46-11-08.2N	103-24-07.6W	15.2
1285459	Bowman County	Bowman, ND	46-11-02.0N	103-23-50.0W	30.5
1286936	Bowman County	Rhame, ND	46-14-16.5N	103-39-35.6W	36.6
1292602	Bowman Regional Airport	Bowman, ND	46-09-56.1N	103-17-47.1W	9.1
1297302	State of North Dakota	Bowman, ND	46-10-17.3N	103-18-11.2W	16.8
1314954	Municipal Communications	Rhame, ND	46-13-53.1N	103-38-56.6W	60.7

The listed coordinates for the above structures are from documents filed with the FCC and have not been verified by this consultant.

Table 3 – FCC-Registered Antenna Structures within 25 KM of Center of Project Area

[5] The closest FCC-registered tower to a planned turbine is ASR 1046458, 2.83 kilometers from Turbine T4.

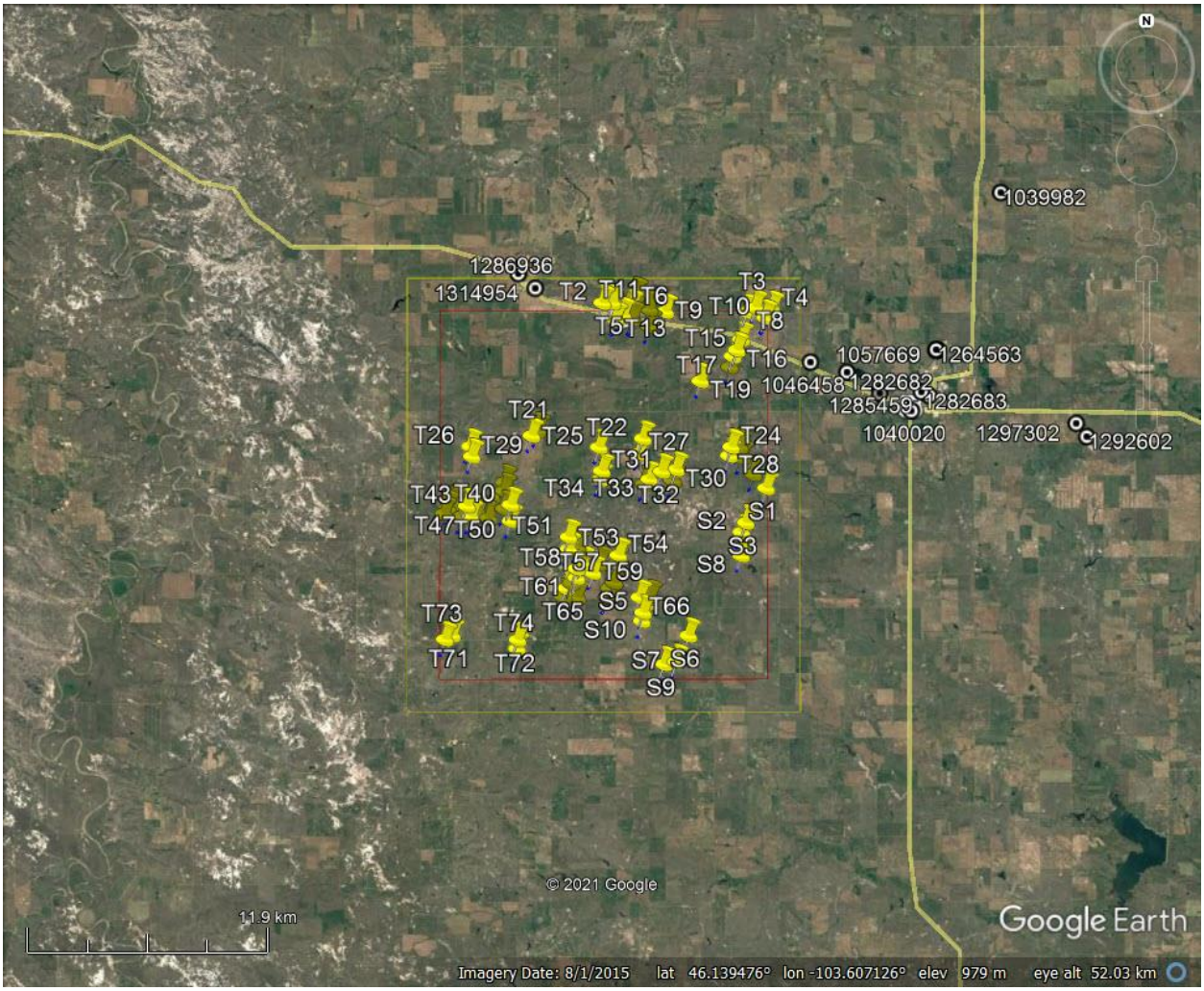

Figure 5 – FCC-Registered Antenna Structures within 25 KM of Center of Project Area

IV. ANALYSIS OF BROADCAST FACILITIES

4.1 TV Broadcast Facilities

The rotating blades of a wind turbine have the potential to disrupt off-the-air broadcast TV reception within a few miles of the turbine, especially when the direct path from the viewer's residence is obstructed by terrain. Interference is caused when signals reflected by the blades arrive at the viewer's TV antenna along with the direct signal. This is known as "multipath interference." However, as turbine manufacturers have replaced all-metal blades with blades constructed of mostly nonmetallic materials[6], this effect has been reduced. Also, the new generation of HDTV receivers is better equipped to deal with minor multipath interference (which is manifested by "pixilating" or "freezing" of the digital picture) than analog TV sets, as special circuitry is employed to suppress the reflected signal. Occasionally, however, multipath interference from one or more turbines can cause video failure in HDTV receivers, especially if the receiver location is in a valley or other place of low elevation.

There is some possibility of signal disruption for residences that have to point their outdoor antennas through the turbine area, or that utilize "rabbit ear" antennas and/or older HDTV receivers. Most of this effect should be dissipated for locations three or more miles from a turbine, but some residual problems could be noted for HDTV receivers that are located below the grade level at the turbine base. Usually, a rule of thumb is that approximately 10% of the receiver locations are affected to some extent within three miles of a large turbine when the turbine is between the TV station and the receiver. The usual effect is intermittent "pixilation" or freezing of the digital TV picture. This estimate is based upon Evans Engineering's experience with similar wind energy projects.

Bowman County is in the Minot-Bismarck-Dickinson, North Dakota Designated Market Area (DMA) as defined by Nielsen Media Research. TV stations that are predicted to serve any part of the Bowman wind project area or its adjacent areas with an off-the-air signal are listed in Table 4 below. The predicted service areas of these stations are shown in yellow in Figure 6.

[6] Modern turbine blades are usually constructed from glass-reinforced plastic (GRP), although they usually contain some metal for strengthening, balance and grounding.

Call Sign	Type of Station[7]	Network Affiliate	Displayed Channel	RF Channel	City of License	Power (KW)	Ant. Height (m HAAT)	Dist. km)	Azimuth (°T)
KQCD-TV	Conventional	NBC	7	7	Dickinson, ND	11.3	205	101.5	27.5
KDSE-DT	Conventional	PBS	9	9	Dickinson, ND	30.3	238	84.0	38.9

Table 4 - TV Stations Serving Bowman Project Area and Environs

If the Bowman wind project should cause disruptions to over-the-air TV viewing, methods to resolve them are available, and are as follows:

1. Relocation of the household antenna to receive a better signal
2. Installation of a better outside antenna, or one with a higher gain
3. Installation of satellite or cable TV

According to this engineer's calculations, and based on the 2019 U.S. Census Update, there are approximately 157 households within an area likely to be affected (approximately 200 square miles, shown in Figure 6). Based on the 10% criteria described previously, up to 16 TV receiving locations may be affected in the worst-case. Mitigation costs would be approximately $200 per location for an upgraded outdoor antenna, or $400 per year per location for a satellite or cable subscription.

It is the opinion of this consultant that any disruptions to over-the-air TV broadcast signals, if they occur, can be resolved satisfactorily.

[7] "Conventional" TV station is a station serving a wide geographic area which is often affiliate of a major broadcast network but also could be independent of a network.

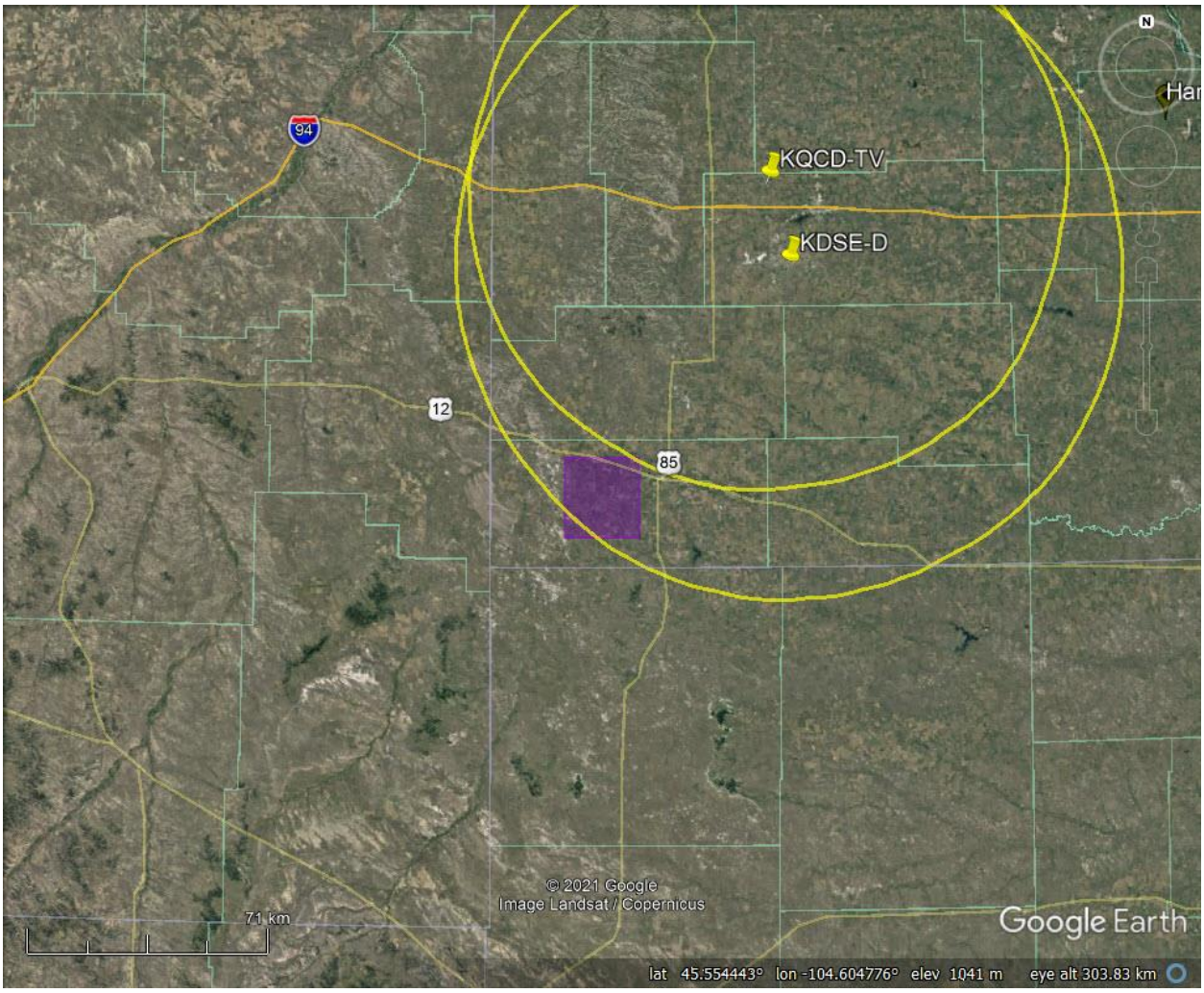

Figure 6 – Predicted Over-the-Air Television Coverage into Bowman Project Area

The yellow boundaries represent TV station coverages that extend into or near the Bowman wind energy project area. The purple square represents the predicted potential off-the-air TV reception interference area. According to the 2019 US Census Update, there are 157 households within the interference area.

4.2 FM Facilities

The full-service FM stations that place a predicted primary signal over at least part of the project area are listed in the following Table 6. The FM stations' service area boundaries are mapped in Figure 7.

Call Sign	Type of Station[8]	Freq. (MHz)	City of License	Power (KW)	Ant. Height (m HAAT)	Dist. (km)	Azimuth (°T)
K220FJ	Translator	91.9	Bowman, ND	0.008	34.9	17.1	72.8
K293BN	Translator	106.5	Bowman, ND	0.068	148	18.0	66.5

Table 6 – FM Stations Serving Bowman Project Area

Real-world experience with wind farms has shown that FM radio station signals (88 to 108 MHz) are fairly insensitive to wind turbine interference, even in cases where the FM transmitting antenna is surrounded by turbines that are higher than the FM antenna. Because of the "capture effect" supported by the "discriminator" in FM receivers, significant disruptions to the above facilities are not expected. Although the received signal may vary with the blade rotation at some receiver locations in the immediate area, good quality FM radios should factor out such time-varying signals.

The transmitting antennas of the two FM translators in Bowman and their respective predicted coverage areas are beyond the footprint of the proposed Bowman turbines (see Figure 7). In any case, as explained above, turbine interference to the reception of K220FJ or K293BN is not expected.

4.3 AM Facilities

Large metallic structures such as wind turbines can adversely affect the transmitted signals of AM broadcast stations up to three kilometers away. A search of the FCC's database revealed no AM facilities within the required notification distance of three kilometers from any planned turbine. There should therefore be no reasonable expectations of disruptions in transmitted radiations on the AM band due to the presence of the turbines. Occasionally, depending upon ground conditions, local AM receivers may experience slight signal changes due to local effects,

[8] An FM translator station is a low-power station that retransmits the signals of a full-power FM station on a different frequency for the purpose of filling in an uncovered area within the designated service area or extending the reach of a full-power FM station outside its designated service area.

but such anomalies are not recognized by the FCC or the standards of good engineering practice as having an unduly adverse effect.

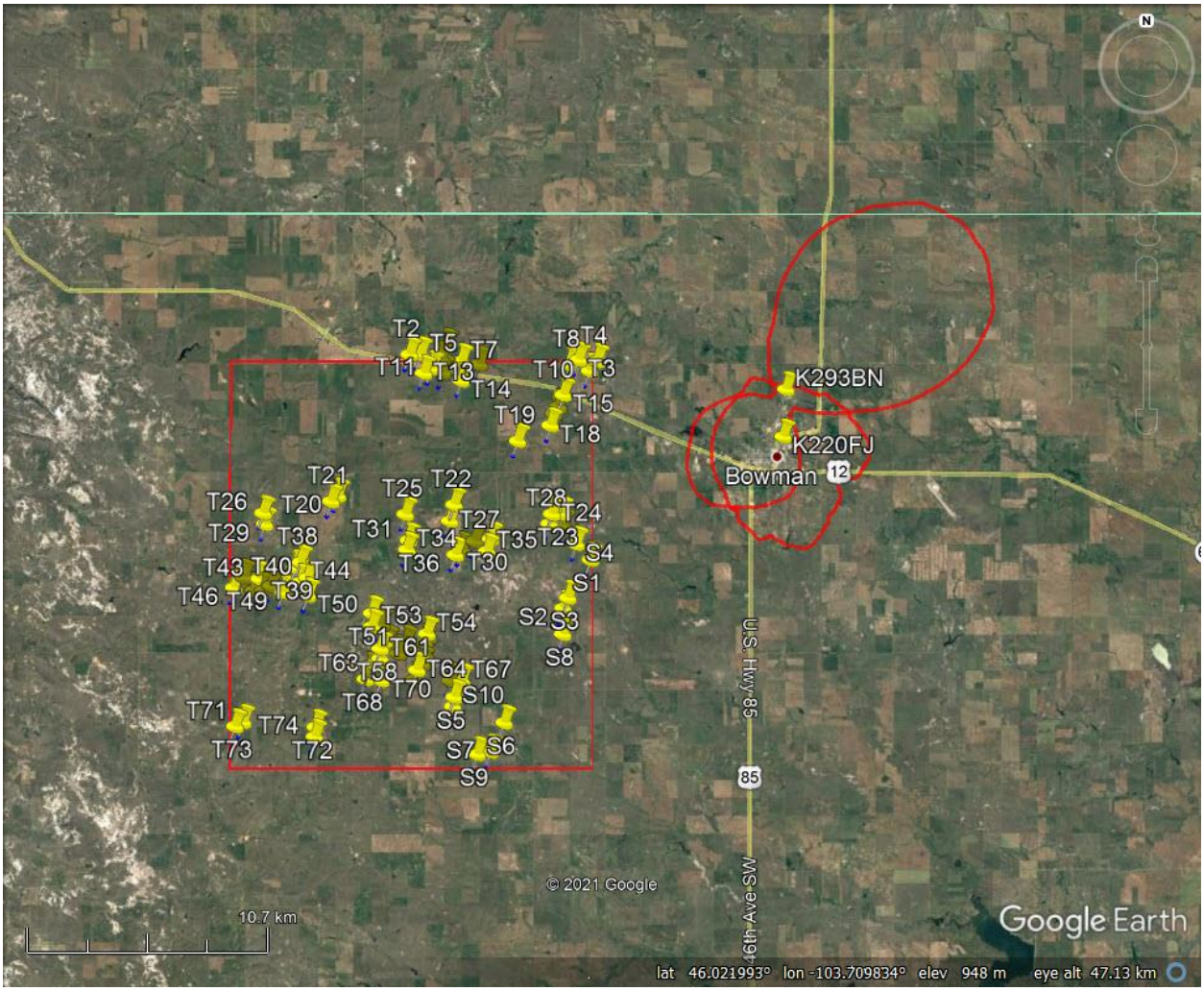

Figure 7 – FM Radio Station Locations & Coverage near Bowman Project Area

V. RADAR AND NTIA NOTIFICATION

5.1 DoD Radar Concerns

The Department of Defense (DoD) and the Department of Homeland Security *Long Range Radar Joint Program Office* "JPO" has adopted a "pre-screening tool" to evaluate the impact of wind turbines on air defense long-range radar. This tool was applied to the Bowman project area, and it returned a result of "no anticipated impact" (green) to Air Defense and Homeland Security radars (see Figure 8). However, a definitive determination is obtained only after formal study by the DoD, which is triggered by the FAA 7460-1 notification process.

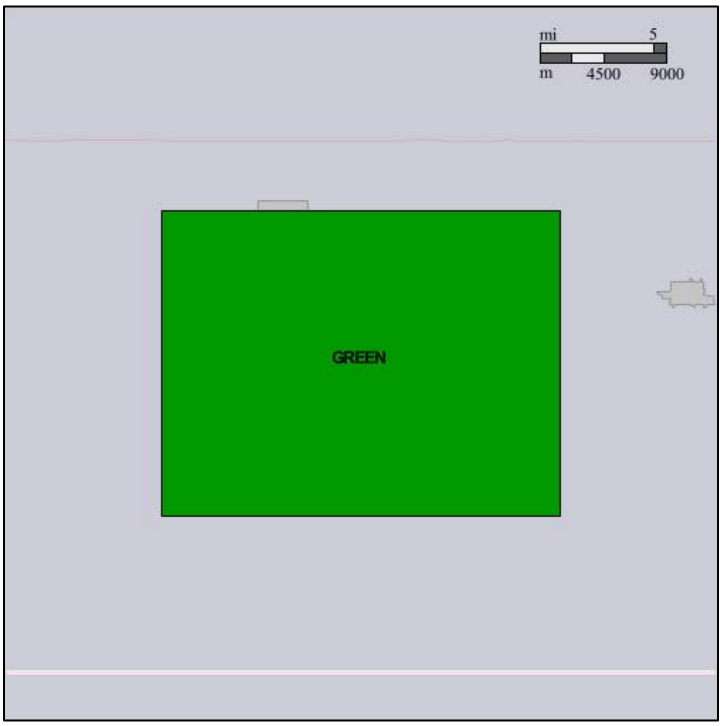

Figure 8 – DoD Long-Range Radar Screening

Map Legend:

- **Green:** No anticipated impact to Air Defense and Homeland Security radars. Aeronautical study required.

5.2 NEXRAD

A pre-screening tool has been developed to evaluate the potential impact of obstructions to the NEXRAD Weather Surveillance Doppler Radar Stations. This tool was applied to the Bowman project area, and it returned a result, shown in Figure 9, of "impacts not likely" to weather radar operations. However, a definitive determination is obtained only after the NTIA review process.

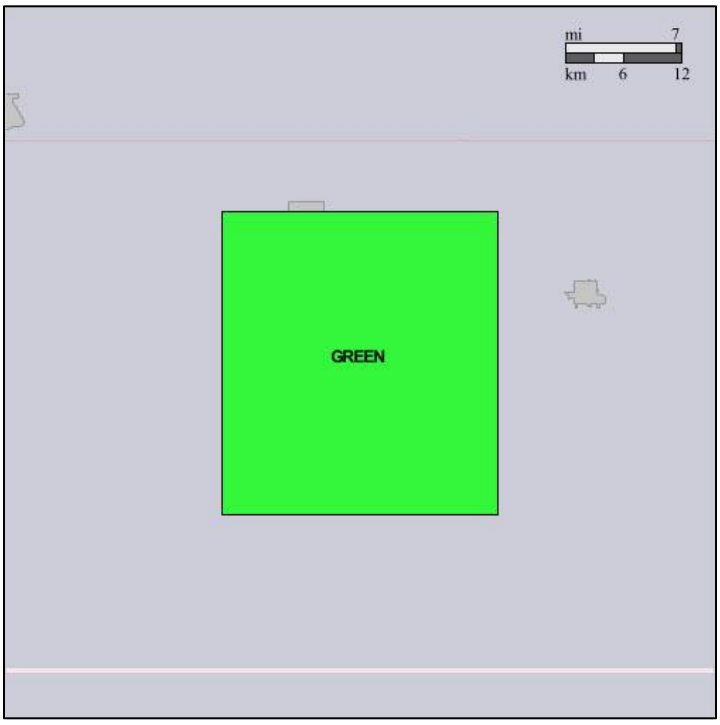

Figure 9 – NEXRAD Weather Radar Screening

Map Legend:

- **Green: No Impact Zone.** Impacts not likely. NOAA will not perform a detailed analysis, but would still like to know about the project.

5.3 NTIA NOTIFICATION

Operation of RF frequencies for federal government use is managed by the National Telecommunication Information Agency (NTIA), which is part of the U.S. Department of Commerce. The technical specifications for most government facilities are unavailable to the public. In order to avoid the derailment of the wind energy project due to late objections from a government agency, the NTIA should be notified of the proposed project during pre-construction planning. The NTIA has set in place a review process, wherein the Interdepartmental Radio Advisory Committee (IRAC), consisting of representatives from various government agencies, reviews new proposals for wind turbine projects for impact on government frequencies. In almost all cases, no adverse impact is found, and IRAC usually issues a determination in about 60 days.

On February 10, 2021, this office sent a notification of the Bowman wind project in its final configuration to the NTIA, and a determination is expected about the first full week of April 2021.

VI. CONCLUSIONS AND RECOMMENDATIONS

1. The only FCC-licensed microwave path found in the vicinity of the project does penetrate the project area but would not be impacted by any proposed turbine according to the current layout.

2. If an excessive amount of time goes by before the turbines are to be constructed (six months or more), it is recommended that the microwave study be updated in case new paths have been added to the FCC's database.

3. No land mobile transmitting stations are expected to be adversely affected, assuming that their transmitters are located exactly as per their FCC licenses. If any of the turbines are to be re-sited, it is recommended that no turbine be closer than 150 meters from land mobile stations WQAC538 and WQJA861.

4. Interference to off-the-air TV reception due to operating wind turbines is not expected to be a significant problem. Effective mitigation methods to resolve any interference that may occur are available, with satellite or cable service installation providing the worst-case solution. No radio broadcast facilities are likely to be affected.

Respectfully Submitted,

B. Benjamin Evans
RF Impact Consultant

February 15, 2021

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

March 31, 2020

Mr. B. Benjamin Evans
EVANS ENGINEERING SOLUTIONS, LLC
524 Alta Loma Drive
Thiensville, WI 53092

Re: Bowman Project, Revision 1: Bowman County, ND

Dear Mr. Evans:

In response to your request on February 5, 2020, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the Bowman Wind Project, Revision 1, located in Bowman County, North Dakota.

After a 45+ day period of review, of the reviewing federal agencies, none had concerns with turbine construction in the designated areas.

While the other IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by the IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review these proposals.

Sincerely,

John R. McFall
Deputy Chief, Spectrum Services Division
Office of Spectrum Management

Appendix D
Agency Correspondence

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Agency Correspondence

Representative Letters Sent

May 11, 2020

[Address Block]

RE: Requesting Comments on an up to 200-megawatt Wind Farm in Bowman County, North Dakota

Dear [Name],

Bowman Wind, LLC (Bowman Wind), an indirect wholly-owned subsidiary of Apex Clean Energy Holdings, LLC (Apex), is proposing to construct up to 200 megawatts (MW) of new wind energy generation in Bowman County, North Dakota (Project). Bowman Wind will be submitting an Application for a Certificate of Site Compatibility for the proposed Project to the North Dakota Public Service Commission (NDPSC). The Project will interconnect to the Basin Electric Power Cooperative Rhame 230 kilovolt (kV) substation within the Project boundary. As such, the Project's generation interconnection line will be less than one mile long and will be locally permitted.

The planned nameplate capacity for the Project is up to 200 MW. The Project's permanent facilities will include:

- Up to 70 wind turbines and associated equipment;
- New gravel access roads and improvements to existing roads;
- Underground electrical collection lines;
- An operations and maintenance facility;
- A Project substation; and
- Up to two permanent meteorological towers up to 92 meters tall.

The Project's temporary facilities will include:

- Staging/laydown areas for construction activities;
- Temporary improvements to existing roads, including driveways, for transport and access during construction; and
- Crane paths to be used during construction.

The turbine locations, access roads, and collection line routes have not been finalized at this time. Table 1 provides the sections of land that Bowman Wind is evaluating for siting the Project.

c/o Apex Clean Energy, Inc.
8665 Hudson Blvd North, Suite 110 | Lake Elmo, MN 55042
T 612.260.6614 | F 434.220.3712
apexcleanenergy.com

Table 1 Bowman Wind Farm Preliminary Project Location				
County Name	**Township Name**	**Township**	**Range**	**Sections**
Bowman	Marion	132N	103W	21, 29-36
	Adelaide	131N	104W	13-15, 20-29, 31-36
	Hart Unorganized Territory	131N	103W	1-5, 7-36
	Nebo	130N	104W	1-18, 20-24, 26-27
	Amor	130N	103W	1-12, 16-19

In conjunction with preparing the NDPSC application, we are seeking input from your agency or entity regarding any sensitive resources, current or planned development, or property interests your agency or entity may have in or around the Preliminary Project Area that Bowman Wind should consider as it moves forward with development. In addition, we ask that you provide information regarding any applicable permits that may be required from your office. To facilitate your review, we have enclosed a map that depicts the area within which turbines and associated facilities may be proposed. We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the NDPSC's review process.

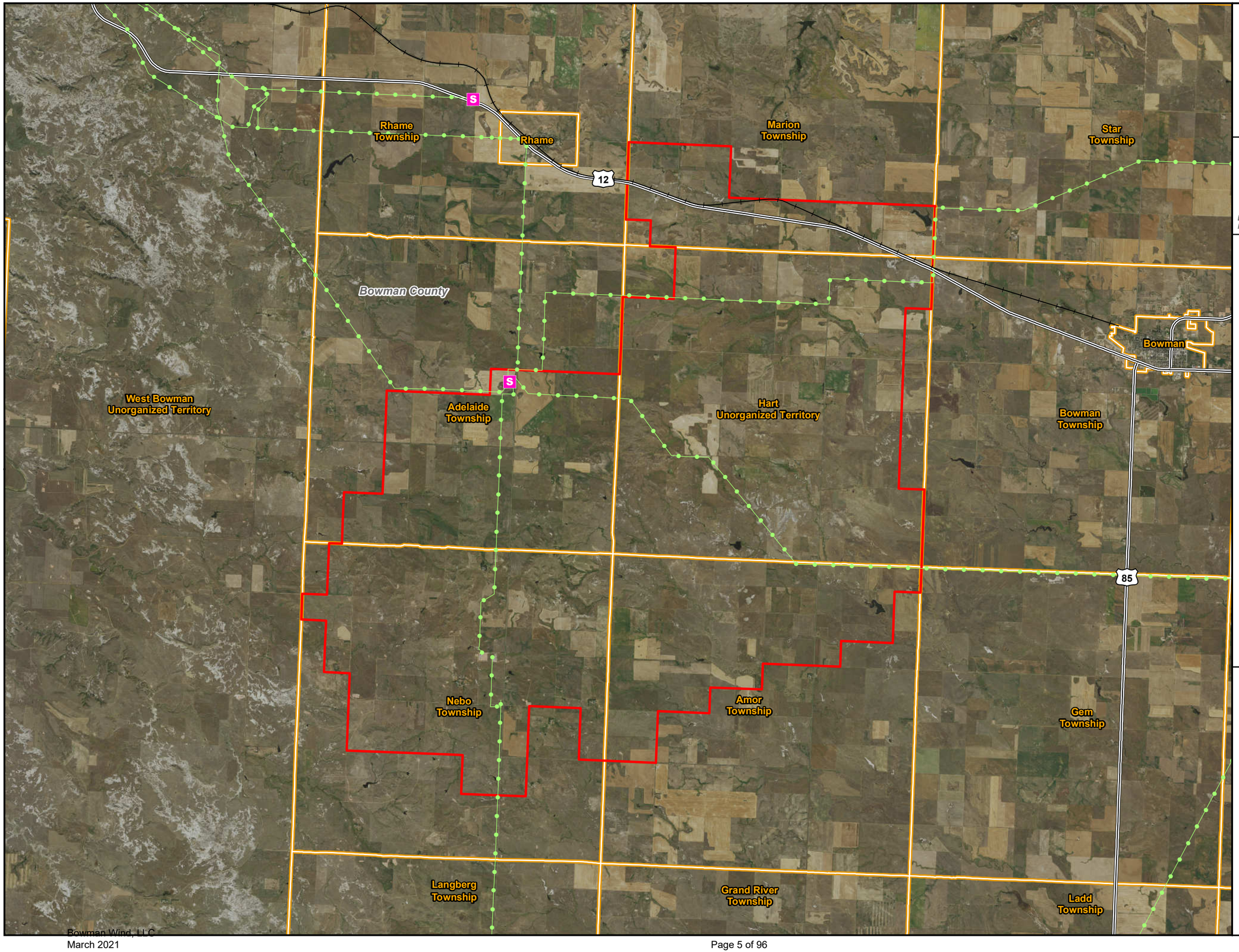
If you require further information or have questions regarding this matter, please contact me at (715) 432-3927 or scott.jansen@apexcleanenergy.com.

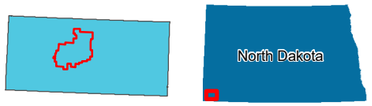
Sincerely,

Scott Jansen
Senior Development Manager
Apex Clean Energy

Enc. Preliminary Project Location Map

c/o Apex Clean Energy, Inc.
8665 Hudson Blvd North, Suite 110 | Lake Elmo, MN 55042
T 612.260.6614 | F 434.220.3712
apexcleanenergy.com





0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ND GIS Hub, ESRI
Imagery: ND GIS 2018

- Existing Substation
- Existing Transmission Line
- City/Township
- Preliminary Project Boundary

Figure 1
Preliminary Project Area

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\BowmanPermitting\Site_Permit\Mapping\Fig01_Bowman_Project_Location.mxd
Date: (5/6/2020)

Appendix D

Agency Correspondence

Agencies Contacted

Title	First	Last	Title	Agency	Address	PO Box	City	State	Zip
Mr.	David	Norquist	Deputy Secretary of Defense	U.S. Department of Defense	1010 Defense Pentagon		Washington	DC	20301-1010
Ms.	Patricia	McQueary	Program Manager	U.S. Army Corps of Engineers, North Dakota Regulatory Office	3319 University Drive		Bismarck	ND	58504
Mr.	Dave	Anderson	Assistant Manager	Federal Aviation Administration, Dakota-Minnesota Airports District	2301 University Drive, Bldg. 23B		Bismarck	ND	58504
Mr.	Drew	Becker	Ecological Services Supervisor	U.S. Fish and Wildlife Service, North Dakota Field Office	3425 Miriam Avenue		Bismarck	ND	58501-7926
Mr.	Kyle	Wanner	Director	North Dakota Aeronautics Commission	2301 University Drive, Bldg. 22	PO Box 5020	Bismarck	ND	58502-5020
Mr.	Wayne	Stenehjem	Attorney General	North Dakota Attorney General's Office	600 East Boulevard Avenue, Dept. 125		Bismarck	ND	58505-0040
Mr.	Doug	Goehring	Agriculture Commissioner	North Dakota Department of Agriculture	600 East Boulevard Avenue, Dept. 602		Bismarck	ND	58505-0020
Mr.	David	Glatt	Director	North Dakota Department of Environmental Quality	918 E. Divide Avenue, 4th Floor		Bismarck	ND	58501
Mr.	Christopher	Jones	Executive Director	North Dakota Department of Human Services	600 East Boulevard Avenue, Dept. 325		Bismarck	ND	58505-0250
Ms.	Erica	Thunder	Commissioner of Labor	North Dakota Department of Labor and Human Rights	600 East Boulevard Avenue, Dept. 406		Bismarck	ND	58505-0340
Mr.	Wayde	Sick	Director and Executive Officer	North Dakota Department of Career and Technical Education	600 East Boulevard Avenue, Dept. 270		Bismarck	ND	58505-0610
Ms.	Michelle	Kommer	Commissioner	North Dakota Department of Commerce	1600 E. Century Avenue, Suite 2		Bismarck	ND	58503
Mr.	Greg	Link	Chief	North Dakota Game and Fish Department, Conservation and Communications	100 N. Bismarck Expressway		Bismarck	ND	58501-5095
				North Dakota Industrial Commission	600 East Boulevard Avenue, Dept. 405		Bismarck	ND	58505-0840
Governor	Doug	Burgum		North Dakota Office of the Governor	600 East Boulevard Avenue		Bismarck	ND	58505-0100
Mr.	William	Panos	Director	North Dakota Department of Transportation	608 East Boulevard Avenue		Bismarck	ND	58505-0700
Ms.	Claudia	Berg	Director	North Dakota State Historical Society	612 East Boulevard Avenue		Bismarck	ND	58505
Mr.	Scott	Davis	Executive Director	North Dakota Indian Affairs Commission	600 East Boulevard Avenue, Room 117		Bismarck	ND	58505
Mr.	Bryan	Klipfel	Executive Director	Job Service North Dakota	1600 E. Century Avenue		Bismarck	ND	58503
Ms.	Jodi	Smith	Commissioner	North Dakota Department of Trust Lands	1707 North 9th Street	PO Box 5523	Bismarck	ND	58506-5523
				North Dakota Trust Lands, Energy Infrastructure & Impact Office	1707 North 9th Street	PO Box 5523	Bismarck	ND	58506-5523
Mr.	Ryan	Gardner	Interim Director	North Dakota Parks & Recreation	1600 E. Century Avenue, Suite 3	PO Box 5594	Bismarck	ND	58506-5594
Mr.	Barton	Schott	Chair	North Dakota State Soil Conservation	2718 Gateway Avenue, Suite 304		Bismarck	ND	58503
				North Dakota State Water Commission	900 East Boulevard Avenue		Bismarck	ND	58505-0850
			Director	North Dakota Transmission Authority	600 East Boulevard Avenue, Dept. 405		Bismarck	ND	58505-0840
			Director	North Dakota Pipeline Authority	600 East Boulevard Avenue, Dept. 405		Bismarck	ND	58505-0840
Ms.	Lynn	Helms	Director	North Dakota Geological Survey	600 East Boulevard Avenue		Bismarck	ND	58505-0840
Ms.	Mylynn	Tufte	State Health Officer	North Dakota Department of Health	600 E Boulevard Ave, Dept 301		Bismarck	ND	58505
Mr.	Jerry	Jeffers	President and Bowman County Commissioner	Bowman County Planning & Zoning Board	104 1st St. NW, Suite 4		Bowman	ND	58623
Mr.	Rick	Braaten	Bowman County Commissioner	Bowman County Commission	104 1st St. NW, Suite 1		Bowman	ND	58623
Mr.	Josh	Buckman	Bowman County Commissioner	Bowman County Commission	104 1st St. NW, Suite 1		Bowman	ND	58623
Mr.	Pine	Abrahamson	Bowman County Commissioner	Bowman County Commission	104 1st St. NW, Suite 1		Bowman	ND	58623
Mr.	Lynn	Brackel	Bowman County Commissioner	Bowman County Commission	104 1st St. NW, Suite 1		Bowman	ND	58623

Appendix D

Agency Correspondence

U.S. Department of Defense and Ellsworth Air Force Base

From: Allen, Douglas [USA] [mailto:Allen_Douglas@bah.com]
Sent: Thursday, February 22, 2018 12:23 PM
To: Mark Mauersberger <mark.mauersberger@apexcleanenergy.com>
Subject: Bowman Wind Project (2017-WTE-6065) Potential AF impacts

Mr Mauersberger,

You are listed as the POC for the Bowman Wind Project (2017-WTE-6065) in OE/AAA

I m writing to notify you that the Air Force has identified potential mission impacts associated with this project, specifically those missions that take place within the Powder River Training Complex We are working with the necessary Air Force stakeholders to gather all of the potential impacts and assess their severity, and will be ready for a joint meeting in the near future

Please let me know if you and your company are willing to work with the Air Force to help mitigate the potential impacts associated with Bowman, and we ll be looking forward to working with you in the near future

Thank you and please feel free to give me a call if need be (757 951 5121),

Doug Allen, AICP
SAF/IEI Encroachment Analyst
Allen_Douglas@bah.com
Cell: 757-951-5121

From:	Allen, Douglas [USA]
To:	Ozzie Nelson (eric.nelson.42@us.af.mil); Stone, George W CIV USAF 28 OG (US) (george.stone@us.af.mil); Dave Belote
Cc:	Scott Koziar; Mark Mauersberger; Tracy Butler; Karlis Povisils; Dylan Fraser
Subject:	Bowman Wind (2017-WTE-6065) MRT Meeting
Start:	Friday, March 09, 2018 11:00:00 AM
End:	Friday, March 09, 2018 12:00:00 PM
Location:	Dial In: (877) 885-1087; Conference Code: 343-450-4607
Attachments:	Ellsworth -- Bowman Wind -- V6.pptx

Dial In: (877) 885-1087; Conference Code: 343-450-4607

Does this time/date work for you guys to talk with Apex re: Bowman?

- **Roll Call:**
  - Doug Allen, SAF/IEI
  - Ozzie Nelson, ACC/A3
  - Steve White, IMSC Det 8
  - Dave Belote, Dare Strategies
  - Mark Mauersberger, Apex
  - Scott Koziar, Apex
  - Dylan Fraser, Apex
  - Tracy Butler, Apex
  - Karlis Povisils, Apex
  - Chia Stone, Ellsworth AFB
- **Purpose:** Discuss impact mitigation options for the Bowman Wind Turbine Project.
- **Action Items/Next Steps:**
  - AF: Provide Apex with historical LFE data
  - Apex: Use LFE data plus curtailment offer and determine economic impact/feasibility
  - **Next Step**: Reconvene to discuss agreement (Date TBD)
- **Notes:**
  - Apex will run numbers re: curtailment to 85 fps to see if there is any benefit to slowing down to this speed vs stopping the turbine
  - Dave Belote suggested the agreement could include 1-2 less curtailment days during LFEs replaced with money for studies to determine wind turbine impacts to operations, which could be used for real-life scenarios
  - Apex agrees to install NVG lighting on all turbines
  - Re: non-compliance – has been included in a past curtailment agreement
  - Ellsworth/PRTC directives require a 30-day notice ahead of all LFEs – can add Apex to the list of notified stakeholders
  - Mandated limits to PRTC LFEs as follows:
    - Maximum of 10 LFE days per year
    - Maximum of 1 LFE per quarter
    - Maximum of 3 days per LFE
    - 30 day notification prior to LFEs
  - It may be possible for AF to alert Apex when "high war" LFEs will be conducted and the turbines do not need to be curtailed
  - Noted that past LFE activities do not necessarily reflect future LFE activities
  - Apex Q: Would all turbines need to be curtailed?
    - A: Yes, since all turbines in this project are located within the PRTC airspace.
  - General Q: How many turbines will ultimately be built?
    - A: The project is limited to 200 MW total, so total number of turbines depends on the size and output of the turbines. The max would be roughly 100 and the minimum roughly 50, however the max/min represents the extreme and the final total is likely to be somewhere in the middle.

From: Dave Belote
To: Holland, Paul A CTR (USA)
Cc: Butt, Myra T.; Allen, Douglas K Jr CTR (USA)
Subject: Re: Bowman Update
Date: Friday, April 17, 2020 3:12:34 PM

Sounds good! Thanks — Dave

Dave Belote
DARE Strategies LLC
Sent from my iPhone

> On Apr 17, 2020, at 3:10 PM, Holland, Paul A CTR (USA) <paul.a.holland12.ctr@mail.mil> wrote:
>
> Dave,
>
> I checked in with Chia earlier this week about Bowman.
>
> Since this is the first agreement they've worked at Ellsworth, he wanted to run it up to the OG/CD for awareness before it goes to Jim and Jerry for their review.
>
> He said that the TMT would be completed on that by next Friday.
>
> Have a good weekend and we'll talk on Monday.
>
> Best,
>
> Paul
>
> Paul A. Holland
> Air Force Mission Sustainment Analyst, Ctr
> Office of the Deputy Assistant Secretary
> (Installations)
> Phone: 703-862-9866

From:	Holland, Paul A.
To:	Dave Belote
Cc:	Butt, Myra T.; ALLEN, DOUGLAS K JR CTR USAF HAF SAF/SAF/IEI; Edward Chupein; KUO, HSUAN-WEN CTR USAF AFDW SAF/SAF/IEI
Subject:	Executed Bowman Mitigation Agreement
Date:	Thursday, November 05, 2020 2:55:32 PM
Attachments:	Bowman Wind Mitigation Agreement Executed.pdf

Good Afternoon Dave,

Please see attached the signed and executed Bowman Mitigation Agreement.

Thanks for your assistance in getting this one across the finish line.

Best,

Paul

Paul Holland
SAF/IEI Mission Sustainment Analyst, Ctr
C: 703-862-9866

AGREEMENT AMONG THE DEPARTMENT OF DEFENSE, THE DEPARTMENT OF THE AIR FORCE, AND BOWMAN WIND, LLC, ADDRESSING THE BOWMAN WIND PROJECT NEAR BOWMAN, NORTH DAKOTA

This is an agreement among the Department of Defense (DoD), acting through the Military Aviation and Installation Assurance Siting Clearinghouse, the Department of the Air Force (MILDEP), acting through the Deputy Assistant Secretary of the Air Force for Installations (collectively, the "DoD parties"), and Bowman Wind, LLC (Project Owner). Together, these three entities are referred to as "parties" and individually as a "party." Any reference to "DoD parties" means both parties and does not indicate that one party acts for or on behalf of the other. In this agreement, DoD does not include the United States Army Corps of Engineers when engaged in its civil works program, including any permitting actions.

This agreement is entered into pursuant to section 183a of title 10, United States Code, and part 211 of title 32, Code of Federal Regulations.

Attachments A, *Federal Aviation Administration Filings for Bowman Wind Project*; B, *Bowman Wind Project Map and Project Area*; and C, *Curtailment Communications Protocol*, are attached to this agreement and made a part hereof.

For good and valuable consideration, the receipt of which is hereby acknowledged, the parties agree as follows:

SECTION 1. PURPOSE.

A. Objective. The objective of this agreement is to mitigate any potential adverse impact and to minimize risks to national security while allowing the Bowman Wind Project (Project) to proceed with construction and development.

B. De-confliction. As the Project was originally filed, the spinning wind turbines would conflict with MILDEP's operation of the Powder River Training Complex (PRTC). As originally filed, the Project's proposed turbine locations may have adversely affected the MILDEP's Large Force Exercises (LFEs) conducted by the 28th Bomb Wing, Ellsworth Air Force Base (AFB), in South Dakota. This includes the effects of the spinning wind turbines on airborne Doppler radar. The parties have focused on de-conflicting these activities and agree that the terms below allow the mutual goals of the parties to be met.

SECTION 2. DEFINITIONS.

A. Access. "Access" means either to enter a physical space or to remotely read, copy, edit, divert, release, alter the state of, or otherwise affect information technology systems (e.g., network, data, security, software, hardware).

B. Actual Curtailment Hours. Hours of curtailment, beginning when the rotor blade rotation stops and the blades are locked in accordance with this agreement.

C. ADLS. Aircraft Detection Lighting Systems.

D. ASN. Federal Aviation Administration Aeronautical Study Number.

E. Banked Hours. [RESERVED]

F. CFIUS. Committee on Foreign Investment in the United States.

G. CFR. Code of Federal Regulations.

H. Curtailment. The cessation of wind turbine operations when the wind turbine blades are not spinning and are locked. Curtailment requires that all of a turbine's rotor blades be completely precluded from rotation about the rotor hub.

1. Curtailment begins when rotor blade rotation stops and the blades are locked.

2. Curtailment ends after the MILDEP provides notification to Project Owner that cessation of operations is no longer required.

3. Curtailment is measured by hours (or any fraction thereof).

I. Day. A calendar day unless indicated otherwise.

J. DoD. Department of Defense, an executive department of the United States.

K. FAA. Federal Aviation Administration, an agency of the United States Department of Transportation.

L. Fiscal Year. The period that begins on October 1st and ends at the end of September 30th of the following year.

M. Hour. A temporal hour of 60 minutes, not a mega-watt hour. In order to account for fractions of an hour, hours will be calculated by rounding up the time measured to the next full minute, then dividing that number by 60, and expressing the quotient as a positive number out to three decimal places. By way of illustration only, if the measured amount of time were 46 minutes and 20 seconds, the time would be rounded up to 47 minutes, and because 47 divided by 60 equals 0.7833333333, the number of hours would be expressed as 0.783.

N. MILDEP. Department of the Air Force, a military department of the United States.

O. National Security or Defense Purpose. An emergency circumstance where the President of the United States, the Secretary of Defense, or a combatant commander under 10 U.S.C. section 164 directs a change to the mission of Ellsworth AFB in support of emergency circumstances. An emergency circumstance does not include routine changes to the mission of Ellsworth AFB.

P. Project. The Bowman Wind Project, which will consist of no more than 100 wind turbines within the project area depicted in Attachment B. The proposed wind turbines are identified in Attachment A by ASN.

Q. Project Owner. Bowman Wind, LLC, and its successors and assigns.

R. Siting Clearinghouse. Military Aviation and Installation Assurance Siting Clearinghouse established pursuant to 10 U.S.C. section 183a.

S. U.S.C. United States Code.

SECTION 3. MITIGATION.

A. In General. This agreement is structured to ensure Project Owner may construct and operate the Project without adversely impacting military operations and readiness. Project Owner agrees to limit the total number of Project wind turbines to not more than 100, and the Project wind turbine blade tips to a maximum height of 700 feet above ground level. Project Owner agrees to restrict the construction of the Project to the specific geographic coordinates, listed in Attachment A, and Project Area as shown in Attachment B. The location, height, and number of the structures within the boundary may be altered, but not to exceed the maximum height (700 feet at the blade tip) or the maximum number of the turbines (100). The MILDEP may provide written concurrence to a Project Owner request for changes in turbine geographic coordinates to the extent they are contained within the Project Area shown in Attachment B. Project Owner agrees to install Night Vision Goggle compatible lighting on all turbines associated with the Project that are required to have lighting pursuant to FAA requirements. Project Owner also agrees to ensure compliance with North Dakota law requiring aircraft detection lighting systems.

B. Impact Analysis during Test Energy Phase. [RESERVED]

C. Amendment of Applications. Project Owner agrees to amend its applications before the FAA, listed on Attachment A, by incorporating this agreement into each of those applications within 5 days of the execution of this agreement.

D. Withdrawal of Objections.

1. Within 10 calendar days of the execution of this agreement, the DoD parties shall deliver to the FAA "No Objections with Provisions" for the ASNs corresponding to the wind turbine

locations listed on Attachment A. The "Provisions" will incorporate by reference this agreement, referring to it by its title, the date executed, and its signatories.

2. If Project Owner submits any substitute ASNs to FAA within 12 months of the execution of this agreement, the DoD parties agree not to object to those substitute ASNs, provided that the substitute ASNs do not exceed the maximum height specified in section 3.A, that the substitute ASNs are located within the siting parameters of the Project Area specified in this agreement or any amendments to this agreement, that the total number of structure ASNs after substitution does not exceed 100, and that this agreement is incorporated into the substitute ASN filings.

3. All parties agree that, if Project Owner requests to extend the effective period of FAA's Determination of No Hazard to Air Navigation in accordance with 14 CFR section 77.35, then the DoD Parties will not object to such an extension as requested, provided that the affected ASNs are listed on Attachment A or are substitute ASNs that were submitted within 12 months of the execution of this agreement, that the wind turbine ASNs do not exceed the maximum height specified in section 3.A and are located within the siting parameters of the Project area specified in this agreement or any amendments to this agreement, that the total number of wind turbine ASNs for the Project still does not exceed 100, and that this agreement is incorporated into the ASN filings affected by the extension.

4. The DoD parties agree not to object to the construction and operation of the Project before any federal, state, or local regulatory entity with jurisdiction over the Project (except as provided in sections 6.B and 10.H of this agreement), provided that Project Owner is in material compliance with the terms of this agreement and that Project Owner has disclosed to the DoD parties in writing all material facts necessary to fully assess potential adverse impacts and all material facts relevant to other federal, state, or local regulatory entity jurisdictional matters.

E. Other Regulatory Actions. This agreement shall not prevent or limit the DoD parties from communicating in any form with any other regulatory body or agency with jurisdiction or possible jurisdiction over matters affecting Ellsworth AFB beyond the Project.

SECTION 4. CURTAILMENT.

A. Curtailment for Test Purposes. [RESERVED]

B. Curtailment for Training Purposes. The maximum curtailment requirement for training is 60 hours annually during the first 5-year period of this agreement. For each subsequent 5-year period after the first 5-year period, the MILDEP will re-examine the mission requirements and, in its sole discretion, adjust the total curtailment hours required for the next 5-year period. The maximum curtailment shall not exceed 80 hours for any annual period during the term of this agreement. The DoD parties agree that curtailment under this subsection (4.B) will only be requested in order to mitigate the impacts of the Project wind turbines on LFE training missions. The MILDEP and Project Owner agree to manage curtailment hours in accordance with the terms

and conditions set forth in this agreement and Attachment C. The MILDEP's LFE training missions are generally conducted during the workweek on a quarterly basis, never to exceed three days in a row.

Upon the request of the MILDEP and in accordance with the attached Curtailment Communications Protocol (Attachment C), Project Owner agrees to curtail the operations of the wind turbine generators up to 60 hours in any fiscal year or as adjusted pursuant to this subsection (4.B). The MILDEP has sole discretion to schedule these hours, up to six hours per week, in three-hour blocks on any day from Monday through Friday. There shall be no curtailment on any United States federal holiday.

C. Curtailment for a National Security or Defense Purpose. In addition to curtailment provided elsewhere in this agreement, upon request by either DoD party, Project Owner agrees to curtail wind turbine operations immediately for a national security or defense purpose. Such curtailment may not be requested except for a national security or defense purpose utilizing the communication protocol set out in Attachment C. Curtailment for a national security or defense purpose will be temporary in nature and extend only so long as is absolutely necessary to meet the discrete, temporary, and stated national security or defense purpose. This agreement in no way precludes Project Owner from seeking any available legal remedies for any curtailment associated with a national security emergency other than challenging the curtailment itself. Any request for curtailment under this subsection will include the releasable portions of the President's, the Secretary's, or the combatant commander's mission order.

D. Curtailment for Establishing Baselines. [RESERVED]

E. Wear and Tear. It is a fundamental premise of this agreement that the limited curtailment expected to be required from this agreement will not cause excess wear and tear on the Project. Project Owner agrees that it is responsible for any damage or wear and tear to the turbines as a result of curtailment (as defined in section 2.H) pursuant to this agreement.

F. Disclosure of Curtailment Request. Project Owner acknowledges that there may be national security considerations associated with any request by the MILDEP for curtailment in accordance with the terms of this agreement and any curtailment resulting therefrom. Project Owner therefore agrees not to disclose any such request or any curtailment resulting therefrom without the prior consent of the MILDEP, and the MILDEP agrees that consent to disclose to a business entity with which a non-disclosure agreement is in place will not be unreasonably withheld.

SECTION 5. REVIEW OF BUSINESS ENTITIES.

A. Protection of Defense Capabilities. It is a priority for the MILDEP to protect national defense capabilities and military operations, including military installations, research, development, test and evaluation activities, and military readiness activities, from compromise and exploitation that may occur due to an activity under foreign control operating in the vicinity of those national defense capabilities and military operations.

B. Advance Notice.

1. Project Owner has provided advance written notice to the MILDEP of the following:

a. The names of business entities or persons having a direct ownership interest in the Project.

b. The names of the material vendors and business entities with which Project Owner will potentially execute contracts to perform construction, supply turbines, or conduct operations activities at the location of the Project.

c. The names of any foreign entities or persons being allowed to access the wind turbine structures and associated data systems.

2. For those entities or persons identified under paragraphs 5.B.1.a and 5.B.1.b, the MILDEP agrees to identify to Project Owner, no later than 30 days after the effective date of this agreement, any entity or person posing a security concern. For those entities or persons identified under paragraph 5.B.1.c, the MILDEP agrees to identify to Project Owner, no later than 30 days after the receipt of the name of any foreign entity or person being allowed to access the wind turbines and associated data systems, any entity or person posing a security concern. Project Owner agrees to enter into negotiations with the DoD parties in order to mitigate any such concern. Any such security concern must be resolved prior to allowing access to the site by such persons or representatives of such entities or the use of wind turbines or other permanent on-site equipment manufactured by such a business entity.

3. Project Owner agrees to provide advance written notice to the MILDEP of Project Owner's use of any material vendor not previously screened pursuant to this section. The term "material" used in this subsection means "significant, influential, or relevant." Project Owner shall allow the MILDEP 30 days following such a notice to conduct a security review and assess any security concern. Project Owner will provide advance written notice of a potential new material vendor but need not wait 30 days if an unexpected situation arises for which employing services or vendors immediately is prudent for the operation of the Project.

SECTION 6. ASSIGNMENT.

A. Right to Assign. This agreement shall be binding upon Project Owner and its successors and assigns. If Project Owner and its successors or assigns (assignors) elect to sell, convey, mortgage, assign, or otherwise transfer all or any part of its interests and obligations in the assets comprising the Project (assignment) to any third party (assignee), assignor shall cause such assignee to expressly acknowledge the existence of this agreement. The assignor shall provide a copy of this agreement to the assignee. The assignee shall provide new point of contact information (as in Section 8) to the DoD parties.

B. Notice of Assignment to CFIUS. If the prospective assignee is a foreign national or foreign-owned or -controlled business entity, assignor and the proposed assignee shall jointly provide notice of the proposed transaction to CFIUS in accordance with applicable regulations (subpart D of 31 CFR part 800) and provide a copy of the notice to the MILDEP. Nothing in this agreement shall prohibit or limit DoD from objecting to the transaction before CFIUS, nor limit communications with CFIUS during national security reviews and investigations, and, should mitigation result, during mitigation, tracking, and post-consummation monitoring and enforcement, pursuant to applicable statutes and regulations.

C. Effect of Assignment. Upon an assignment, assignor shall be relieved of any obligations or liabilities under this agreement to the extent that the assignee has assumed in writing such obligations or liabilities and provided that Project Owner has provided a copy of the assignment, including the assumption of obligations and liabilities, to the DoD parties.

SECTION 7. EFFECTIVE DATE AND EXPIRATION.

A. Effective Date. This agreement becomes effective on the date when all parties have signed it.

B. Expiration. This agreement shall expire and have no further force and effect upon the occurrence of the earlier of the following:

1. Construction of the Project has not commenced within the time prescribed under 14 CFR sections 77.33 and 77.35.

2. The Project is decommissioned.

3. Ellsworth AFB ceases operations.

4. DoD ceases to use the FAA-approved Special Use Airspace currently managed by Ellsworth AFB and takes appropriate action accordingly.

5. Termination of the agreement by written mutual agreement of the parties.

C. Actions Prior to Expiration. Any activities engaged in by the parties (including the expenditure of part or all of any voluntary contribution) that occurred prior to expiration of this agreement shall remain valid and continue in effect, notwithstanding the expiration of the agreement.

SECTION 8. POINTS OF CONTACT AND NOTIFICATION.

A. Points of Contact (POCs). The following persons shall be the primary POCs for the parties for purposes of this agreement. Any notice, request, or other communication to be provided pursuant to this agreement shall be delivered to the POCs. Any party may change its POC by

providing written notification of the change to the other parties at least 30 days in advance of the change taking effect.

1. DoD. Executive Director, Military Aviation and Installation Assurance Siting Clearinghouse, 3400 Defense Pentagon, Room 5C646, Washington, DC 20301-3400

2. MILDEP. Director, Air Force Encroachment Management, Office of the Deputy Assistant Secretary of the Air Force for Installations, 1665 Air Force Pentagon, Room 4B94, Washington, DC 20330-1665, usaf.pentagon.saf-ie.mbx.saf-ieim-workflow@mail.mil

3. Project Owner. General Counsel, Apex Clean Energy, LLC, 310 4th Street NE, Suite 300, Charlottesville, VA 22902 USA.

B. Notification. Any written notice shall be sent by registered or certified mail, postage prepaid; sent by a nationally recognized overnight delivery service that provides a receipt for delivery; or hand delivered. A notice shall be deemed received when delivered to the recipient's address.

SECTION 9. BREACH AND COMPENSATORY MITIGATION.

A. Dispute Resolution. If a party believes that another party has breached this agreement, it shall provide written notice of the breach within 30 days of discovery of the breach to all other parties and provide the breaching party a reasonable opportunity (but in all cases at least 30 days from delivery of such notice) to cure the breach. Failure to provide notice within such 30-day period only waives the rights with respect to the periods from after the expiration of such 30-day period and until the date when the notice was given. If there is a dispute between the involved parties as to whether a breach occurred, the involved parties agree to attempt to resolve the dispute beginning with Project Owner and representatives of the MILDEP at Ellsworth AFB. Disputes may be elevated, on the part of the DoD parties, to the MILDEP headquarters and then to the Executive Director of the Siting Clearinghouse. If the breach is not cured or resolved after this initial dispute resolution process, any party may seek to enforce this agreement. Each party specifically reserves any and all rights or causes of action it may have either at law or in equity to require compliance with any provision of this agreement. Each party reserves the right to enforce or refrain from enforcing against another party the terms of this agreement as it sees fit and failure to enforce does not act to excuse future breaches.

B. Voluntary Contributions in the Nature of Liquidated Damages as Compensatory Mitigation. If Project Owner fails to curtail the operation of its wind turbines as required by this agreement, Project Owner shall, in lieu of actual damages, make a voluntary contribution under this agreement to DoD in the nature of liquidated damages of one hundred ninety-one thousand, five hundred, and sixteen dollars ($191,516) for each time Project Owner fails to curtail wind turbine operations as required by this agreement. The Commander, 28th Bomb Wing, will determine whether non-curtailed wind turbine impacts to the LFE training operation can be mitigated without requiring payment of the voluntary contribution. The parties agree that the voluntary contribution amount provided for in this clause, which is based on the calculated total

flight training costs of a B-1B aircrew with a flight time of one hundred twenty (120) minutes, is a fair and reasonable estimate of damages that the MILDEP will incur as a result of Project Owner's failure to curtail its wind turbine operations as required by this agreement. Project Owner shall make payment of the voluntary contribution under this provision within 30 days of receiving the MILDEP's payment request. The parties agree that the maximum cumulative amount of payment for failure to comply with wind turbine curtailment over the course of this agreement pursuant to this clause is one million, five hundred thousand dollars ($1,500,000). DoD will use these funds to offset the cost of measures undertaken by DoD to mitigate adverse impacts of this Project or other energy projects within the meaning of 10 U.S.C. section 183a on military operations and readiness or to conduct studies of potential measures to mitigate such impacts. DoD shall accept such payment as a voluntary contribution of funds pursuant to 10 U.S.C. section 183a. Such voluntary contribution may be in addition to voluntary contributions made by other project owners, and such other contributions may be in amounts different from that made by Project Owner. DoD will accept the voluntary contribution on behalf of the DoD parties and will transfer the funds to appropriate accounts. All voluntary contributions shall be paid electronically through Pay.gov.

1. Project Owner shall use one of the following two methods of making payment:

a. ACH Debit (preferred). ACH debit authorizes Pay.gov to request a payment immediately upon processing. Many institutions use ACH debit blocks as a precaution to prevent accidental withdrawals from unauthorized sources. In order to ensure the transaction is not blocked, Project Owner will use DoD's specified ID number as an exception for the debits authorized on the Pay.gov site. The ID for this specific collection is 00008522Z4.

b. ACH Credit. ACH Credit is a promise to arrange a payment from the promisor's bank account to the agency being paid.

2. To complete a voluntary contribution transaction:

a. Visit the Pay.gov website: https://www.pay.gov/public/form/start/579188704.

b. Fill out the form provided on the site.

c. Once submitted, print a copy of the confirmation for your records.

3. Important things to remember when filling out the form:

a. Collection Number: The collection number for this transaction will be: 2020BowmanWindLLCBowman.

b. Description: $191,516.

c. For further assistance, visit Pay.gov Web Help section: https://www.pay.gov/WebHelp/HTML/about.html

DoD Primary POC for voluntary contribution settlement:
Krishna Nekkalapudi
WHS Financial Management Directorate
4800 Mark Center Drive
Alexandria, VA 22350
Office: 703-545-0048
Email: krishnachaitanya.nekkalapudi.civ@mail.mil

DoD Alternate POC for voluntary contribution settlement:
Antonio King
WHS Financial Management Directorate
4800 Mark Center Drive
Alexandria, VA 22350
Office: 703-545-0028
Email: antonio.d.king10.civ@mail.mil

SECTION 10. GENERAL PROVISIONS.

A. Amendments. Any party to this agreement may request that it be amended, whereupon the parties agree to consult to consider such amendments. Any amendment to this agreement shall become effective when signed by all of the parties unless its terms provide for a different effective date. Amendments only providing substitute ASNs within the Project boundary, with no change to height or total number of Project ASNs, need only be signed by the MILDEP's and Project Owner's designated Project officers if filed with FAA within 12 months of the effective date of this agreement.

B. Integration. This agreement contains the entire agreement and understanding between the parties with respect to all of the subject matter contained herein, thereby merging and superseding all prior agreements and representations by the parties with respect to such subject matter.

C. Governing Law. This agreement shall be governed by and construed in accordance with the laws of the United States and the State of North Dakota, as may be applicable.

D. Interpretation. In the event an ambiguity or question of intent or interpretation arises, this agreement shall be construed as if drafted jointly by the parties and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of authorship of any of the provisions of this agreement. Any reference to any Federal, state, interstate, local, or foreign statute or law shall be deemed also to refer to all rules and regulations promulgated thereunder, as they may have been amended from time to time, unless the context requires otherwise.

E. Headings and Titles. The headings or section titles contained in this agreement are inserted solely for convenience and do not constitute a part of this agreement between the parties, nor should they be used to aid in any manner in the construction of this agreement.

F. Severability. If any term, provision, or condition of this agreement is held to be invalid, void, or unenforceable by a U.S. governmental authority and such holding is not or cannot be appealed further, then such invalid, void, or unenforceable term, provision, or condition shall be deemed severed from this agreement and all remaining terms, provisions, and conditions of this agreement shall continue in full force and effect. The parties shall endeavor in good faith to replace such invalid, void, or unenforceable term, provision, or condition with valid and enforceable terms, provisions, or conditions that achieve the purpose intended by the parties to the greatest extent permitted by law.

G. Waivers; Remedies Cumulative. There is no implied waiver of rights under this agreement. No failure or delay on the part of a party in exercising any of its rights under this agreement or in insisting upon strict performance of provisions of this agreement, no partial exercise by either party of any of its rights under this agreement, and no course of dealing between the parties shall constitute a waiver of the rights of any party under this agreement, other than the requirement to raise a matter of breach within 30 days of discovery. Any waiver shall be effective only by a written instrument signed by the party granting such waiver, and such waiver shall not operate as a waiver of, or estoppel with respect to, any subsequent failure to comply with this agreement. The remedies provided in this agreement are cumulative and not exclusive of any remedies provided by law.

H. CFIUS. Nothing in this agreement shall relieve Project Owner or its successors or assigns from complying with 31 CFR part 800 (Mergers, Acquisitions, and Takeovers by Foreign Persons) nor prevent or limit the parties from communicating in any form with CFIUS.

I. Anti-Deficiency. For the DoD parties, this agreement is subject to the availability of appropriated funds and sufficient resources. No provision in this agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. section 1341.

J. Disclosure. The parties may freely disclose this agreement with any person or entity. DoD will post the agreement on the Siting Clearinghouse website. Project Owner may mark any part of any document it believes to be proprietary or competition sensitive and that it wants DoD or the MILDEP to exempt from disclosure. The DoD parties will only disclose any such marked information in accordance with the provisions of 5 U.S.C. section 552 (the Freedom of Information Act).

K. No Third Party Beneficiaries. Nothing in this agreement, express or implied, is intended to give to, or shall be construed to confer upon, any person not a party any remedy or claim under or by reason of this agreement and this agreement shall be for the sole and exclusive benefit of the parties and their respective successors and assigns.

L. Full and Complete Satisfaction. The completion of the obligations of each of the parties under this agreement constitute the full and complete satisfaction of those obligations.

M. Other Federal Agencies. This agreement does not bind any Federal agency, other than the DoD parties, nor waive required compliance with any law or regulation.

N. Completion of Construction. Within 60 days of the completion of construction of the Project, Project Owner shall deliver to DoD copies of the FAA form 7460-2 for each ASN, including the final coordinates for each turbine erected.

O. Grid Operator Protocols. Project Owner shall disclose this curtailment requirement to the grid operator and shall comply with the mitigation agreement's curtailment provisions, including requesting waivers from the grid operator if grid protocols would interfere with this mitigation agreement.

[*Continued on following page*]

P. Signature/Counterparts. The parties represent and warrant that the signatories below have authority to sign on behalf of and bind each respective party, and that no other signature is required to bind that party. This agreement may be executed in several counterparts, each of which shall be deemed an original, all of which shall constitute but one and the same instrument.

IN WITNESS WHEREOF, the parties have executed and delivered this agreement.

FOR THE DEPARTMENT OF DEFENSE:

Jordan Gillis
Assistant Secretary of Defense
(Sustainment)

11/4/2020
Date

FOR THE DEPARTMENT OF THE AIR FORCE:

MORIARTY.ROBERT.E.1013267584 Digitally signed by MORIARTY.ROBERT.E.1013267584 Date: 2020.09.24 09:35:10 -04'00'

ROBERT E. MORIARTY, P.E.
Deputy Assistant Secretary of the Air Force
(Installations)

Date

FOR BOWMAN WIND, LLC:

BY: APEX CLEAN ENERGY FINANCE, LLC
ITS: SOLE MEMBER

BY: APEX GBR, LLC
ITS: SOLE MEMBER

BY: APEX CLEAN ENERGY HOLDINGS, LLC
ITS: MANAGER

Ken Young
COO

09/14/2020
Date

Attachment A

Federal Aviation Administration Filings for Bowman Wind Project

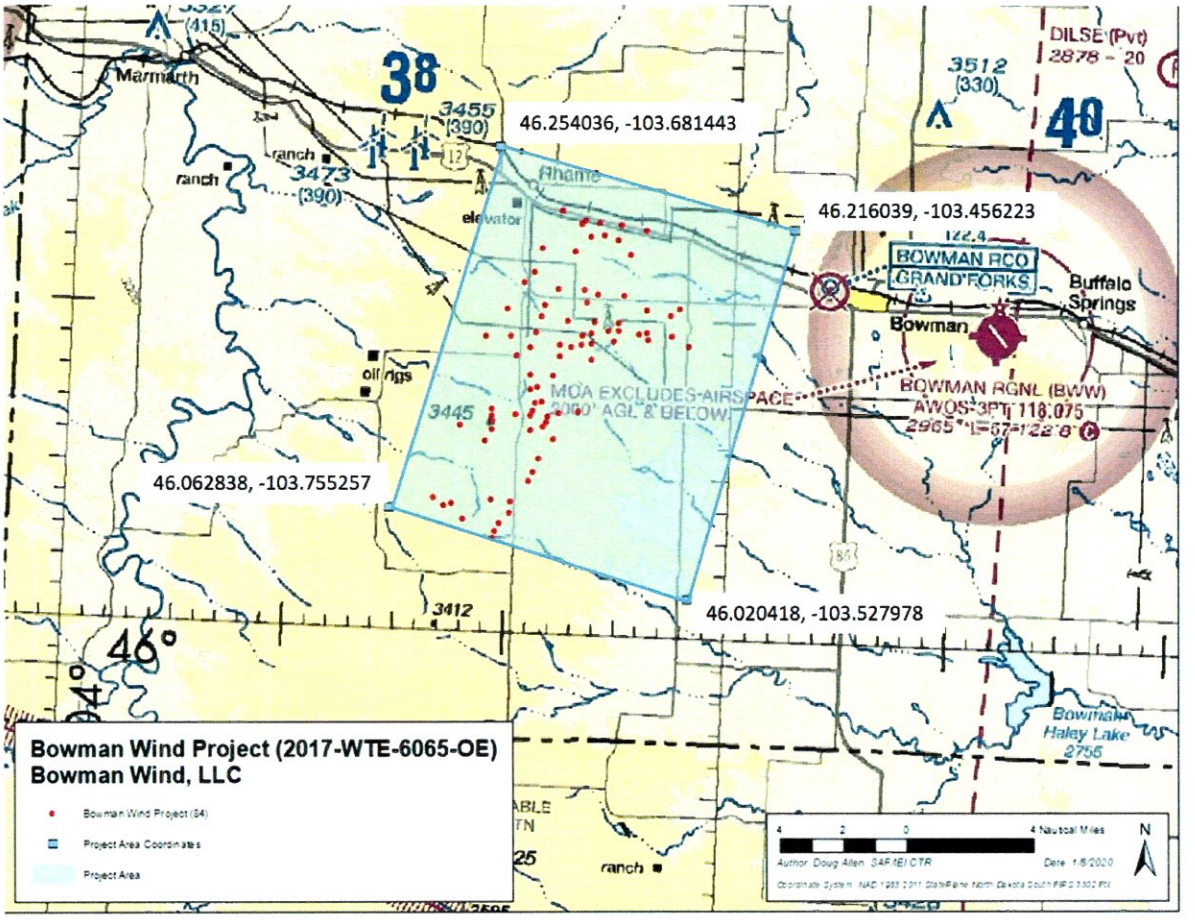
Case Number	City	State	Latitude (N)	Longitude (W)	Structure Height (Feet)
2020-WTE-416-OE	Bowman	ND	46-13-04.84	103-36-43.39	499
2020-WTE-417-OE	Bowman	ND	46-12-58.39	103-36-12.00	499
2020-WTE-418-OE	Bowman	ND	46-12-55.91	103-35-18.68	499
2020-WTE-419-OE	Bowman	ND	46-12-52.58	103-34-47.60	499
2020-WTE-420-OE	Bowman	ND	46-12-44.33	103-33-47.44	499
2020-WTE-421-OE	Bowman	ND	46-12-44.35	103-34-07.88	499
2020-WTE-422-OE	Bowman	ND	46-12-39.60	103-35-44.48	499
2020-WTE-423-OE	Bowman	ND	46-12-37.39	103-35-20.12	499
2020-WTE-424-OE	Bowman	ND	46-12-34.93	103-36-01.30	499
2020-WTE-425-OE	Bowman	ND	46-12-33.66	103-36-35.79	499
2020-WTE-426-OE	Bowman	ND	46-9-29.12	103-30-44.55	499
2020-WTE-427-OE	Bowman	ND	46-9-28.26	103-35-06.38	499
2020-WTE-428-OE	Bowman	ND	46-9-28.85	103-36-42.89	499
2020-WTE-429-OE	Bowman	ND	46-9-15.68	103-31-11.81	499
2020-WTE-430-OE	Bowman	ND	46-9-14.80	103-36-43.88	499
2020-WTE-431-OE	Bowman	ND	46-9-10.38	103-31-34.07	499
2020-WTE-432-OE	Bowman	ND	46-9-11.82	103-35-11.55	499
2020-WTE-433-OE	Bowman	ND	46-9-01.93	103-31-44.98	499
2020-WTE-434-OE	Bowman	ND	46-8-59.22	103-36-41.12	499
2020-WTE-435-OE	Bowman	ND	46-8-58.51	103-36-15.79	499
2020-WTE-436-OE	Bowman	ND	46-9-00.81	103-40-05.08	499
2020-WTE-437-OE	Bowman	ND	46-8-43.59	103-36-38.18	499
2020-WTE-438-OE	Bowman	ND	46-8-39.61	103-33-46.02	499
2020-WTE-439-OE	Bowman	ND	46-8-43.08	103-39-46.12	499
2020-WTE-440-OE	Bowman	ND	46-8-34.54	103-34-14.91	499
2020-WTE-441-OE	Bowman	ND	46-8-31.44	103-36-43.09	499
2020-WTE-442-OE	Bowman	ND	46-8-28.23	103-34-48.54	499
2020-WTE-443-OE	Bowman	ND	46-8-21.00	103-39-46.58	499
2020-WTE-444-OE	Bowman	ND	46-8-17.78	103-36-18.20	499
2020-WTE-445-OE	Bowman	ND	46-8-16.93	103-36-43.72	499
2020-WTE-446-OE	Bowman	ND	46-8-17.03	103-39-21.53	499
2020-WTE-447-OE	Bowman	ND	46-8-09.62	103-40-05.05	499
2020-WTE-448-OE	Bowman	ND	46-7-54.38	103-36-39.72	499
2020-WTE-449-OE	Bowman	ND	46-7-52.89	103-36-14.44	499
2020-WTE-450-OE	Bowman	ND	46-7-49.77	103-35-43.91	499
2020-WTE-451-OE	Bowman	ND	46-7-52.04	103-40-05.06	499
2020-WTE-452-OE	Bowman	ND	46-7-41.43	103-36-43.05	499
2020-WTE-453-OE	Bowman	ND	46-7-31.94	103-40-11.00	499
2020-WTE-454-OE	Bowman	ND	46-7-31.92	103-40-38.11	499
2020-WTE-455-OE	Bowman	ND	46-7-25.18	103-36-19.82	499

Case Number	City	State	Latitude (N)	Longitude (W)	Structure Height (Feet)
2020-WTE-456-OE	Bowman	ND	46-7-24.06	103-41-24.48	499
2020-WTE-457-OE	Bowman	ND	46-7-16.28	103-36-32.62	499
2020-WTE-458-OE	Bowman	ND	46-7-17.73	103-43-12.77	499
2020-WTE-459-OE	Bowman	ND	46-7-13.97	103-40-43.28	499
2020-WTE-460-OE	Bowman	ND	46-7-01.67	103-42-14.74	499
2020-WTE-461-OE	Bowman	ND	46-7-01.84	103-43-09.84	499
2020-WTE-462-OE	Bowman	ND	46-6-54.74	103-36-54.48	499
2020-WTE-463-OE	Bowman	ND	46-6-54.17	103-36-32.97	499
2020-WTE-464-OE	Bowman	ND	46-6-50.78	103-37-20.05	499
2020-WTE-465-OE	Bowman	ND	46-6-46.25	103-37-36.86	499
2020-WTE-466-OE	Bowman	ND	46-6-46.67	103-43-08.12	499
2020-WTE-467-OE	Bowman	ND	46-6-38.30	103-36-31.88	499
2020-WTE-468-OE	Bowman	ND	46-6-36.65	103-37-47.58	499
2020-WTE-469-OE	Bowman	ND	46-6-31.87	103-42-16.15	499
2020-WTE-470-OE	Bowman	ND	46-6-28.44	103-37-58.80	499
2020-WTE-471-OE	Bowman	ND	46-6-25.91	103-40-43.21	499
2020-WTE-472-OE	Bowman	ND	46-6-21.75	103-36-32.46	499
2020-WTE-473-OE	Bowman	ND	46-6-22.32	103-41-00.20	499
2020-WTE-474-OE	Bowman	ND	46-6-08.47	103-37-22.46	499
2020-WTE-475-OE	Bowman	ND	46-6-06.04	103-36-32.77	499
2020-WTE-476-OE	Bowman	ND	46-6-05.38	103-37-40.34	499
2020-WTE-477-OE	Bowman	ND	46-6-01.92	103-41-01.24	499
2020-WTE-478-OE	Bowman	ND	46-5-56.27	103-36-43.63	499
2020-WTE-479-OE	Bowman	ND	46-5-47.75	103-37-39.04	499
2020-WTE-480-OE	Bowman	ND	46-5-32.61	103-36-39.77	499
2020-WTE-481-OE	Bowman	ND	46-5-33.08	103-37-38.55	499
2020-WTE-482-OE	Bowman	ND	46-5-15.49	103-37-36.66	499
2020-WTE-483-OE	Bowman	ND	46-5-01.00	103-37-40.25	499
2020-WTE-484-OE	Bowman	ND	46-4-00.46	103-42-29.59	499
2020-WTE-485-OE	Bowman	ND	46-3-55.56	103-42-49.05	499
2020-WTE-486-OE	Bowman	ND	46-4-00.40	103-36-48.54	499
2020-WTE-487-OE	Bowman	ND	46-5-56.45	103-32-12.41	499
2020-WTE-488-OE	Bowman	ND	46-5-19.49	103-35-05.01	499
2020-WTE-489-OE	Bowman	ND	46-6-48.90	103-34-07.65	499
2020-WTE-490-OE	Bowman	ND	46-10-56.14	103-28-54.48	499
2020-WTE-491-OE	Bowman	ND	46-10-53.83	103-31-13.67	499
2020-WTE-492-OE	Bowman	ND	46-10-16.39	103-35-48.06	499
2020-WTE-493-OE	Bowman	ND	46-11-35.22	103-34-24.19	499
2020-WTE-494-OE	Bowman	ND	46-12-35.46	103-30-25.82	499
2020-WTE-495-OE	Bowman	ND	46-12-25.85	103-32-44.90	499
2020-WTE-496-OE	Bowman	ND	46-11-53.48	103-38-13.99	499
2020-WTE-497-OE	Bowman	ND	46-9-30.83	103-38-22.83	499
2020-WTE-498-OE	Bowman	ND	46-9-13.49	103-42-00.03	499

Case Number	City	State	Latitude (N)	Longitude (W)	Structure Height (Feet)
2020-WTE-499-OE	Bowman	ND	46-3-51.51	103-39-54.27	499
2020-WTE-500-OE	Bowman	ND	46-5-36.65	103-43-29.65	499
2020-WTE-501-OE	Bowman	ND	46-6-53.81	103-30-14.60	499
2020-WTE-502-OE	Bowman	ND	46-7-31.40	103-30-34.31	499

Attachment B

Bowman Wind Project Map and Project Area



Attachment C
Curtailment Communications Protocol

1. Purpose and Scope. This attachment establishes the protocol for communication between Project Owner and Ellsworth AFB, acting on behalf of the MILDEP, when curtailment of wind turbine operations is required.

2. Parties Authorized to Request Curtailment and Receive Curtailment Requests (Curtailment Contact).

A. Ellsworth AFB. The 28th Bomb Wing Airspace Manager and Wing Scheduling will be the primary MILDEP points of contact. These are the only persons authorized to request curtailment for Ellsworth AFB.

B. Project Owner. The Project Owner Remote Operations Center is the only Party authorized to receive a request by Ellsworth AFB for curtailment.

3. Curtailment Procedures.

A. 30 Day Schedule. No later than thirty (30) days in advance of a scheduled LFE, Ellsworth AFB will notify the Project Owner Remote Operations Center of the planned LFE days and times for which curtailment will be required.

B. Weekly Schedule. No later than seven (7) days prior to the LFE, Ellsworth AFB will notify the Project Owner Remote Operations Center via email of the planned start time and end time of the curtailment periods that would be required to avoid any adverse impact by the spinning of wind turbine blades. The block of time corresponding to start time and end time shall be referred to herein as the "requested period." The weekly schedule shall set forth separate requested periods for each LFE block that will require curtailment. The Project Owner Remote Operations Center will confirm receipt of the email. If confirmation is not received within 24 hours, the requesting official will contact the Project Owner Remote Operations Center by phone to request email confirmation of the weekly schedule.

C. Day of Curtailment Procedures. On the day scheduled for curtailment, Ellsworth AFB will notify the Project Owner Remote Operations Center to begin curtailment procedures, confirming there has been no change from the weekly schedule for that day. The Remote Operations Center will curtail wind turbine operations within 5 minutes. The Project Owner Remote Operations Center will remove curtailment restrictions from the turbines 180 minutes later. Upon receipt of the notice, the Project Owner Remote Operations Center shall promptly send an email to Ellsworth AFB confirming receipt of the notice and memorializing the curtailment in writing.

D. Procedures if Additional Training Time is Required. If additional training time is required after curtailment has been initiated, Ellsworth AFB will call the Project Owner Remote Operations Center to continue curtailment procedures beyond the

normal 180 minutes. The Remote Operations Center will continue to curtail turbines for the requested period. Upon receipt of such notice, the Project Owner Remote Operations Center shall promptly send an email to Ellsworth AFB confirming receipt of such notice and memorializing the curtailment in writing.

E. Procedures if the Training Schedule Is Changed. If the MILDEP changes the schedule for a LFE such that the MILDEP would require curtailment outside of the applicable requested period, Ellsworth AFB will promptly notify the Project Owner Remote Operations Center either via phone or via email of such change and will indicate the revised start time (hereinafter "revised start time") of the updated curtailment request. Upon receipt of such notice, the Project Owner Remote Operations Center shall promptly send an email to Ellsworth AFB confirming receipt of such notice and memorializing the curtailment in writing. In such instance, Project Owner is authorized to continue operating the Project without interruption until Ellsworth AFB calls to begin the revised LFE. If, prior to the revised start time, the MILDEP again changes the schedule for the LFE such that the revised start time must be further revised, then Ellsworth AFB will again notify the Project Owner Remote Operations Center according to the procedures outlined in this section. Project Owner will not shut down the turbines until Ellsworth AFB calls per the normal curtailment procedures outlined in section 3 of this attachment (above).

F. Procedures if Training Is Completed Early. If a LFE is completed before the end of the requested period then the MILDEP will make every effort to notify the Project Owner Remote Operations Center promptly via phone. In such instance, curtailment will end 20 minutes after such notice is received by the Project Owner Remote Operations Center. If the MILDEP successfully contacts the Project Owner Remote Operations Center via phone call, then the aforementioned 20 minute time period shall begin upon the completion of such phone call, and the Project Owner Remote Operations Center shall promptly send an email to Ellsworth AFB to confirm receipt of such telephonic notice and to memorialize in writing the exact time of the completion of such phone call. If the MILDEP cannot reach the Project Owner Remote Operations Center via phone, then the MILDEP shall promptly send such notification via email, and the aforementioned 20-minute time period shall begin running upon the timestamp of such email.

4. Verification of Curtailment. The Project Owner Remote Operations Center shall notify Ellsworth AFB promptly to confirm that the wind turbine blades are curtailed. Such notice shall be delivered either via phone or via email. If such notice is delivered via phone, the Project Owner Remote Operations Center shall promptly thereafter send an email to Ellsworth AFB to memorialize the notice in writing. Before any wind turbine operations begin, Project Owner agrees to provide a web-based portal for the relevant scheduling offices to confirm that all Project turbines are curtailed.

5. Remote Curtailment Scheduling. Project Owner may, with agreement of the 28th Bomb Wing, Ellsworth AFB, create a secure remote interface to be used by Ellsworth AFB to provide all or some of the information described in sections 3 and 4 of this attachment (Remote Scheduling). If Project Owner fully or partially implements Remote Scheduling, the Parties will not be required to follow the processes described above during the periods for which the Remote Scheduling is

accessible to Ellsworth AFB. Project Owner may discontinue Remote Scheduling at any time and return to the processes described herein.

6. **Contact Listing.**

A. Air Force.

1. Mr. George Stone, Airspace Manager, (605) 385-1230

2. 28th OSS Wing Scheduling, (605) 385-4110

3. PINE TREE, (605) 385-1570

B. Project Owner.

1. Manager, Remote Operations Control Center (Primary), (434) 328-2305

2. Senior Vice President of Technology and Energy Assessment (Secondary), (434) 220-3790

7. **Reporting.** The operations of the Project will be controlled and monitored using a system known as the Supervisory Control and Data Acquisition (SCADA) system.

A. Quarterly Report. Project Owner shall create a quarterly report using the SCADA system that will show the precise number of hours the Project was curtailed during each quarter (hereinafter the "quarterly report"). The Project Owner Curtailment Contact shall deliver each quarterly report to Ellsworth AFB within 7 days after the end of each quarter. Project Owner and Ellsworth AFB may discuss such quarterly reports during periodic review sessions, or at any such time as Project Owner and Ellsworth AFB mutually agree. Project Owner may, with agreement of the 28th Bomb Wing, Ellsworth AFB, establish a secure remote interface to be used by Ellsworth AFB to access the information contained in the quarterly report (Remote Report Access). If Project Owner establishes the Remote Report Access then it shall not be required to create the quarterly report during the periods for which the Remote Report Access is accessible to Ellsworth AFB. Project Owner may discontinue the Remote Report Access at any time and return to the process for providing monthly reports described herein.

B. Annual Report. At the end of each fiscal year, Project Owner shall create an annual report using the SCADA system (hereinafter the "annual report") to show the sum of hours the Project was curtailed during that fiscal year, as recorded by Project Owner, and a historical schedule showing Actual Curtailment Hours for all preceding years of the Project's operation. Project Owner shall deliver the annual report to Ellsworth AFB within 15 days after the end of each year. Within 7 days after receiving the annual report, Ellsworth AFB shall provide to Project Owner written notice via email that the 28th OSS Scheduling Office either accepts the annual report as accurate or disagrees with the annual report. In the event of disagreement, Ellsworth AFB and Project Owner shall enter dispute resolution as described in section 9 of the main agreement. The outcome of such dispute resolution shall be a revised annual report

agreed upon by Ellsworth AFB and Project Owner and memorialized in writing. The number of hours of curtailment for a given year as agreed upon by Ellsworth AFB and Project Owner and memorialized in writing in accordance with this subsection shall be the Actual Curtailment Hours.

8. Process Reviews. Ellsworth AFB and Project Owner shall conduct a semi-annual review to ensure that proper procedures were followed and to identify any lessons learned. Project Owner and Ellsworth AFB may conduct more frequent process reviews as required.

9. Process Testing. Ellsworth AFB and Project Owner shall conduct at least two tests of these procedures prior to the Project beginning commercial operations. These tests shall be scheduled at a mutually agreeable time and location. The first test shall be conducted during the development of the Project's control system and shall include a technical discussion of the process and how the curtailment will be implemented. The second test shall occur during the Wind Project's final commissioning and testing and shall represent a simulation of the process described herein. Upon completion of each test, Ellsworth AFB and Project Owner shall review the test results to identify any potential improvements to the process.

10. Communications Protocol for a National Security or Defense Purpose. Under circumstances described in section 4.C of the main agreement, either DoD party will call the Project Remote Operations Center to request immediate curtailment. Advance notification is unlikely due to the unpredictable and dynamic nature of national security or defense events. The applicable DoD party will call the Project Remote Operations Center as soon as possible after the national security or defense event is terminated and curtailment is no longer required.

Appendix D

Agency Correspondence

U.S. Department of Commerce, National Telecommunications and Information Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

March 31, 2020

Mr. B. Benjamin Evans
EVANS ENGINEERING SOLUTIONS, LLC
524 Alta Loma Drive
Thiensville, WI 53092

Re: Bowman Project, Revision 1: Bowman County, ND

Dear Mr. Evans:

In response to your request on February 5, 2020, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the Bowman Wind Project, Revision 1, located in Bowman County, North Dakota.

After a 45+ day period of review, of the reviewing federal agencies, none had concerns with turbine construction in the designated areas.

While the other IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by the IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review these proposals.

Sincerely,

John R. McFall Digitally signed by John R. McFall Date: 2020.03.31 14:55:04 -04'00'

John R. McFall
Deputy Chief, Spectrum Services Division
Office of Spectrum Management

Appendix D

Agency Correspondence

U.S. Army Corps of Engineers, North Dakota Regulatory Office

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
3319 UNIVERSITY DRIVE
BISMARCK, NORTH DAKOTA 58504-7565

May 28, 2020

NWO-2020-01018-BIS

Apex Clean Energy
Attn: Mr. Scott Jansen
8665 Hudson Blvd North, Suite 110
Lake Elmo, Minnesota 55042

Dear Mr. Jansen:

This is in response to your letter dated May 11, 2020, requesting comments on the proposed Bowman Wind LLC, 200-megawatt Wind Farm project. The proposed project location in Bowman County, North Dakota is as follows:

Sections	Township	Range
21, 29-36	132N	103W
13-15, 20-29, 31-36	131N	104W
1-5, 7-36	131N	103W
1-18, 20-24, 26-27	130N	104W
1-12, 16-19	130N	103W

U. S. Army Corps of Engineers Regulatory Offices administer Section 404 of the Clean Water Act (Section 404). A Section 404 permit would be required for the discharge of dredge or fill material (temporarily or permanently) in waters of the United States. Waters of the United States may include, but are not limited to, rivers, streams, ditches, coulees, lakes, ponds, and their adjacent wetlands. Fill material includes, but is not limited to, rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mines or other excavation activities and materials used to create any structure or infrastructure in waters of the United States.

Based on the information contained in your letter, the Corps has determined that your proposed project may need a Clean Water Act Section 404 permit. The permit application and instructions for completing the application are enclosed and may also be found at: http://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Obtain-a-Permit. Be sure to accurately describe all proposed work and construction methodology. If you decide to submit a permit application, an aquatic resource delineation prepared according to the North Dakota Minimum Standards for Delineations (enclosed) is also required as supporting documentation. Once the application is complete, mail it to the letterhead address or to the email address (preferred) below.

Printed on Recycled Paper

Due to precautions taken in response to the COVID-19 pandemic, The North Dakota Regulatory office prefers that all submissions are sent electronically to the following email address: CENWO-OD-RND@usace.army.mil instead of a hard copy by mail. Please split large attachments (>25 MB) into multiple emails if needed.

Please refer to identification number NWO-2020-01018-BIS in any correspondence concerning this project. If you have any questions, please contact Jeremy Nygard by email at *Jeremy.S.Nygard@usace.army.mil*, or telephone at (701) 255-0015, extension 2006. For more information regarding our program, please visit our website at *http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx*.

Sincerely,

ERHARDT.TONI.R.1231324557
Digitally signed by ERHARDT.TONI.R.1231324557
Date: 2020.05.28 13:15:28 -05'00'

Toni R. Erhardt
Senior Project Manager
North Dakota

Enclosures

MINIMUM STANDARDS FOR ACCEPTANCE OF AQUATIC RESOURCES DELINEATION REPORTS

30 October 2019

The U.S Army Corps of Engineers, through its Regulatory Program, regulates certain activities in waters of the United States. Waters of the United States are defined under 33 CFR Part 328. In order for the Corps to determine the amount and extent of waters of the United States at a site, aquatic resources must first be delineated in accordance with established regulatory standards, guidance and protocol, such as the 1987 Corps of Engineers Wetlands Delineation Manual and appropriate regional supplements. Before making any permit decision, the Corps is responsible for conducting or verifying the delineation and determining which of the aquatic resources have the potential to fall under federal jurisdiction.

Due to limited staffing and resources, the North Dakota State Regulatory Office recommends permit applicants employ the services of individuals experienced in delineating aquatic resources. Permit applicants are encouraged early in the project planning stages to contact the Corps to determine what level of documentation is required for their project. A permit applicant should submit their aquatic resources delineation, along with a request for a preliminary or approved jurisdictional determination. Early consultation may help identify potential concerns and could result in a quicker permit decision.

The North Dakota Regulatory Office has established minimum standards for delineation reports to insure consistency and accuracy in aquatic resources delineations, which will minimize potential delays. The standards are based on years of experience conducting and verifying delineations, as well as the best practices of environmental consultants. **Delineations submitted for verification must follow the standards, unless determined to not be practical on a case-by-case basis. The Corps may determine that a desktop delineation may be appropriate instead of a full field aquatic resource delineation**. Please contact the State Program Manager for approval for desktop evaluations. A desktop delineation includes analysis of an area using current and historical aerial photographs, NRCS Soils Mapping, and NWI maps. We will not accept desktop evaluations where the only reference is NWI maps. These are only to be used as a tool to determine the potential for wetlands on-site and should not replace the use of good aerial photography. Situations where adherence to the standards may not be practical include activities with small permanent or temporary impacts to aquatic resources (under 0.10 acre), applicants with limited financial resources, and emergencies. The ND State Office will notify the requestor for delineation submittals

that do not contain enough information to accurately identify the limits of waters of the United States.

It should be noted that the Corps does not accept any variations of these standards as provided by other agencies. It is the Corps that determines whether a water is jurisdictional. **THERE SHOULD BE NO REFERENCE IN THE REPORT REGARDING THE JURISDICTION OF ANY WATER. THIS INCLUDES NO REFERENCES TO ARTIFICIAL WETLANDS**. **THIS IS A CORPS DECISION.**

U.S. Army Corps of Engineers
North Dakota Regulatory Office
Minimum Standards for Aquatic Resource Delineation Reports

ORM #/Project Title_____

Reviewer_____ Date _____

An aquatic resources delineation report submitted to the North Dakota Regulatory Office must include the following:

☐ (Mandatory) A cover letter requesting a jurisdictional determination. The letter must specify whether a preliminary and/or approved jurisdiction determination is requested. The RGL 16-01 Appendix 1 form can be used.

☐ (Mandatory) A signed statement from the property owner(s) allowing Corps personnel to enter the property and to collect samples during normal business hours. If the property is land-locked, the owner or proponent must obtain permission from the adjacent property owner(s) to provide access for Corps personnel. The RGL 16-01 Appendix 1 form can be used.

☐ (Mandatory) A statement that the delineation has been conducted in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and appropriate regional supplement(s). The regional supplement(s) used must be identified. **For ordinary high water mark (OHWM) delineations, a statement identifying the use of the OHWM field guide must be included**. "**Arid West Ephemeral and Intermittent Streams OHWM Datasheet"**

☐ (Mandatory) Directions to the survey area, and the location of the Access Point of Entry. **The directions should be detailed enough that a regulator can drive to the site**. Google Maps can be used to provide directions and included in the Appendices.

☐ (Mandatory) Contact information for the applicant(s), property owner(s), and agent(s). Must include the applicant/property owner as the JD is issued to the property owner.

☐ (Mandatory) The total acreage of the survey area.

☐ (Mandatory) Date(s) field work was completed.

☐ (Mandatory) A site location map on a 7.5-minute USGS quadrangle. The map must provide the name of the USGS quadrangle, Section, Township, Range, and the latitude and longitude **(in decimal degrees).**

☐ (Mandatory) A map of all delineated aquatic resources ("Aquatic Resources Delineation Map") showing the following:

- ☐ (Mandatory) All aquatic resources delineated must be clearly shown on the map. Because only the Corps determines the regulatory status of each aquatic resource, the map must not include any labeling about jurisdiction.
- ☐ (Mandatory) At least one set of paired data points, documented in data forms, for each aquatic resource or complex. The paired data points must be located close to the delineated boundary. Additional data points may be necessary, depending on various factors including the size and shape of the aquatic resource, changes in vegetation communities, and slope. **The location of all data points should be shown on the wetland delineation map.**
- ☐ (Mandatory) A reference block that identifies the survey or project name, individual(s) who conducted the delineation, date of the map, and date(s) of any revisions or the company or agency that created the maps.
- ☐ (Mandatory) The orientation of the map on the page (as it is read) must be the same for all maps submitted.
- ☐ By convention, North will normally be toward the top of the page.

☐ Digital data for the site, aquatic resource boundaries, and data point locations must be provided in a geographic information system (GIS) format, with ESRI Shape-files being the preferred format. Each GIS data file must be accompanied by a metadata file containing the appropriate geographic coordinate system, projection, and datum. If GIS data is unavailable or otherwise cannot be produced and the Corps determines a site visit is necessary, the aquatic resource boundaries must be physically marked with numbered flags or stakes before the North Dakota Regulatory Office can complete a delineation verification. **This is optional depending on the size of the proposed project.**

☐ (Mandatory) A table listing all aquatic resources. The table shall include the name of each aquatic resource, its Cowardin type, acreage, and location (**latitude/longitude, in decimal degrees**). For linear features, the table must show both acreage and linear feet. **THE TABLE SHOULD NOT INCLUDE REFERENCES TO ARTIFICIAL WETLANDS!**

☐ If remote sensing was used in the delineation, provide an explanation of how it was used and include the name, date and source of the tools used and copies of applicable maps/photographs. Typically for desktop evaluations.

☐ (Mandatory) A narrative describing all aquatic resources at the site and an explanation for the mapped boundaries, especially for resources containing complex transition zones. On large projects, the narrative can combine similar resources into one descriptive paragraph. THIS SHOULD NOT INCLUDE REFERENCE TO ARTIFICIAL WETLANDS OR ARTIFICIAL DITCHES. THIS HAS NO BEARING ON WHETHER A

WATER IS JURISDICTIONAL. A description of a “ditch” wetland does not need a qualifier that it is artificial. The narrative must include the following:

☐ **(Mandatory) A description of existing field conditions. The field condition description must include current land use, flood/drought conditions, irrigation practices, and any characteristics considered atypical. The Existing Conditions describes the region in which the project will occur. A clear description of the setting helps to explain the context and intensity of impacts. The setting discussion gives the reader a concise description of the area’s topography, soils, habitat, watercourses and level of human or natural disturbance.**

- ☐ Current Land use addressed
- ☐ What are the functions of the wetlands or other waters
- ☐ Flood/drought conditions
- ☐ Irrigation practices
- ☐ Geographic Position
- ☐ Geology
- ☐ Climate, in particular, mean annual rainfall and snowfall
- ☐ Level of human or natural disturbance discussed?

☐ (Mandatory) **A discussion of the hydrology at the site, including all known surface or subsurface sources, drainage gradients, surface water connections to the nearest traditional navigable waterway or interstate water, and any potential influence for manmade water sources, such as irrigation. The discussion should also identify the nearest “blue-line” waterway or other feature found on the most recent USGS map.**

- ☐ **Surface or subsurface sources**
- ☐ **Drainage gradients**
- ☐ **Surface water connections to the nearest traditional navigable waterway or interstate water**
- ☐ **Potential influence for manmade water sources**
- ☐ **Nearest “blue-line” waterway or other feature found on the most recent USGS map**
- ☐ What watershed is the project located in?
- ☐ What is the size of the drainage basin?
- ☐ Direction of flow should be clearly shown on the delineation map.

☐ (Mandatory) **A discussion of plant communities and habitat types present at the site and a list of the scientific name, common name, and wetland indicator status of all plants.**

- ☐ **Plant communities**
- ☐ **Habitat types**
- ☐ **List of the scientific names, common name, and wetland indicator status of all plants.**

☐ (Mandatory) Soil descriptions, soil map(s), and a discussion of hydric soils or soils with hydric inclusions at the site. **The NRCS soils map should only be included with the delineation if the soils are being discussed within the delineation report. If the report does not identify the actual soils observed on the site, then soils reports should not be included.**

- ☐ Soil descriptions
- ☐ Discussion of hydric soils
- ☐ Discussion on Field Indicators

☐ (Mandatory) Any observed or documented interstate or foreign commerce associated with aquatic resources found on the site, specifically recreation or other use by interstate or foreign travelers, sale of fish or shellfish in interstate or foreign commerce, and use by industries operating in interstate or foreign commerce.

- ☐ Identify any recreational use of the site by interstate or foreign visitors
- ☐ Identify any commercial uses that may be used in interstate commerce
- ☐ Identify any potential industries that may be using the water on site

☐ A completed copy of the *Aquatic Resources Excel* spreadsheet must be submitted. For delineations that include greater than 25 separate waters, the spreadsheet will be required by the ND Regulatory Office.

☐ (Mandatory) Completed data forms for each sample point including all essential information to make a decision.

☐ For long linear projects, such as pipelines and road projects, similarly situated waters can be assessed as a group and not as individual waters. This applies especially to road projects that may include linear roadside ditches that may be assessed as a man-made tributary. For these situations, a pre-application meeting should be scheduled with the Corps for further clarification.

Often, additional information can expedite the verification of a delineation. Particularly helpful data includes site specific topographic maps, Light Detection and Ranging (LIDAR), satellite, aerial and ground photographs, floodplain maps, and related reports.

More information regarding aquatic resource delineation, including reference materials, can be found on our website at:
http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx

U.S. Army Corps of Engineers (USACE)

NATIONWIDE PERMIT PRE-CONSTRUCTION NOTIFICATION (PCN)

33 CFR 330. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 02-28-2022

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority	Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.
Principal Purpose	Information provided on this form will be used in evaluating the nationwide permit pre-construction notification.
Routine Uses	This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of the agency coordination process.
Disclosure	Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued.

The public reporting burden for this collection of information, 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR RESPONSE TO THE ABOVE EMAIL.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (*see sample drawings and/or instructions*) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Middle - Last -	First - Middle - Last -
Company -	Company -
Company Title -	E-mail Address -
E-mail Address -	
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. with AREA CODE	**10. AGENT'S PHONE NOs. with AREA CODE**
a. Residence b. Business c. Fax d. Mobile	a. Residence b. Business c. Fax d. Mobile

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this this nationwide permit pre-construction notification and to furnish, upon request, supplemental information in support of this nationwide permit pre-construction notification.

_____ _____

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY	
13. NAME OF WATERBODY, IF KNOWN (*if applicable*)	14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
15. LOCATION OF PROPOSED ACTIVITY (*see instructions*) Latitude °N Longitude °W	City: State: Zip:

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID | Municipality

Section | Township | Range

17. DIRECTIONS TO THE SITE.

18. IDENTIFY THE SPECIFIC NATIONWIDE PERMIT(S) YOU PROPOSE TO USE:

19. DESCRIPTION OF PROPOSED NATIONWIDE PERMIT ACTIVITY (*see instructions*)

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

21. PURPOSE OF NATIONWIDE PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by Proposed Nationwide Permit Activity (*see instructions*)

Acres | Linear Feet | Cubic Yards Dredged or Discharged

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project on any related activity (*see instructions*)

24. If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and requires pre-construction notification, explain how the compensatory mitigation requirement in paragraph (c) of general condition 23 will be satisfied, or explain why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required for the proposed activity.

25. Is Any Portion of the Nationwide Permit Activity Already Complete? ☐ Yes ☐ No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed NWP activity or utilize the designated critical habitat that might be affected by the proposed NWP activity. (*see instructions*)

27. List any historic properties that have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic property or properties. (*see instructions*)

28. For a proposed NWP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

29. If the proposed NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the Corps district having jurisdiction over that project? ☐ Yes ☐ No

If "yes", please provide the date your request was submitted to the Corps District:

30. If the terms of the NWP(s) you want to use require additional information to be included in the PCN, please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

31. Pre-construction notification is hereby made for one or more nationwide permit(s) to authorize the work described in this notification. I certify that this information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a

Department of the Army

Nationwide Permit (NWP) Pre-Construction Notification (PCN)

Blocks 1 through 4. To be completed by the Corps of Engineers.

Block 5. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the preconstruction notification, please attach a sheet of paper with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the PCN. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where he / she can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by the applicant, if an agent is to be employed.

Block 12. Proposed Nationwide Permit Activity Name or Title. Please provide a name identifying the proposed NWP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 13. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the NWP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Activity Street Address. If the proposed NWP activity is located at a site having a street address (not a box number), please enter it in Block 14.

Block 15. Location of Proposed Activity. Enter the latitude and longitude of where the proposed NWP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area requiring evaluation. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality where the site is located.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide a description of the location of the proposed NWP activity, such as lot numbers, tract numbers, or you may choose to locate the proposed NWP activity site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed NWP activity site if known. If there are multiple locations, please indicate directions to each location on a separate sheet of paper and mark as Block 17.

Block 18. Identify the Specific Nationwide Permit(s) You Propose to Use. List the number(s) of the Nationwide Permit(s) you want to use to authorize the proposed activity (e.g., NWP 29).

Block 19. Description of the Proposed Nationwide Permit Activity. Describe the proposed NWP activity,including the direct and indirect adverse environmental effects the activity would cause. The description of the proposed activity should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal. Identify the materials to be used in construction, as well as the methods by which the work is to be done.

Provide sketches when necessary to show that the proposed NWP activity complies with the terms of the applicable NWP(s). Sketches usually clarify the activity and result in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed NWP activity (e.g.,a conceptual plan), but do not need to be detailed engineering plans.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 19.

Block 20. Description of Proposed Mitigation Measures. Describe any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed NWP activity. The description of any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or additional mitigation measures.

Block 21. Purpose of Nationwide Permit Activity. Describe the purpose and need for the proposed NWP activity. What will it be used for and why? Also include a brief description of any related activities associated with the proposed project. Provide the approximate dates you plan to begin and complete all work.

Block 22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by the Proposed Nationwide Permit Activity. For discharges of dredged or fill material into waters of the United States, provide the amount of wetlands, streams, or other types of waters filled, flooded, excavated, or drained by the proposed NWP activity. For structures or work in navigable waters of the United States subject to Section 10 of the Rivers and Harbors Act of 1899, provide the amount of navigable waters filled, dredged, occupied by one or more structures (e.g., aids to navigation, mooring buoys) by the proposed NWP activity.

For multiple NWPs, or for separate and distant crossings of waters of the United States authorized by NWPs 12 or 14, attach an extra sheet of paper marked Block 21 to provide the quantities of wetlands, streams, or other types of waters filled, flooded, excavated, or drained (or dredged or occupied by structures, if in waters subject to Section 10 of the Rivers and Harbors Act of 1899) for each NWP. For NWPs 12 and 14, include the amount of wetlands, streams, or other types of waters filled, flooded, excavated, or drained for each separate and distance crossing of waters or wetlands. If more space is needed, attach an extra sheet of paper marked Block 21.

Block 23. Identify Any Other Nationwide Permit(s), Regional General Permit(s), or Individual Permit(s) Used to Authorize Any Part of Proposed Activity or Any Related Activity. List any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. For linear projects, list other separate and distant crossings of waters and wetlands authorized by NWPs 12 or 14 that do not require PCNs. If more space is needed, attach an extra sheet of paper marked Block 22.

Block 24. Compensatory Mitigation Statement for Losses of Greater Than 1/10-Acre of Wetlands When Pre-Construction Notification is Required. Paragraph (c) of NWP general condition 23 requires compensatory mitigation at a minimum one-for-one replacement ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation is more environmentally appropriate or the adverse environmental effects of the proposed NWP activity are no more than minimal without compensatory mitigation, and provides an activity-specific waiver of this requirement. Describe the proposed compensatory mitigation for wetland losses greater than 1/10 acre, or provide an explanation of why the district engineer should not require wetland compensatory mitigation for the proposed NWP activity. If more space is needed, attach an extra sheet of paper marked Block 23.

Block 25. Is Any Portion of the Nationwide Permit Activity Already Complete? Describe any work that has already been completed for the NWP activity.

Block 26. List the Name(s) of Any Species Listed As Endangered or Threatened under the Endangered Species Act that Might be Affected by the Nationwide Permit Activity. If you are not a federal agency, and if any listed species or designated critical habitat might be affected or is in the vicinity of the proposed NWP activity, or if the proposed NWP activity is located in designated critical habitat, list the name(s) of those endangered or threatened species that might be affected by the proposed NWP activity or utilize the designated critical habitat that might be affected by the proposed NWP activity. If you are a Federal agency, and the proposed NWP activity requires a PCN, you must provide documentation demonstrating compliance with Section 7 of the Endangered Species Act.

Block 27. List Any Historic Properties that Have the Potential to be Affected by the Nationwide Permit Activity. If you are not a federal agency, and if any historic properties have the potential to be affected by the proposed NWP activity, list the name(s) of those historic properties that have the potential to be affected by the proposed NWP activity. If you are a Federal agency, and the proposed NWP activity requires a PCN, you must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

Block 28. List the Wild and Scenic River or Congressionally Designated Study River if the Nationwide Permit Activity Would Occur in such a River. If the proposed NWP activity will occur in a river in the National Wild and Scenic River System or in a river officially designated by Congress as a "study river" under the Wild and Scenic Rivers Act, provide the name of the river. For a list of Wild and Scenic Rivers and study rivers, please visit http://www.rivers.gov/

Block 29. Nationwide Permit Activities that also Require Permission from the Corps Under 33 U.S.C. 408. If the proposed NWP activity also requires permission from the Corps under 33 U.S.C. 408 because it will temporarily or permanently alter, occupy, or use a Corps federal authorized civil works project, indicate whether you have submitted a written request for section 408 permission from the Corps district having jurisdiction over that project.

Block 30. Other Information Required For Nationwide Permit Pre-Construction Notifications. The terms of some of the Nationwide Permits include additional information requirements for preconstruction notifications:

* NWP 3, Maintenance –information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals.
* NWP 31, Maintenance of Existing Flood Control Facilities –a description of the maintenance baseline and the dredged material disposal site.
* NWP 33, Temporary Construction, Access, and Dewatering –a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions.
* NWP 44, Mining Activities –if reclamation is required by other statutes, then a copy of the final reclamation plan must be submitted with the pre-construction notification.
* NWP 45, Repair of Uplands Damaged by Discrete Events –documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration.
* NWP 48, Commercial Shellfish Aquaculture Activities –(1) a map showing the boundaries of the project area, with latitude and longitude coordinates for each corner of the project area; (2) the name(s) of the species that will be cultivated during the period this NWP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area (a detailed survey is not required).
* NWP 49, Coal Remining Activities –a document describing how the overall mining plan will result in a net increase in aquatic resource functions to the district engineer and receive written authorization prior to commencing the activity.
* NWP 50, Underground Coal Mining Activities –if reclamation is required by other statutes, then a copy of the reclamation plan must be submitted with the pre-construction notification.

If more space is needed, attach an extra sheet of paper marked Block 29.

Blocks 31 and 32. For bank stabilization activities, we are collecting information on the use of living shorelines in coastal waters and lakes to inform future NWP rulemaking efforts. If the PCN is for a proposed NWP 13 activity, and it is located in coastal waters or a lake, please check the appropriate box in block 31 to indicate whether you considered the use of a living shoreline to protect your property from erosion. If the PCN is for a proposed NWP 13 activity, and it is located in coastal waters or a lake, please check the appropriate box in block 32 to indicate whether there are contractors in your area that construct living shorelines.

Block 33. Signature of Applicant or Agent. The PCN must be signed by the person proposing to undertake the NWP activity, and if applicable, the authorized party (agent) that prepared the PCN. The signature of the person proposing to undertake the NWP activity shall be an affirmation that the party submitting the PCN possesses the requisite property rights to undertake the NWP activity (including compliance with special conditions, mitigation, etc.).

DELINEATION OF WETLANDS, OTHER SPECIAL AQUATIC SITES, AND OTHER WATERS

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. The 45 day PCN review period will not start until the delineation is submitted or has been completed by the Corps.

DRAWINGS AND ILLUSTRATIONS

General Information.

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map, a Plan View or a Typical Cross-Section Map. Identify each illustration with a figure or attachment number. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings should also be included. Please submit one original, or good quality copy, of all drawings on 8½x11 inch plain white paper (electronic media may be substituted). Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross-section). While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.

ADDITIONAL INFORMATION AND REQUIREMENTS

For proposed NWP activities that involve discharges into waters of the United States, water quality certification from the State, Tribe, or EPA must be obtained or waived (see NWP general condition 25). Some States, Tribes, or EPA have issued water quality certification for one or more NWPs. Please check the appropriate Corps district web site to see if water quality certification has already been issued for the NWP(s) you wish to use. For proposed NWP activities in coastal states, state Coastal Zone Management Act consistency concurrence must be obtained, or a presumption of concurrence must occur (see NWP general condition 26). Some States have issued Coastal Zone Management Act consistency concurrences for one or more NWPs. Please check the appropriate Corps district web site to see if Coastal Zone Management Act consistency concurrence has already been issued for the NWP(s) you wish to use.

Appendix D

Agency Correspondence

Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office and North Dakota Game & Fish Department)

May 26, 2020 NDGFD and USFWS Email Communication

From: Ryan Henning
To: Josh Martin; Nathan Lehman; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com); Brenna Gunderson; Dyke, Steve R.; Mueller, Elisha K.; Riddle, Heidi L; Becker, Drew N
Subject: RE: Bowman Wind Project Review
Attachments: image001.png

Hi Steve, Elisha, Drew and Heidi,
I wanted to send this email as an introduction to the voluntary mitigation offset option that the Bowman Wind Project is currently evaluating and will be a focus of topic for our upcoming meeting. The Bowman Wind Project plans to evaluate voluntary offsets through application of the Shaffer et al. (2019) model [Estimating offsets for avian displacement effects of anthropogenic impacts]. As part of evaluating the voluntary offsets for grassland nesting birds, the Bowman Wind Project will plan to use a combination of locally collected untilled grassland data and two years of avian use surveys to better inform two of the key criteria inputs within the Shaffer et al. (2019) model: Impact Distance and Percent Displacement. The local data will better inform these two input model parameters of Shaffer et al. (2019) since the Bowman Wind Project is in a different grassland community and also has a different mixture of grassland birds when compared to the three data collection sites associated with the Shaffer and Buhl (2016) study [Effects of wind-energy facilities on grassland bird distributions].
Please let us know if you have any questions in advance of the meeting on the use of locally collected data associated with these two parameters and ability to input into the Shaffer et al. (2019) model.
Regards,
-Ryan

RYAN HENNING
Senior Director - Environmental

Apex Clean Energy, Inc.
310 4th St. NE, Suite **300**, Charlottesville, VA 22902
cell: 303-807-2429 | fax: 434-220-3712
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-----Original Appointment-----
From: Ryan Henning
Sent: Friday, May 8, 2020 1:54 PM
To: Ryan Henning; Josh Martin; Nathan Lehman; Clayton Derby; Brenna Gunderson; Dyke, Steve R.; Mueller, Elisha K.; Riddle, Heidi L; Becker, Drew N
Subject: Bowman Wind Project Review
When: Thursday, May 28, 2020 9:00 AM-11:00 AM (UTC-07:00) Mountain Time (US & Canada).
Where: Via Zoom

Hello everyone and thanks in advance for agreeing to meet virtually to discuss the proposed Bowman Wind Project. I'll plan to the email the turbine shape files once those are final along with a draft agenda.

Join Zoom Meeting
https://apexcleanenergy.zoom.us/j/96650300724

Meeting ID: 966 5030 0724
One tap mobile
+12532158782,,96650300724# US (Tacoma)
+13462487799,,96650300724# US (Houston)

Dial by your location
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 669 900 6833 US (San Jose)
+1 301 715 8592 US (Germantown)
+1 312 626 6799 US (Chicago)
+1 646 558 8656 US (New York)
Meeting ID: 966 5030 0724

Appendix D

Agency Correspondence

Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office and North Dakota Game & Fish Department)

July 31, 2020 NDGFD and USFWS Agency Meeting

From:	Ryan Henning
To:	Mueller, Elisha K.; Dyke, Steve R.; Riddle, Heidi L
Cc:	msmith@fredlaw.com; Brenna Gunderson; Scott Jansen; Nathan Lehman; Josh Martin; Owen Brenner; Chad LeBeau; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com)
Subject:	FW: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting
Attachments:	image001.png BOW_NDGF USFWS Agency Meeting Summary_2018-02-09.pdf

Hi all,

Thanks for your time today, it was very much appreciated. I'm resending the original February 13, 2018 email distribution that includes the meeting minutes where the lek survey protocol was discussed and agreed upon.

Separately, Clayton and I are working on updating the Shaffer Loesch offset model calculation narrative document. Our goal is to have that document completed and emailed by mid-next week. Lastly and in the interim, Josh has uploaded the grassland data shapefiles and the current Layout 050 turbine locations to the box folder.

https://apexcleanenergy.app.box.com/folder/114343621018

Please let us know if you have any problems accessing that data.

Regards,

-Ryan

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From: Ryan Henning <ryan.henning@apexcleanenergy.com>
Sent: Tuesday, February 13, 2018 1:17 PM
To: sdyke@nd.gov
Subject: FW: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

Hi Steve,

Resending this email as I had your incorrect email address.

Regards,

-Ryan

RYAN HENNING
Sr. Permitting Manager

Apex Clean Energy, Inc.
310 4th St. NE, Suite 200, Charlottesville, VA 22902
cell: 303-807-2429 | fax: 434-220-3712
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From: Ryan Henning
Sent: Friday, February 9, 2018 1:09 PM
To: 'sdyke@state.nd.us' <sdyke@state.nd.us>; 'Kevin_Shelley@fws.gov' <Kevin_Shelley@fws.gov>
Cc: Dave Phillips <dave.phillips@apexcleanenergy.com>; Jennie Geiger <jennie.geiger@apexcleanenergy.com>; Mark Mauersberger <mark.mauersberger@apexcleanenergy.com>
Subject: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

Good afternoon Steve and Kevin,
Thank you for meeting on January 30, 2018 to discuss the Bowman Wind Project. I have attached meeting notes outlining the topics discussed for your review and consideration.
We really appreciate your time and helpful input.
Regards,
-Ryan

RYAN HENNING
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BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees:	Kevin Shelley, USFWS John Schumacher, NDGFD Elisha Mueller, NDGFD Josh Montgomery, NDGFD Steve Dyke, NDGFD RJ Gross, NDGFD Ryan Henning, Apex Clean Energy Jennie Geiger, Apex Clean Energy (by phone)
Notes Prepared by:	Apex Clean Energy
Date:	February 9, 2018

On June 20, 2017, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service (USFWS), and North Dakota Game and Fish Department (NDGFD) to discuss the Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to update the agencies on the status of the Project and to agree on specifics for the Tier 3 studies recommended by each agency. The following presents a summary of topics discussed and agreed upon next steps.

Eagles: USFWS confirmed that ECPG-level surveys to evaluate potential eagle use of the Project area and to identify nests within 10 miles were appropriate for the Project. USFWS requested that Apex set up a meeting after nest surveys are complete to discuss findings

Prairie Grouse: NDGFD indicated that they complete lek surveys for greater sage-grouse and sharp-tailed grouse in and around the Project area and are monitoring translocated greater sage-grouse in Bowman County. NDGFD offered to provide the most current historical and active lek location data to inform facility siting. It was agreed that Apex should supplement the annual NDFG lek surveys by surveying known leks (including historic lek sites) in or within 1 mile of the Project area. The lek surveys will occur from 0.5 hours before sunrise to 1 hour after sunrise, with 2 visits to each lek location between April 1 to May 15, where site access is available.

Other: It was agreed that prairie dog colonies should be mapped to inform siting of project features in response to potential prey concentrations. Apex will obtain data on existing prairie dog colonies from NDGFD, confirm boundaries and status of these colonies, and map additional colonies observed within the Project area.

NDFGD recommended that Apex delineate all areas of previously untilled (i.e., native prairie) grassland that are larger than 160 acres, using a combination of available data and field verification. The goal of this work is to inform siting of project facilities to avoid and minimize impacts to these tracts, and to enable quantification of impacts where necessary to inform potential mitigation strategies.

Final Tier 3 Survey Plan: The following surveys were recommended and agreed upon for the project:

- Aerial raptor nest surveys out to 1 mile and eagle nest surveys in suitable habitat out to 10 miles, completed no later than leaf-on in spring 2018
- 1 - 2 years of ECPG-level surveys (approximately 30% of the area evaluated with 800-m plots, 1x/month)
- Check historic and active leks within the Project area and 1-mile buffer. Surveys will occur from 0.5 hours before sunrise to 1 hour after sunrise and from April 1 – May 15.
- Mapping of intact grassland habitats > 160 acres in size

Action Items:

- NDGFD to provide existing lek and prairie dog data for the assessment areas.
- Apex to implement above survey plan and review results with the agencies once complete

From:	Ryan Henning
To:	Mueller, Elisha K.; Dyke, Steve R.; Riddle, Heidi L
Cc:	msmith@fredlaw.com; Brenna Gunderson; Scott Jansen; Nathan Lehman; Josh Martin; Owen Brenner; Chad LeBeau; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com)
Subject:	RE: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting
Attachments:	image001.png Bowman Grassland Offset Measure_08-06-2020.pdf

Good afternoon,

As we discussed during the July 31, 2020 meeting, attached is the narrative document that discusses the Bowman Wind Project's incorporation of the Shaffer et al (2019) offset model and the corresponding offset area calculation for Layout 050. If you have any questions, please don't hesitate to reach out to Clayton or me. We will plan to follow up shortly to finalize the application of the model for the use in the BBCS and the additional reference in the NDPSC permit application.

Regards,

-Ryan

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From: Ryan Henning
Sent: Friday, July 31, 2020 2:57 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Dyke, Steve R. <sdyke@nd.gov>; 'Riddle, Heidi L' <heidi_riddle@fws.gov>
Cc: Smith, Mollie <msmith@fredlaw.com>; Brenna Gunderson <brenna.gunderson@apexcleanenergy.com>; Scott Jansen <scott.jansen@apexcleanenergy.com>; Nathan Lehman <nathan.lehman@apexcleanenergy.com>; Josh Martin <josh.martin@apexcleanenergy.com>; Owen Brenner <owen.brenner@apexcleanenergy.com>; Chad LeBeau <cwlebeau@west-inc.com>; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com) <cderby@west-inc.com>
Subject: FW: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

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To: 'sdyke@state.nd.us' <sdyke@state.nd.us>; 'Kevin_Shelley@fws.gov' <Kevin_Shelley@fws.gov>
Cc: Dave Phillips <dave.phillips@apexcleanenergy.com>; Jennie Geiger <jennie.geiger@apexcleanenergy.com>; Mark Mauersberger <mark.mauersberger@apexcleanenergy.com>
Subject: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

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Bowman Wind, LLC - Use of the Shaffer et al. (2019) Model to Estimate Offsets for Potential Breeding Grassland Bird Displacement Effects from the Proposed Bowman Wind Project

Bowman Wind, LLC (Bowman Wind) understands that applying the overarching policy of avoidance, minimization, and mitigation as part of developing the Bowman Wind Project (Project) is important. In past discussions regarding the Project, the United States Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department (NDGF) have outlined their preferences for avoidance and minimization (e.g., moving turbines off of unbroken grasslands where possible, relocating large portions of the wind farm to the north away from more sensitive landscapes, placing roads along edges of grasslands to minimize further fragmentation, etc.), with voluntary offsets using best available science to mitigate any remaining potential displacement to grassland birds. Bowman Wind also agrees that appropriate restoration efforts using approved native seed mixes (as appropriate and approved by the landowner) are vital in restoring temporary impact areas associated with construction activities.

A. Layout Modifications to Reduce Potential Unbroken Grassland Impacts

With respect to the Project site, a key concern identified was potential impact to unbroken grasslands and the potential displacement of grassland birds, as documented in Shaffer and Buhl (2016) at other wind project sites. Bowman Wind met with the USFWS and NDGF on July 31, 2020 to discuss a number of design measures incorporated into the turbine layout that avoid and minimize potential impacts to unbroken grasslands compared to the layout presented during the May 20, 2020 meeting with the agencies. For example, both the NDGF and USFWS raised concerns at the May 20, 2020 meeting about the direct placement of primary turbine locations on unbroken grasslands. Based on that input, Layout 050 was developed, which significantly reduces impacts to unbroken grasslands, with only two of the proposed 70 turbine locations placed within unbroken grasslands. Bowman Wind is continuing to explore layout options that would further reduce potential grassland impacts. In parallel, Bowman Wind is conducting a turbine technology review to see if larger commercially-available or potential future turbine options may be viable for the Project site. Further, Bowman Wind has committed to voluntary offsets for any potential remaining impacts.

B. Discussion of Offset Model

To evaluate voluntary offsets for potential avian displacement impacts, Bowman Wind has been investigating application of the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). Based on this evaluation, Bowman Wind will use the application of the Shaffer Loesch model, with updated unbroken grasslands data to account for field-verified conditions.

In Shaffer et al. (2019), the authors discuss incorporating updated land use/land cover data – in this case untilled grasslands – into the model, instead of using the default data layers provided by C. Loesch and used as the preset layers in the Shaffer Loesch GIS-based model. Through discussions with C. Loesch, Bowman Wind confirmed that C. Loesch supports using the best-available data, as more accurate grassland data provides more accurate modeling. Therefore, Bowman Wind plans to incorporate updated site-specific grassland mapping to better inform the model. Currently, Bowman Wind has updated grassland mapping for the Project site completed by SWCA in 2018 and landowner-informed intact grassland data (as of July 27, 2020). This information will be further refined based on grassland field surveys of the buildable areas within the Project site, which are currently being conducted by WEST.

Table 1 shows the modeling results for Layout 050 (which was presented July 31, 2020) with the current grassland data (SWCA mapping and landowner informed data), as well as the Shaffer et al (2019) baseline / preset model assumptions of 300 m impact distance displacement, 53 percent displacement, and 1.9 pairs/ha pre-impact and offset densities.

Table 1
July 2020 Meeting Layout 050 Grassland Mapping Update Used for the Avian-impact Offset Method to Estimate Offsets for Displaced Breeding Grassland Birds *{UPDATED LAYOUT TO BE USED IN THE FINAL CALCULATION}

Parameter	***Metric***	***Units***	***Source***	***Formula***	*Row 2*
Impact Distance	300	m	Shaffer and Buhl (2016)	--	*Row 3*
Impact Area	397	ha	Derived from GIS Model & SWCA and Landowner Informed Grassland Dataset	--	*Row 4*
Pre-Impact Density	1.9	pairs/ha	Shaffer and Buhl (2016)	--	*Row 5*
Percent Displacement	53	percent	Shaffer et al. (2019)	--	*Row 6*
Offset Density	1.9	pairs/ha	Equal Value Habitat	--	*Row 7*
Number Pairs in Impact Site	754	pairs	--	B8 = B4*B5	*Row 8*
Number Pairs Displaced	399	pairs	--	B9 =B8*(B6/100)	*Row 9*
Offset Area	210	ha	--	B10=B9/B7	*Row 10*
Column A	*Column B*	*Column C*	*Column D*		

Note: This table was replicated from Shaffer et al (2019) Appendix S1, Table S3, Example 2 calculation sheet.

As noted above, Bowman Wind continues to evaluate further refinements and wind energy optimizations to the layout. However, all future modeling calculations will include the base case model parameter assumptions for impact distance, percent displacement, pre-impact and offset densities, with incorporation of the updated unbroken grassland data. In addition, Bowman Wind will continue to explore pre-impact and offset densities data, since the Project-specific data showed that approximately 20 percent of observations were horned larks and the Project site includes highly divergent habitat and observed grasslands species compared to the data collected and evaluated for sites discussed in Shaffer and Buhl (2016) and as modeled in Shaffer et al. (2019).

Upon completion of the final layout, Bowman Wind will update the modeling, share the results with both the NDGF and USFWS and incorporate the voluntary calculated offset area into the Project-specific Bird and Bat Conservation Strategy.

References

Shaffer, J. A., and D. A. Buhl. 2016. Effects of wind-energy facilities on grassland bird distributions. Conservation Biology 30:59–71.

Shaffer, J. A., C. R. Loesch, and D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications.

Appendix D

Agency Correspondence

Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office and North Dakota Game & Fish Department)

December 21, 2020 Bowman Wind Email Communication

From:	Ryan Henning
To:	Mueller, Elisha K.; Dyke, Steve R.; Riddle, Heidi L
Cc:	msmith@fredlaw.com; Brenna Gunderson; Scott Jansen; Nathan Lehman; Josh Martin; Owen Brenner; Chad LeBeau; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com)
Subject:	RE: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting
Attachments:	image001.png Bowman Unbroken Grasslands Agency Meeting Summary_12-16-2020.pdf

Good evening,

Thanks for meeting with the Bowman Wind project on December 16, 2020. As was discussed during the meeting, please find the final 85 primary and spare turbine locations (74 of the 85 locations will be used for the final layout). Box link: https://apexcleanenergy.box.com/s/b3m2tr0ox05y0rhdq9wf7milutncddzx. A couple things to note about the data files:

1. The folder contains a shapefile of the LAY 054 turbine array which includes the 85 primary and spare turbine locations. As was noted during the meeting, this is worse case and only 74 of the 85 total locations will have a turbine when the final layout is completed.
2. The "AvianOffsetmethodDST.gdb" contains a raster named "GrasslandHabitat". This raster is the updated habitat data based on the field grassland assessment.

In addition, attached is the narrative describing the use of the Shaffer et al 2019 model that incorporated the updated unbroken grassland field data to calculate grassland bird displacement impacts and the corresponding voluntary offset mitigation acreage. If you have trouble accessing the Box folder, please let us know and Josh will find a way to get the data distributed to you directly.

Regards and Happy Holidays,

-Ryan

RYAN HENNING
Apex Clean Energy, Inc.

From: Ryan Henning
Sent: Thursday, August 6, 2020 5:16 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Dyke, Steve R. <sdyke@nd.gov>; Riddle, Heidi L <heidi_riddle@fws.gov>
Cc: Smith, Mollie <msmith@fredlaw.com>; Brenna Gunderson <brenna.gunderson@apexcleanenergy.com>; Scott Jansen <scott.jansen@apexcleanenergy.com>; Nathan Lehman <nathan.lehman@apexcleanenergy.com>; Josh Martin <josh.martin@apexcleanenergy.com>; Owen Brenner <owen.brenner@apexcleanenergy.com>; Chad LeBeau <cwlebeau@west-inc.com>; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com) <cderby@west-inc.com>
Subject: RE: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

Good afternoon,

As we discussed during the July 31, 2020 meeting, attached is the narrative document that discusses the Bowman Wind Project's incorporation of the Shaffer et al (2019) offset model and the corresponding offset area calculation for Layout 050. If you have any questions, please don't hesitate to reach out to Clayton or me. We will plan to follow up shortly to finalize the application of the model for the use in the BBCS and the additional reference in the NDPSC permit application.

Regards,

-Ryan

RYAN HENNING
Senior Director - Environmental

Apex Clean Energy, Inc.
310 4th St. NE, Suite **300**, Charlottesville, VA 22902
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From: Ryan Henning
Sent: Friday, July 31, 2020 2:57 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Dyke, Steve R. <sdyke@nd.gov>; 'Riddle, Heidi L' <heidi_riddle@fws.gov>
Cc: Smith, Mollie <msmith@fredlaw.com>; Brenna Gunderson <brenna.gunderson@apexcleanenergy.com>; Scott Jansen <scott.jansen@apexcleanenergy.com>; Nathan Lehman <nathan.lehman@apexcleanenergy.com>; Josh Martin <josh.martin@apexcleanenergy.com>; Owen Brenner <owen.brenner@apexcleanenergy.com>; Chad LeBeau <cwlebeau@west-inc.com>; Clayton Derby - Western EcoSystems Technology, Inc. (cderby@west-inc.com) <cderby@west-inc.com>
Subject: FW: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

Hi all,

Thanks for your time today, it was very much appreciated. I'm resending the original February 13, 2018 email distribution that includes the meeting minutes where the lek survey protocol was discussed and agreed upon.

Separately, Clayton and I are working on updating the Shaffer Loesch offset model calculation narrative document. Our goal is to have that document completed and emailed by mid-next week.

Lastly and in the interim, Josh has uploaded the grassland data shapefiles and the current Layout 050 turbine locations to the box folder.

https://apexcleanenergy.app.box.com/folder/114343621018

Please let us know if you have any problems accessing that data.

Regards,

-Ryan

RYAN HENNING
Senior Director - Environmental

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From: Ryan Henning <ryan.henning@apexcleanenergy.com>
Sent: Tuesday, February 13, 2018 1:17 PM
To: sdyke@nd.gov
Subject: FW: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

Hi Steve,

Resending this email as I had your incorrect email address.

Regards,

-Ryan

RYAN HENNING
Sr. Permitting Manager

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From: Ryan Henning
Sent: Friday, February 9, 2018 1:09 PM
To: 'sdyke@state.nd.us' <sdyke@state.nd.us>; 'Kevin_Shelley@fws.gov' <Kevin_Shelley@fws.gov>
Cc: Dave Phillips <dave.phillips@apexcleanenergy.com>; Jennie Geiger <jennie.geiger@apexcleanenergy.com>; Mark Mauersberger <mark.mauersberger@apexcleanenergy.com>
Subject: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting

Good afternoon Steve and Kevin,
Thank you for meeting on January 30, 2018 to discuss the Bowman Wind Project. I have attached meeting notes outlining the topics discussed for your review and consideration.
We really appreciate your time and helpful input.
Regards,
-Ryan

RYAN HENNING
Sr. Permitting Manager

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Bowman Wind, LLC – Use of the Shaffer et al. (2019) Model to Estimate Offsets for Potential Breeding Grassland Bird Displacement Effects from the Proposed Bowman Wind Project

As part of the avoidance, minimization, and mitigation strategy for the Bowman Wind Project (Project), Bowman Wind, LLC (Bowman Wind) has been consulting with the United States Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department (NDGF). In early discussions, the USFWS and NDGF outlined their preferences for avoidance and minimization of impacts to unbroken grasslands, with voluntary offsets using best available science to mitigate any remaining potential displacement to grassland birds.

Prior to calculating any voluntary habitat offsets, Bowman Wind first utilized the data layers provided by C. Loesch related to the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). Bowman Wind placed turbines and infrastructure, to the extent practicable, in what the data layers from the model termed "unsuitable" habitat.

Bowman Wind met with the USFWS and NDGF on May 18, 2020 and July 30, 2020 to discuss modifications made to the Project layout to avoid and minimize impacts to unbroken grasslands and offset calculation methodology. A summary of those avoidance/minimization efforts and offset methodology discussions is provided in the attached August 6, 2020 summary, which was previously provided to the USFWS and NDGF ("August 2020 Summary").

As discussed in the August 2020 Summary, when Bowman Wind met with USFWS and NDGF on July 30, 2020, Bowman Wind was still exploring layout options to further reduce potential direct and indirect impacts to unbroken grassland. In parallel, Bowman Wind was conducting a turbine technology review to see if larger commercially-available or potential future turbine options may be viable for the Project site. Additionally, Bowman Wind was continuing to gather and refine the unbroken grassland data to be used in calculating offset acreage for potential impacts.

On December 16, 2020, Bowman Wind met with USFWS and NDGF to provide an update on the ND Public Service Commission permit application timeline, the turbine technology review, layout modifications, and unbroken grassland offset acreage calculations. This summary discusses in further detail the information presented during the December 16, 2020 meeting.

Turbine Technology Review/Layout Update

Bowman Wind evaluated whether a larger nameplate capacity turbine model (i.e., 5.2 megawatt) may be suitable for the Project. Based on the evaluation, using a larger megawatt turbine model is not an option for the Project because the technology for the site's higher wind speeds, topography, wind shear, and turbine spacing needs is not available.

Based on the turbine technology currently under consideration, and incorporation of applicable siting criteria and site-specific data, Bowman Wind has developed a layout consisting of 85 proposed turbine locations. Bowman Wind would construct turbines at up to 74 (i.e., 2.82 megawatt turbines) of the 85 locations, with the remainder of the locations to be used as alternates.

Discussion of Offset Model

As discussed in the August 2020 Summary, to evaluate voluntary offsets for potential grassland nesting bird displacement impacts, Bowman Wind analyzed the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). In Shaffer et al. (2019), the authors discuss incorporating updated land use/land cover data – in this case unbroken grasslands – into the model, instead of using the default data layers provided by C. Loesch and used as the preset layers in the Shaffer-Loesch GIS-based model. Through discussions with C. Loesch, Bowman Wind confirmed that C. Loesch supports using the best-available data, as more accurate unbroken grassland data provides more accurate voluntary offset calculations. As a result, Bowman Wind retained WEST to conduct an unbroken grassland desktop and field assessment for the Project. The unbroken grassland assessment included historical aerial photography review, input from landowners, and field surveys to identify unbroken grasslands within a 400-meter radius of 90 proposed primary and alternate turbine locations.

Bowman Wind used the results of the WEST unbroken grassland assessment to map unbroken grasslands within the suitable breeding habitats designated in the C. Loesch dataset (same data set used to inform earlier turbine placement to avoid and minimize impacts). Based on the updated unbroken grassland data, 5 of the 90 turbine locations analyzed were located on unbroken grasslands within defined suitable habitat in the C. Loesch model data. As a result, Bowman Wind eliminated those 5 turbine locations from further consideration. For the remaining 85 turbine locations, Bowman Wind calculated offset mitigation for displacement impacts to grassland nesting birds applying the four Shaffer et al. 2019 core model assumptions (300 m impact distance displacement, 53 percent displacement, and 1.9 pairs/ha pre-impact and offset densities) and incorporation of the updated unbroken grassland within the model defined suitable breeding habitat data. The inputs and calculations are provided in the table below.

Dec 16, 2020 Meeting Layout 054 Grassland Mapping Updated Based on Field Assessment Used for the Avian-impact Offset Method to Estimate Offsets for Displaced Breeding Grassland Birds *{RESULTS IN THIS TABLE INCLUDE 85 TOTAL PRIMARY AND SPARE TURBINE LOCATIONS – >THE FINAL LAYOUT WILL TOTAL 74 TURBINE LOCATIONS}

Parameter	***Metric***	***Units***	***Source***
Impact Distance	300	m	Shaffer and Buhl (2016)
Impact Area	361	ha	Derived from WEST Grassland Assessment and Loesch Suitable Habitat Data
Pre-Impact Density	1.9	pairs/ha	Shaffer and Buhl (2016)
Percent Displacement	53	percent	Shaffer et al. (2019)
Offset Density	1.9	pairs/ha	Equal Value Habitat
Number Pairs in Impact Site	685	pairs	--
Number Pairs Displaced	363	pairs	--
Offset Area	191	ha	--

Note: This table was replicated from Shaffer et al (2019) Appendix S1, Table S3, Example 2 calculation sheet

Although the number of turbine sites modeled increased from 70 to 85 between the August 2020 Summary and current tabulation, the overall offset mitigation acreage for the 85 turbine layout decreased compared to the prior layout modeled (offset acreage was reduced from 210 ha to 191 ha). Since the Project anticipates only installing up to 74 turbines, Bowman Wind anticipated that the actual offset mitigation acreage will be even further reduced. Additionally, despite the increase in potential turbine locations, none of the turbine bases are located in unbroken grasslands within model defined suitable breeding habitat.

Bowman Wind is incorporating the voluntary offset calculation methodology discussed above into the Project-specific Bird and Bat Conservation Strategy. Using that methodology, Bowman Wind will calculate the Project's voluntary offset acreage using up to 74 of the 85 proposed turbine locations.

References

Shaffer, J. A., and D. A. Buhl. 2016. Effects of wind-energy facilities on grassland bird distributions. Conservation Biology 30:59–71.

Shaffer, J. A., C. R. Loesch, and D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications.

Appendix D

Agency Correspondence

Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office and North Dakota Game & Fish Department)

February 16, 2021 NDGFD and USFWS Agency Meeting

From: Ryan Henning
To: Mueller, Elisha K.
Cc: Dyke, Steve R.; Josh Martin
Subject: RE: Bowman Wind Project
Attachments: image002.png

Thanks for the follow up email, it is very much appreciated. Based on our February 16, 2021 meeting, we now better understand what NDGF has in mind for evaluating and offsetting impacts. We had previously presented and believed what we collectively agreed was to site turbines using the Loesch data and incorporate updated grassland data into the Shaffer et al 2019 model. As was discussed in the July 31, 2020 and December 16, 2020 meetings, the Project used the Loesch grassland unsuitable data layer to initially site turbines. To then evaluate potential indirect impacts to the defined "suitable" layer, we utilized desktop digitized information, information collected from landowners on previously broken areas, and field verification. This data was used to calculate grassland bird displacement impacts and was related to corresponding mitigation offsets. Whereas the NDGF impact methodology relies on desktop digitized grassland data to identify unbroken grasslands within 300 meters of turbines without further analyzing the relationship to potential grassland bird displacement.

Since the project initiated development in 2017, there have been a number of grassland mapping efforts completed through the fall of 2020. When the Project initiated agency coordination in 2017, the NDGF was focused on native prairie tracts greater than 160 acres and requested that mapping be conducted for that acreage threshold. Therefore, the Project hired SWCA to conduct a desktop grassland review and mapping exercise to identify those tracts of unbroken native grasslands greater than 160 acres. I believe that is the 2018 grassland analysis you are referring to in your sidenote in the email below. After our meeting July 30, 2020, the NDGF recommended that all unbroken native grassland tracts regardless of size be mapped in areas proposed for turbine locations. Prior to conducting field surveys, the Project interviewed all landowners that had signed leases to document the status of any broken or unbroken native grasslands and map any of those areas under their ownership. Once the landowner informed unbroken grassland data was compiled, the Project hired WEST to conduct a further desktop review incorporating the landowner data and review of historical aerial and satellite information, followed by a field verification and mapping effort of any unbroken grasslands within 400 meters of proposed turbine locations (the recommended 300 meters, plus 100 meters as buffer in case of shifts). The Project has used the WEST unbroken grassland data for our continued micro-siting and incorporation into the suitable data layer provided in the original model from Loesch.

Now that we understand that the NDGF doesn't distinguish the Loesch unsuitable grassland data from suitable grassland data in their internal analyses, the Project has completed another micro-siting exercise to further revise our methodology and to demonstrate additional avoidance. However, the Project has and will continue to use the WEST grassland data that incorporated landowner historical knowledge, aerial and satellite review, and field verification since we believe it is scientifically more accurate than manually digitizing potential grassland tracts using aerial photographs and other publicly available data. Layout 059 contains the updates of the micro-siting of turbines that further demonstrates the Project's avoidance of impacts to unbroken grasslands. Using the WEST data, layout 059 has been updated and now only has three primary and one spare turbine location on unbroken grasslands (regardless of suitable or unsuitable designation in the Loesch model). Further, as has been previously discussed, the Project will continue to use the best

scientific available information to evaluate potential indirect displacement to grassland bird nesting pairs (i.e. use of the Shaffer et al. 2019 model). That methodology and the resulting grassland bird displacement calculations will be updated and incorporated into the Breeding Bird and Bat Conservation Strategy document.
Lastly, the Project plans to incorporate averted loss which is one of the key principles of the Shaffer et al 2019 peer-reviewed paper by acquiring unbroken grassland conservation easements as a voluntary offset mitigation measure.

Layout 059 has been added to Box at the link below.

https://apexcleanenergy.box.com/s/r6bawmtdu4gpgfbq3sw460uusm7s6lmh
Please let us know if you have any trouble accessing the Box folder with the final layout 059.
Regards,
-Ryan
RYAN HENNING
Apex Clean Energy, Inc.

From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Tuesday, February 16, 2021 2:23 PM
To: Ryan Henning <ryan.henning@apexcleanenergy.com>
Cc: Dyke, Steve R. <sdyke@nd.gov>; Josh Martin <josh.martin@apexcleanenergy.com>
Subject: Bowman Wind Project

Hi Ryan,

I just wanted to touch base real quick after that meeting. I was thinking that it might be worth while for your GIS team to take the layer Sandy provided and compare it to your layer & look closely at some of the areas of discrepancy. Attached is a photo of one example where your layer has a road but it's only a 2 track (which we would not count as broken prairie). I think there was some confusion when you suggested we were changing our methods so I want to share this example in hopes it helps you better understand. It is not that we do not agree with the tools you used to help guide turbine placement, the Department has and still recommends using any tool available (our grassland layer, Chuck's model, etc.). However, as none of these methods will provide perfect results (this specific turbine is a great example), we have always recommended doing a grassland analysis to determine the actual grassland footprint within the turbine buffers. This is how the Department estimates project impacts.

A side note, your newest grassland layer seems to be quite different from the grassland analysis you ran in 2018. Is there a document that explains the differences/ how you got to the updated layer that I missed in the dropbox? That might help clear up some of the discrepancies.

While your team does that, I will work on drafting our letter to PSC so that I can share it with you and we can have another conversation prior to us sending the letter.

Let me know if you have any thoughts/questions/concerns.

Elisha Mueller
Conservation Biologist

701.328.6348 • ekmueller@nd.gov • gf.nd.gov

Appendix D

Agency Correspondence

Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office and North Dakota Game & Fish Department)

March 22, 2021 NDGF Email Communication

Brie Anderson

From: Ryan Henning <ryan.henning@apexcleanenergy.com>
Sent: Monday, March 22, 2021 7:05 PM
To: Mueller, Elisha K.
Cc: Dyke, Steve R.; Johnson, Sandra K.
Subject: RE: Bowman Wind

Hi Elisha,

Thanks for your email. We thought it would be beneficial to provide detailed written responses to your three comments:

1. Turbines 3, 11, 16, 77, and 37 from layout 59 (no turbine number was attached to that data set, so these are the field IDs… hopefully that makes sense). We have identified these turbines as being on native prairie.

A grassland assessment was conducted to identify unbroken native prairie or previously broken grasslands to help inform siting within the proposed development areas of the Bowman Wind Project (Project). Unbroken native prairie was defined as grassland in its original or natural state showing no evidence of soil disturbance, with a dominance of native plant species present (i.e., western wheatgrass, big bluestem, sideoats grama, purple coneflower, blanket flower, etc.). Previously broken grasslands were identified based on features such as rock piles; presence, amount, and apparent height of trees and shrubs; field edge changes; straight line features indicating plowing, disking, harvesting, or planting; non-native plant species present (i.e., smooth brome, alfalfa, etc.), and any other features indicating human disturbance.

The 2020 native prairie/grassland assessment was a three-step process that included interviewing landowners, a desktop review, and a field assessment of grassland parcels within a 400-meter buffer of proposed turbines (Assessment Area). The desktop review included a review of current publicly available datasets (i.e., aerial photography, landowner input, Crop Data Layer 2019, SWCA data from the 2018 assessment, existing land cover data, etc.) and NDGFD Native Habitat Layer. All grassland parcels were digitized using ESRI software (ArcGIS 10.7). During the field assessment, grasslands within the Assessment Areas were visually evaluated on foot where access was permitted or from public roads to confirm the native prairie state (e.g., broken or previously broken).

Based on the native prairie/grassland assessment, turbines with FIDs 3, 11, 16, 37, and 77 (Figure 1) were located in areas identified as previously broken grasslands for the following reasons:

- Grasslands within the Assessment Area of turbines FID 3, 11, and 37 were identified as broken based on the NDGF Native layer, historic aerial imagery (1957-1962) that showed evidence of tillage, and results of the field assessment which indicated the presence of rock piles, vegetation in straight lines, and dominance of non-native planted species (i.e., smooth brome grass and alfalfa), which all indicate previous tillage.
- Grassland within the Assessment Area of turbine FID 16 were identified as broken based on not occurring within the NDGF Native layer, recent aerial imagery that indicated disturbance and degradation in 2019 and 2020, landowner confirmation, and results of the field assessment which indicated the presence of rock piles, vegetation in straight lines, and dominance of non-native planted species (i.e., smooth brome and Poa spp. grasses), which all indicate past tillage.
- Grassland within the Assessment Area of the turbine FID 77 was identified as broken based on not occurring within the NDGF Native layer and historic aerial imagery that showed evidence of tillage (1957 -1962).

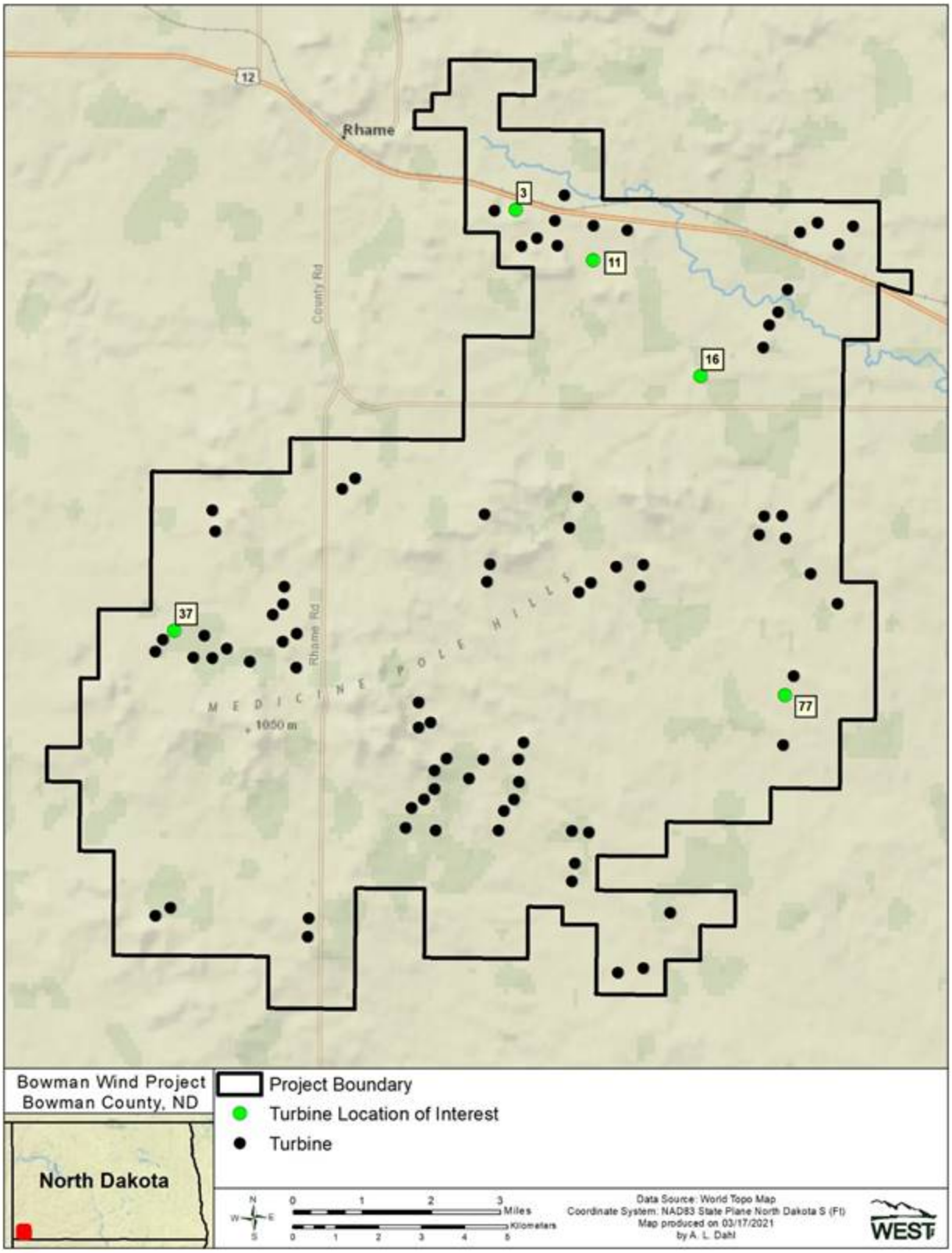

Figure 1 - Turbine locations associated with FIDs 3, 11, 16, 37, and 77

2. Turbines 67, 68, 69, 70, 37, 38, 39, 41, 42, 43, and 44. All of these turbines are within our Greater Sage-grouse Priority Conservation Area and the 6 bolded turbines fall within 4 miles of an active lek. In our early guidance

letter (attached for reference), the Department stated that its first recommendation is to discontinue permitting energy development within this area.

Throughout its development of the Bowman Wind Project (Project), Bowman Wind has been cognizant of the NDGF's concerns regarding potential impacts to greater sage-grouse populations in North Dakota, and has taken those concerns into account in Project siting. Bowman Wind reviewed the North Dakota Sage-Grouse Management Plan (Robinson 2014), which identifies three objectives: 1) conserving sagebrush habitats and habitats important for nesting and brood-rearing within Priority Conservation Areas (PCA), 2) increasing connectivity between available habitats in PCA, and 3) protecting intact PCA from fragmentation (Robinson 2014). The North Dakota Sage-Grouse Management Plan identifies various strategies and conservation actions to minimize impacts of specific anthropogenic structures to sage-grouse and their habitats. However, due to the lack of information available at the time of the publication in 2014, no strategies or conservation actions were presented for wind energy development (Robinson 2014).

As a result, Bowman Wind analyzed other State-specific documentation to identify appropriate measures to avoid and/or minimize potential impacts to sage grouse. The State Wildlife Action Plan states that conservation efforts should focus on leks and areas within 2 mile (mi; 3.2 kilometer [km]) of leks (Dyke et al. 2015). Data on sage-grouse monitoring in North Dakota indicates that areas within 2 miles of a lek are important for breeding and nesting, as 68% of all nests were located within 2 miles of a lek (average 1.7 mi [2. 7 km]; Herman-Brunson 2007, Herman-Brunson et al. 2009).

Bowman Wind also reviewed the limited research available specific to the effects of wind energy on sage-grouse populations. To date, one published study has analyzed the potential effects of wind energy infrastructure on sage-grouse at a single facility/study area. That study indicated that wind energy infrastructure sited within 0.75 mi (1.2 km) of important brood-rearing and late summer habitats could displace sage-grouse that are using those habitats; however, this displacement was found to not negatively affect survival (LeBeau et al. 2017a). In that same study area, trends in males attending leks pre-development compared to post-development of a wind energy facility did not differ, suggesting the presence of the facility did not result in population level declines (LeBeau et al. 2017a, LeBeau et al. 2017b). Leks in that study area where the facility was located ranged from 0.31 mi (0.5 km) to 2.7 mi (4.3 km) to the nearest turbines; however, given the results were associated with one facility/study area, the authors cautioned any avoidance buffers < 0.93 mi (1.5 km; LeBeau et al. 2017b).

Given the limited amount of research of the effects of wind energy on sage-grouse populations, Bowman Wind also considered research on the effects of wind energy development on other grouse populations, given their similar life histories. Based on the 15 published studies that have evaluated the impacts of wind energy on grouse, we understand that wind energy infrastructure has the ability to adversely affect grouse behavior similar to other forms of development, but the magnitude of effects associated with wind energy appears to be less than other forms of energy development (Winder et al. 2014, LeBeau et al. 2017a, 2020a,b). For example, in Idaho, Columbian sharp-tailed grouse (CSTG; Tympanuchus phasianellus columbianus) nest survival and nest site selection were not influenced by proximity to turbines (Proett et al. 2019). Likewise, greater prairie chicken (GRPC; T. cupido) nest and female survival was also reportedly not influenced by proximity to wind turbines in Nebraska or Kansas (Winder et al. 2014, McNew et al. 2014, Harrison et al. 2017, Smith et al. 2017). This is in contrast to the effects of oil and gas development on sage-grouse breeding populations (e.g., Holloran and Anderson 2005, Aldridge and Boyce 2007, Kirol et al. 2020).

A review of North Dakota oil and gas well data shows that ten active wells appear to occur within 2 miles of the previous active sage-grouse lek. Therefore, one of the most disruptive energy developments has already occurred in close proximity to this lek. Comparatively, of the limited Project infrastructure proposed to be located within the PCA, all of the infrastructure is located on the very eastern edge of the PCA boundary, and greater than 2 miles from the active sage-grouse lek. More importantly, the infrastructure was sited in areas with existing disturbances including cultivated croplands and roads, so impacts have previously occurred within these disturbed areas. Further, Project infrastructure located in the PCA is not likely to impact the sage-grouse population given the previous disturbances to this area, active oil and gas wells within 2 miles of the active lek, placement of the proposed infrastructure in previously disturbed areas, and our current understanding of effects of wind energy development on grouse populations. As noted above, grouse monitoring studies in North Dakota suggest placing infrastructure 2 miles away from an active lek will minimize impacts to breeding and nesting sage-grouse (Herman-Brunson 2007, Herman-Brunson et al. 2009). In addition, based on the

best available science for grouse, impacts from wind energy development are not expected to extend beyond one mile from infrastructure. Therefore, Bowman Wind's placement of infrastructure in areas with existing fragmentation and at least 2 miles from leks is not expected to impact the local sage-grouse population (LeBeau et al. 2017a,b; see LeBeau et al. 2020a). Connectivity between habitats is also not expected to be impacted given that the infrastructure located within the PCA is in the eastern-most extent and in areas with existing fragmentation, so affects to the local sage-grouse population and their habitats (if any) have already occurred. Considering all of the information outlined above, Bowman Wind believes it has sited Project infrastructure to avoid and minimize potential impacts to any local, remnant sage-grouse populations.

Aldridge, C. L. and M. S. Boyce. 2007. Linking Occurrence and Fitness to Persistence: A Habitat-Based Approach for Endangered Greater Sage-Grouse. Ecological Applications 17: 508-526.

Dyke, S. R., S. K. Johnson, P. T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, ND.

Harrison J. O., M. B. Brown. L. A. Powell, W. H. Schacht, and J. A. Smith. 2017. Nest site selection and nest survival of greater prairie-chickens near a wind energy facility. The Condor 119:659-672.

Herman-Brunson, M. 2007. Nesting and brood-rearing habitat selection of greater sage-grouse and associated survival of hens and broods at the edge of their historic distribution. Thesis South Dakota State University.

Herman-Brunson K. M, K. C. Jenson, N. W. Kaczor, C. C. Swanson, M. A. Rumble, and R. W. Klaver. 2009. Nesting ecology of greater sage-grouse Centrocercus urophasianus at the eastern edge of their historic distribution. Journal of Wildlife Biology 15: 395-404.

Holloran, M. J. and S. H. Anderson. 2005. Spatial Distribution of Greater Sage-Grouse Nests in Relatively Contiguous Sagebrush Habitats. Condor 107: 742-752.

Kirol, C.P., K.T. Smith, N.E. Graff, J.B. Dinkins, C.W. LeBeau, T.L. Maechtle, A.L. Sutphin, and J.L. Beck. 2020. Greater sage-grouse response to the physical footprint of energy development. Journal of Wildlife Management 84:989–1001.

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Robinson A. C. 2014. Management Plan and Conservation Strategies for Greater Sage-Grouse in North Dakota. North Dakota Game and Fish Department. Bismarck, ND, USA.

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3.The most recent impact analysis and voluntary offset package. We have not seen an updated one and are assuming it is the same as the original, but if this isn't the case, could you provide that prior to our meeting?

Bowman Wind committed to apply the NDGFD's recommended overarching policy of avoidance, minimization, restoration, and mitigation to unbroken grasslands as part of the siting of wind turbines associated with the Project. NDGFD recommended the potential application of the Shaffer et al. 2019 (Estimating offsets for avian displacement effects of anthropogenic impacts) model as a tool to calculate voluntary offsets associated with turbines and potential grassland nesting bird displacement. As previously discussed, Bowman Wind planned to calculate voluntary offsets based on Shaffer et al. 2019 with the WEST grassland data layer (that includes landowner historical knowledge, historical and recent aerial and satellite photography review, and field verification) incorporated as the best-available grassland data. Below are the calculations of voluntary offsets that have been incorporated into the Bird Bat Conservation Strategy (BBCS) for Layout 059, which is the final layout being submitted to the ND PSC for approval.

Final Layout 059 Grassland Mapping Updated Based on WEST Field Assessment Used for the Avian-impact Offset Method to Estimate Offsets for Displaced Breeding Grassland Birds *{RESULTS IN THIS TABLE INCLUDE 85 TOTAL PRIMARY AND SPARE TURBINE LOCATIONS – >THE FINAL PROJECT LAYOUT WILL TOTAL 74, 2.82 MW TURBINE LOCATIONS}

Parameter	Metric	Units	Source
Impact Distance	300	m	Shaffer and Buhl (2016)
Impact Area	537	ha	Derived from WEST Grassland Assessment
Pre-Impact Density	1.9	pairs/ha	Shaffer and Buhl (2016)
Percent Displacement	53	percent	Shaffer et al. (2019)
Offset Density	1.9	pairs/ha	Equal Value Habitat
Number Pairs in Impact Site	1020	pairs	--
Number Pairs Displaced	540	pairs	--
Offset Area	284	ha	--

Note: This table was replicated from Shaffer et al (2019) Appendix S1, Table S3, Example 2 calculation sheet

Bowman Wind committed to following one of the key "averted-loss" tenets of Shaffer et al. 2019 peer-reviewed paper, which is to offset indirect displacement of grassland birds by protecting existing native landscapes or other valuable habitat through voluntary easements. Consistent with this commitment, Bowman Wind plans to acquire unbroken grassland conservation easements for the life of the Project as a voluntary offset for displaced grassland breeding birds by incorporation of the outputs from the framework model calculations in the table above and as detailed in Shaffer et al. 2019.

Shaffer, J. A., and D. A. Buhl. 2016. Effects of wind-energy facilities on grassland bird distributions. Conservation Biology 30:59–71.

Shaffer, J. A., C. R. Loesch, and D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications.

Thanks for all of your coordination and discussions. As an update, the Project plans to submit its application to the North Dakota Public Service Commission this week.

Regards,

-Ryan

RYAN HENNING
Apex Clean Energy, Inc.

From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Wednesday, March 10, 2021 2:40 PM
To: Ryan Henning <ryan.henning@apexcleanenergy.com>
Cc: Dyke, Steve R. <sdyke@nd.gov>; Johnson, Sandra K. <sajohnson@nd.gov>
Subject: Bowman Wind

Hi Ryan,

We have discussed internally and think it would be beneficial to set up another meeting/work session with you and your GIS team. Specifically, we would like to discuss the following topics:

1.) Turbines 3, 11, 16, 77, and 37 from layout 59 (no turbine number was attached to that data set, so these are the field IDs… hopefully that makes sense). We have identified these turbines as being on native prairie.
2.) Turbines **67**, 68, **69**, 70, **37**, 38, 39, **41**, **42**, 43, and **44**. All of these turbines are within our Greater Sage-grouse Priority Conservation Area and the 6 bolded turbines fall within 4 miles of an active lek. In our early guidance letter (attached for reference), the Department stated that it's first recommendation is to discontinue permitting energy development within this area.
3.) The most recent impact analysis and voluntary offset package. We have not seen an updated one and are assuming it is the same as the original, but if this isn't the case, could you provide that prior to our meeting?

Let's try to shoot for the weeks of the 22nd or 29th if possible.

Elisha Mueller
Conservation Biologist

701.328.6348 • ekmueller@nd.gov • gf.nd.gov

North Dakota | Game and Fish
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Appendix D

Agency Correspondence

North Dakota Parks & Recreation

NORTH Dakota | Parks & Recreation
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June 10, 2020

Scott Jansen
Bowman Wind
8665 Hudson Blvd. Suite 110
Lake Elmo, MN 55042

Re: Bowman Wind Farm

Dear Mr. Jansen,

The North Dakota Parks and Recreation Department has reviewed the above referenced proposed Bowman Windfarm located in Bowman County, North Dakota.

Our agency scope of authority and expertise covers recreation and biological resources (in particular rare plants and ecological communities). The project as defined does not affect state park lands that we manage or affect Land and Water Conservation Fund recreation projects that we coordinate.

The North Dakota Natural Heritage biological conservation database has reviewed the project to determine if any current or historical plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, we have several species of concern documented within or adjacent to project site. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. A map and spreadsheet with natural heritage data has been attached.

Given the potential for not only habitat disturbance and disruption but the threat to nesting, feeding and migratory bird and bats in the area we suggest that all efforts be made to avoid impacts to wildlife species and their habitats. In an effort to avoid or minimize impacts to wildlife and their habitats we encourage proper evaluation of all potential wind energy sites. To identify and assess adverse impacts to wildlife we suggest pre and post construction avian and bat monitoring studies be conducted. We defer further comments regarding animal species to the North Dakota Game and Fish Department and the United States Fish and Wildlife Service.

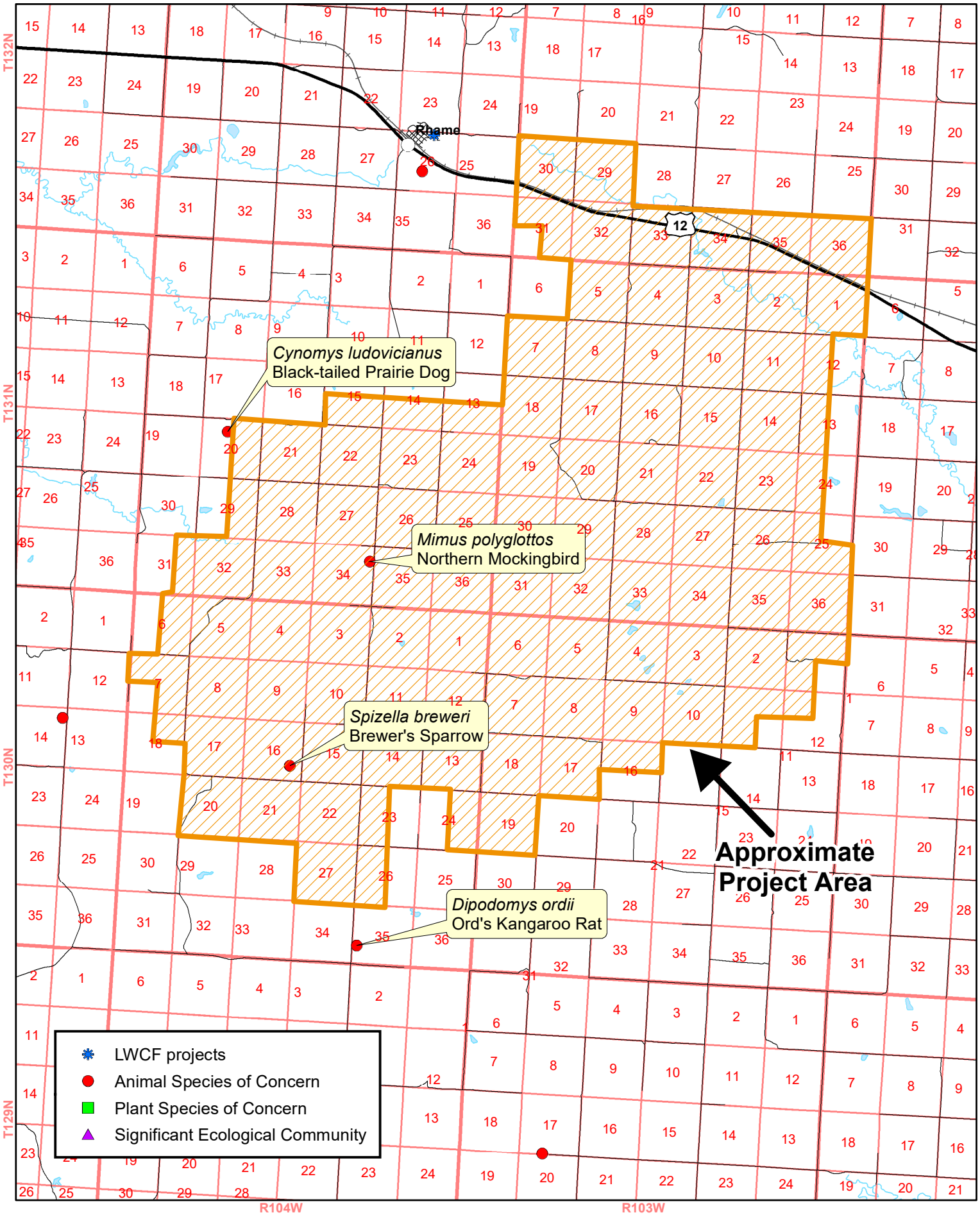
We appreciate your commitment to rare plant, animal and ecological community conservation, management and inter-agency cooperation to date. For additional information, please contact me at (701-220-3377 or kgduttenhefner@nd.gov Thank you for the opportunity to comment on this proposed project.

Sincerely,

Kathy Duttenhefner
Coordinator/Biologist II, Natural Resources Division

1600 East Century Ave. Ste. 3 | Bismarck, ND 58503
PHONE: 701-328-5357 | FAX: 701-328-5363 | EMAIL: parkrec@nd.gov | WEBSITE: www.parkrec.nd.gov

North Dakota Parks and Recreation Department
North Dakota Natural Heritage Inventory



State Scientific Name	State Common Name	State Rank	Global Rank	Federal Status	Township Range Section	County	Last Observation	Estimated Representation Accuracy	Precision
Cynomys ludovicianus	Black-tailed Prairie Dog	SU	G4		131N104W - 20; 131N105W - 01; 132N105W - 26; 131N104W - 01; 130N104W - 17; 132N105W - 34; 130N104W - 07; 131N104W - 34; 132N105W - 35; 132N105W - 25; 130N104W - 09; 132N104W - 34; 131N104W - 27; 131N105W - 28; 131N104W - 36; 131N104W - 26; 131N105W - 36	Bowman	1964-08-14		G
Dipodomys ordii	Ord's Kangaroo Rat	S4	G5		130N104W - 35	Bowman	1976-08		S
Mimus polyglottos	Northern Mockingbird	SU	G5		131N104W - 17; 131N104W - 26; 131N105W - 36; 130N104W - 15; 130N104W - 24; 131N104W - 07; 131N103W - 17; 131N103W - 28; 130N104W - 05; 130N104W - 10; 130N105W - 13; 131N103W - 18; 131N104W - 28; 130N104W - 04; 131N104W - 33; 131N103W - 32; 131N103W - 08	Bowman	1967-06-20		G
Spizella breweri	Brewer's Sparrow	S3	G5		130N104W - 16	Bowman	1976-05		S

Appendix D

Agency Correspondence

North Dakota State Water Commission

NORTH Dakota | Water Commission
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June 8, 2020

Scott Jansen
Bowman Wind
c/o Apex Clean Energy, Inc.
8665 Hudson Blvd North, STE 110
Lake Elmo, MN 55042

Dear Mr. Jansen:

This is in response to your request for a review of the environmental impacts associated with the 200-megawatt Wind Farm project located in Bowman County, ND.

The proposed project has been reviewed by State Water Commission staff, and the following comments are provided:

- There are no FEMA regulatory floodplains identified and/or mapped where this proposed project is to take place. No permits relative to the NFIP are required based on the current effective FIRM and State minimum standards.

- The Office of the State Engineer (OSE) Engineering and Permitting Section reviewed the project location and determined that the project will be constructed near surface water resources. The OSE requests to be notified regarding the proposed project's impacts, if any, to water resources such as watercourses (i.e. streams or rivers), agricultural drains, and wetlands (i.e. ponds, sloughs, lakes, or any series thereof) as any alterations, modifications, improvements, or impacts to those water resources may require a drainage permit(s) or a construction permit(s) from the OSE. Please contact the OSE Engineering and Permitting Section at 701-328-4288 if you have any questions.

- Initial review indicates the project does not require a conditional or temporary permit for water appropriation. However, if surface water or groundwater will be diverted for construction of the project, a water permit will be required per North Dakota Century Code § 61-04-02. Please consult with the Water Appropriations Division of the Office of the State Engineer if you have any questions at (701) 328-2754 or waterpermits@nd.gov.

- The State Water Commission maintains a network of observation wells across the state for monitoring the water levels and quality in glacial and bedrock aquifers. These wells are often installed in road and highway rights-of-way to limit inconvenience to the adjacent landowners. State Water Commission observation wells have a yellow protective casing extending between 1 and 3 feet above ground surface, and their locations are marked with a stake. If an observation well is encountered during project activities and must be removed, please contact the Water Appropriations Division. The State Water Commission hopes to keep all observation wells, but otherwise will ensure the well is properly abandoned.

Thank you for the opportunity to provide review comments. Should you have further questions, please contact me at 701-328-4970 or stevebest@nd.gov.

Sincerely,

Steven Best
Planner III

SB:dm/1570

Appendix D

Agency Correspondence

State Historical Society of North Dakota

May 13, 2020

Mr. Scott Jansen
Senior Development Manager
Apex Clean Energy
8665 Hudson Blvd North, Suite 110
Lake Elmo, MN 55042

ND SHPO Ref: 20-0335 PSC Bowman Wind in Bowman County, North Dakota

Dear Mr. Jansen,

We reviewed your preliminary information on ND SHPO Ref: 20-0335 PSC Bowman Wind in Bowman County, North Dakota. We recommend survey for cultural resources as follows:

- A current Class I (file search) to determine any previously recorded cultural resources in the project area.

- A Class II (reconnaissance) and Class III (pedestrian) survey by a permitted architectural historian for standing buildings and structures (including cemeteries) over 45 years old in the visual Area of Potential Effect (APE). This is within a two-mile radius of individual turbine locations. The purpose is to evaluate any architectural or structural features that may be eligible for nomination to the National Register of Historic Places. At least three out of the seven aspects of integrity used to evaluate historic properties could be impacted by the proposed project: the setting, feeling, and association of historic sites.

- A Class III archaeological survey of all areas of direct impact including crane paths, met towers, access roads, turbine locations and staging areas, unless the footprint has been recently surveyed for cultural resources.

Thank you for the opportunity to review this project to date. We look forward to review of the Class II/Class III surveys. Please include the ND SHPO reference number listed above in any further correspondence for this specific project. If you have any questions, please contact Lorna Meidinger at (701) 328-2089 or lbmeidinger@nd.gov.

Sincerely,

for Claudia J. Berg
State Historic Preservation Officer (North Dakota)

20-0335

Appendix D

Agency Correspondence

Bowman County Airport Authority

Bowman County Airport Authority

TO: Scott Jansen Apex Clean Energy
FROM: Bowman County Airport Authority/ Board
SUBJECT: Bowman Wind Turbine Project 56 Approval Letter

Bowman County Airport Authority met February 5, 2021 and determined there is no impact, from Project 56 Wind Turbine Layout, to the Bowman Regional Airport and it's 5 mile (radius) associated airspace. Motion to approve presented, seconded and motion passed to forward this Letter of Approval to Apex Clean Energy.

Signed this date- February 8, 2021

Bowman County Airport Authority- Rodney Sichart - chairman

Address- P.O. Box 331, Bowman, North Dakota 58623

Appendix E
Sound Analysis Report

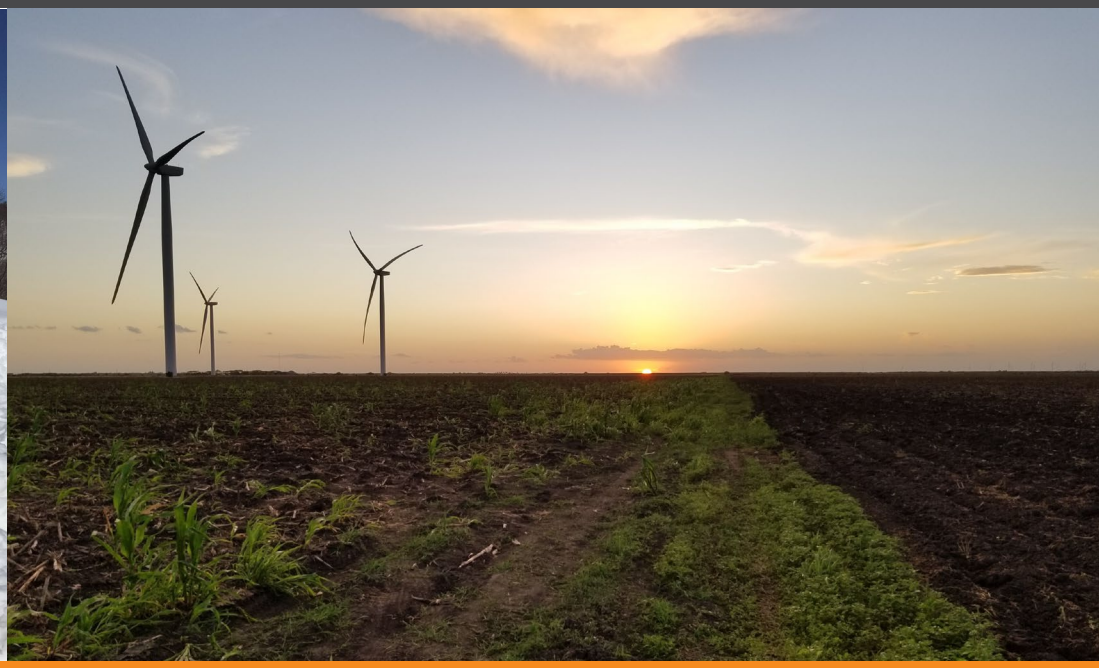
Bowman Wind, LLC
March 2021

RSG
the science of insight

MERJENT

BOWMAN WIND SOUND MODELING

Report | March 23, 2021



55 Railroad Row
White River Junction, VT 05001
802.295.4999
www.rsginc.com

PREPARED FOR:
MERJENT

SUBMITTED BY:
RSG

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1.0 EXECUTIVE SUMMARY

The Bowman Wind Farm project (the “Project”) is an approximately 200 MW nameplate capacity wind power generation facility proposed in Bowman County, North Dakota.

The Project is subject to a noise standard of 45 dBA L_{eq} within 100 feet of any residence. To assess the noise impacts of the Project, RSG has conducted sound propagation modeling of the planned turbine layout. The 45 dBA L_{eq} standard is also applied to sound generated by battery storage and substation components of the Project. We used the internationally accepted sound propagation modeling methodology, ISO 9613-2, with parameters developed specific to wind turbines.

The modeling results show that Project sound levels are at or below 44 dBA L_{eq} within 100 feet of participating and non-participating residences and community buildings assuming concurrent and continuous operation of all Project components. Modeled Project generated operational sound levels do not exceed the applicable noise standards.

2.0 INTRODUCTION

The Bowman Wind Farm Project is an approximately 200 MW nameplate capacity wind power generation facility proposed in Bowman County, North Dakota. RSG conducted sound propagation modeling for the proposed turbine array to assess compliance with the applicable sound level requirements.

Included in this report are:

1. A Project description,
2. An overview of ordinances and standards that apply to the Project,
3. A description of sound propagation modeling procedures,
4. Sound propagation modeling results, and
5. Conclusions.

A primer on acoustical terminology is provided in Appendix A.

Acoustical issues specific to wind turbine noise are described in Appendix B.

3.0 PROJECT DESCRIPTION

A Project area map is shown in Figure 1. The Project is located about 5 miles (8 km) west of the City of Bowman. Land within the Project area is rural and is primarily used for agriculture with some residences interspersed. The terrain is relatively flat.

The Project is modeled using General Electric (GE) 2.83 MW wind turbines with 127-meter rotor diameters, 89-meter hub heights, and fitted with low-noise trailing edges (LNTE). Other turbine models and hub heights are also being considered. Up to 74 wind turbines will be constructed. The preliminary locations for 85 turbine (74 primary and 11 alternative) sites are included in the modeling in this report. A single 222 MVA transformer at the collector substation connects the turbine array to the electric grid.

The Project also proposes a battery energy storage system (BESS) facility. This facility stores energy generated by the Project primarily during off-peak demand periods and releases that energy primarily during peak demand periods. The 400 MWh BESS includes batteries, cooling equipment, inverters, and transformers. It is proposed to be located on a fifteen-acre parcel just south of the Project substation.

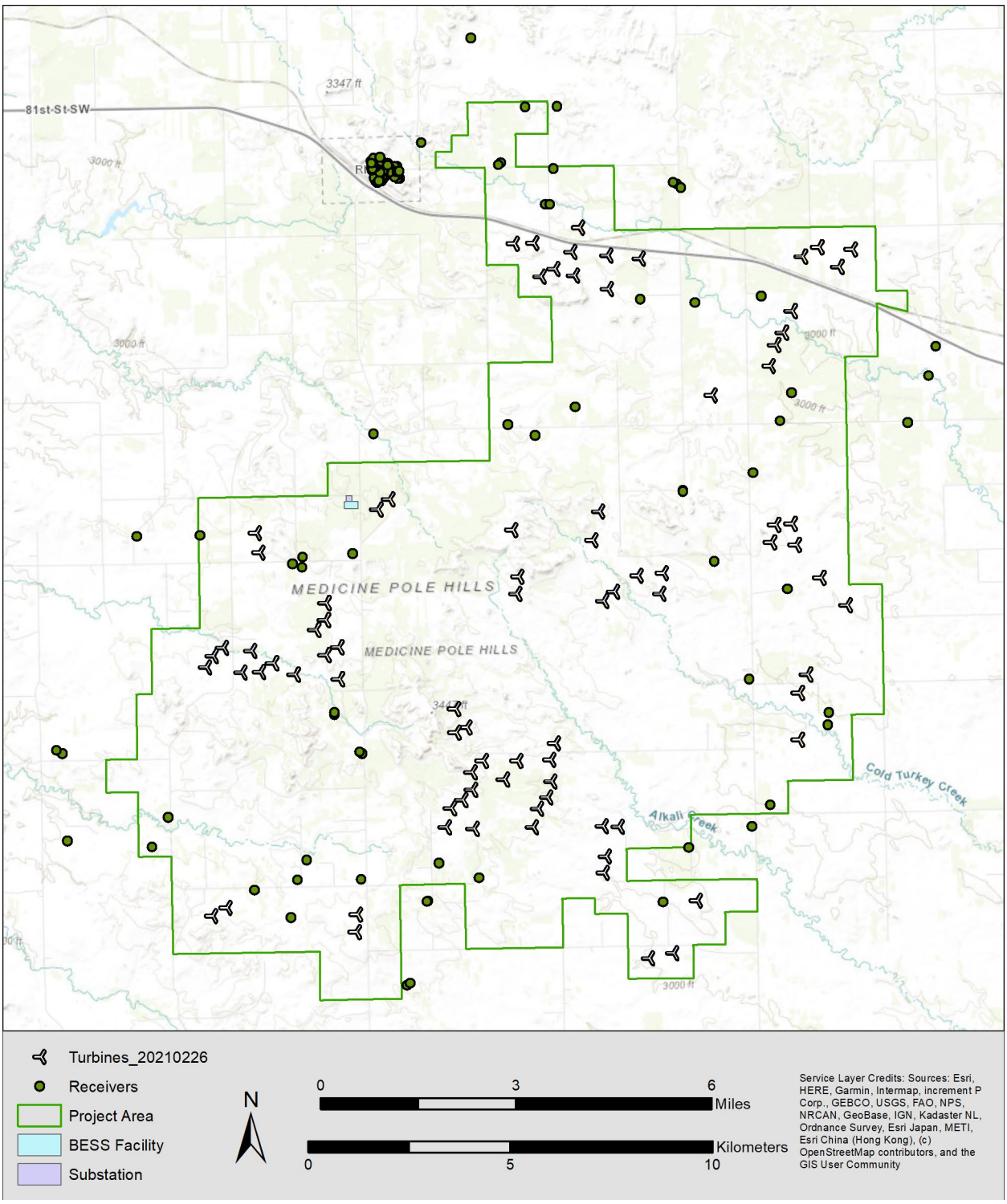

FIGURE 1: BOWMAN WIND FARM – PROJECT AREA MAP

4.0 NOISE STANDARDS & GUIDELINES

There are no Federal noise regulations applicable to the Project.

The State of North Dakota has adopted regulations through the North Dakota Public Service Commissions (PSC) for the noise emitted from wind energy facilities under PSC Chapter 69-06-08-01(4). The regulation states that noise produced by wind turbines shall not exceed 45 dBA within 100 feet of an inhabited residence or community building. The regulation allows for the criteria to be waived in writing by the owner of the occupied residence or the community building.

Bowman County has a wind energy facility ordinance in Section 6.11 of its Zoning Ordinance. The code states that “sound levels of wind turbines within 100 feet of any non-participating residence will not exceed 45 dBA L_{eq}. Construction noise or reasonable and necessary maintenance activities are allowed to exceed the sound limit except between the hours of 10 PM to 6 AM local time. This sound standard does not apply to participating dwellings.”

5.0 SOUND PROPAGATION MODELING

5.1 PROCEDURES

Modeling for the Project was performed in accordance with the standard ISO 9613-2, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." The ISO standard states,

> This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level … under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation … or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The model takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain. The acoustical modeling software used here was CadnaA® Version 2020 from Datakustik GmbH. CadnaA® is a widely accepted acoustical propagation modeling tool, used by many noise control professionals in the United States and internationally.

ISO 9613-2 also assumes downwind sound propagation between every source and every receiver. Consequently, all wind directions, including the prevailing wind directions, are taken into account. The Project area was modeled with a ground factor of G=0.5. Otherwise, no reflections (such as due to buildings) were considered. Shielding by structures and foliage attenuation were likewise not considered. Atmospheric absorption was based on 10˚C and 70% relative humidity and source contributions were considered up to 10,000 meters (6.2 miles) from each receiver. Turbines were modeled with the manufacturer specified apparent sound power. All turbine data used is the most recent available from the manufacturer. The model was laid over the USGS Digital Terrain Model to give accurate elevations throughout.

Sound levels were modeled within 100 feet in all directions from each of the 143 residences and seven community buildings located in the area. All receivers were modeled at a 4-meter (13 foot) height. Locations of these receivers are shown in Appendix D.

To account for sound power and propagation uncertainty, +2 dB was added to the modeling results.

Results calculated with these parameters represent the highest one-hour equivalent sound level ($L_{eq(1h)}$) that will be emitted by the Project. As such, the results are likely to overestimate typical sound levels from the Project.

5.2 SOUND SOURCES

Wind Turbines

The 85 wind turbine locations shown in Figure 1 were included in the sound propagation model. The wind turbine assumed was the GE 2.83-127 LNTE, although other models are currently being considered. If a different wind turbine is selected, revised sound modeling will be produced for that model. Details of the wind turbine modeled are found in Appendix C.

Project Transformer

The proposed 34.5 kV to 230 kV 222 MVA 1050 kV BIL collector substation transformer will be located in the western portion of the Project area (see Figure 1).

The sound emissions data used for modeling is from the NEMA TR 1 standard ("Transformers, Step Voltage Regulators, and Reactors, NEMA TR 1-2013"), with spectral information taken from a transformer test performed by RSG for a similarly sized transformer.

The transformer will have cooling fans. Cooling fan operation is usually a function of electric load and ambient air temperature. As a conservative assumption, we model the transformer with fans on. The fans-off cooling mode is specified by NEMA TR 1 as having sound pressure levels that are 3 dB lower.

Battery Energy Storage System

The proposed battery energy storage system (BESS) facility would be located in the western portion of the site, immediately south of the substation (see Figure 1).

The 400 MWh BESS facility would include 90 Powin battery containers, 90 inverters, and 90 4.2-MVA transformers. Each container would utilize two heating ventilation air conditioners (HVAC) for a total of 180 HVAC units.

The HVAC unit assumed was the Marvair 6-ton Vertical Mount Air Conditioner, with a specified sound pressure level of 60 dBA at 50 feet, equivalent to a sound power level of 94.7 dBA. Spectral information was taken from a HVAC unit test performed by RSG for a similarly sized Marvair unit.

Sound emissions data for similarly sized inverters and transformers was used. The BESS inverters were each assumed to generate a sound power level of 92 dBA and the transformers were each assumed to generate a sound power level of 84 dBA.

5.3 RESULTS

Maximum Hourly L_{eq}

Modeling results are shown in Table 1 and Figure 2. This analysis assumes a credible worst-case scenario with all primary and spare turbines and all substation and BESS equipment operating simultaneously under their loudest mode and without taking into account shielding or foliage attenuation.

As shown in Table 1 and Figure 2, all sensitive land uses are modeled to be below the 45 dBA L_{eq} criteria. Detailed information for each receiver is provided in Appendix D.

TABLE 1: MODEL RESULTS SUMMARY ($L_{eq\text{-}1h}$)

Land Use	Average	Maximum	Minimum	≥ 45 dBA
All (150)	30 dBA	44 dBA	20 dBA	0%
Participating Residence (19)	40 dBA	44 dBA	32 dBA	0%
Non-Participating Residence (124)	29 dBA	44 dBA	20 dBA	0%
Community Buildings (7)	27 dBA	41 dBA	24 dBA	0%

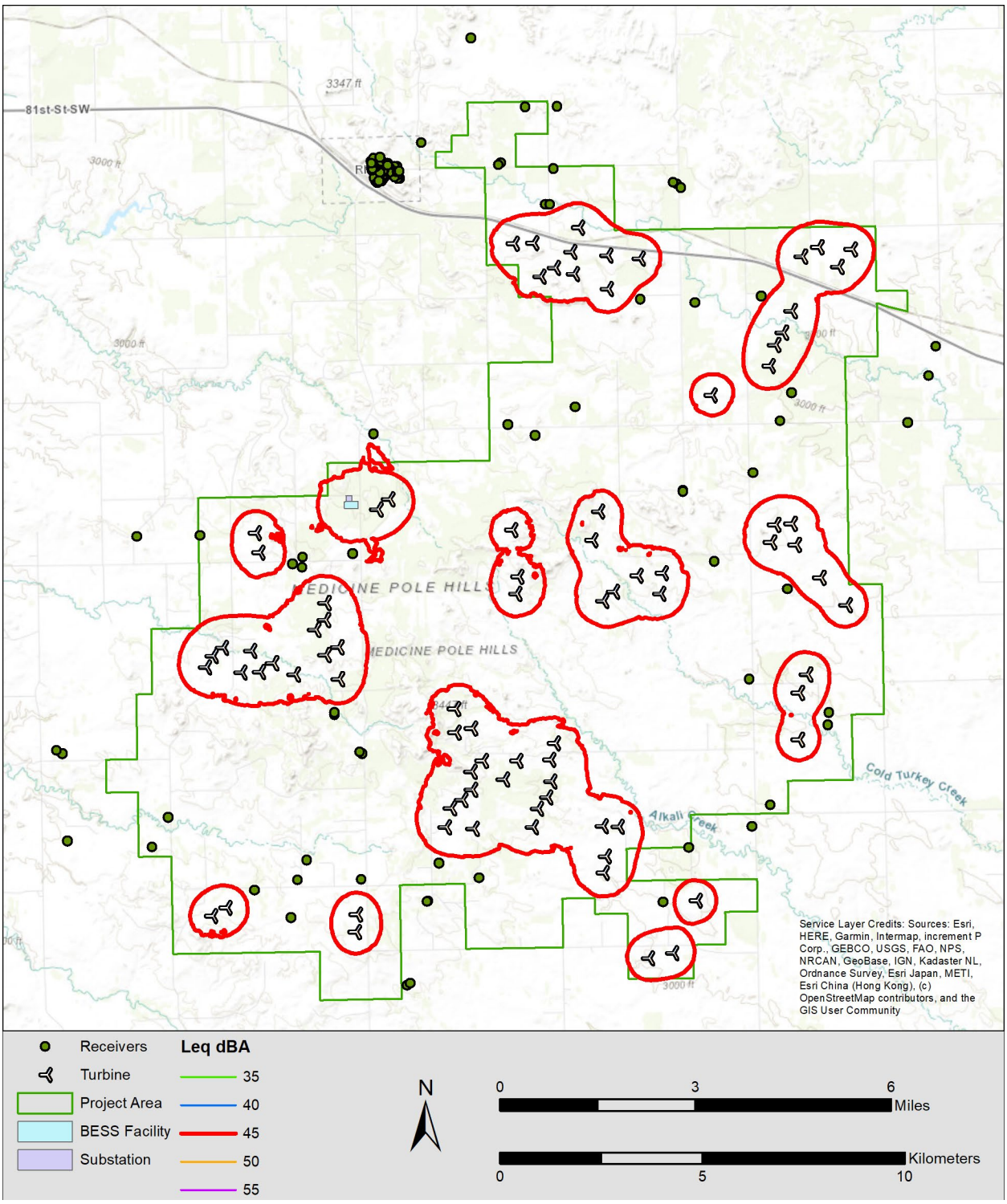

FIGURE 2: SOUND PROPAGATION MODELING RESULTS

Long-Term Project Sound Levels

The modeling results shown in Table 1, Figure 2, and Appendix D are calculated a worst-case short term (1-hour) equivalent average sound level with all Project components (primary and alternative) operating continuously and simultaneously under a single worst-case meteorological condition. However, in real-life a variety of meteorological conditions will occur, and each turbine will only operate at maximum sound power for a portion of the time. The actual sound level at a receiver will depend on variations in atmospheric stability, wind speed, wind direction, and other parameters that change hourly, as well as the operational utilization of each turbine. Differences between $L_{eq(1h)}$ and annual average sound levels due to changes in meteorology are on the order of 5 to 15 dBA, depending on the configuration of the receiver relative to the turbines.[1] Therefore, a receiver that is modeled to have a highest hour 44 dBA $L_{eq(1h)}$ exposure will have an annual average sound level of 29 to 39 dBA.

Tonality

Figure 3 shows the tonal prominence of the GE 2.83-127 LNTE turbine compared with the ANSI S12.9 Part 4 tonality criteria. This indicates that sound power spectrum of the wind turbine does not have a tonal prominence.

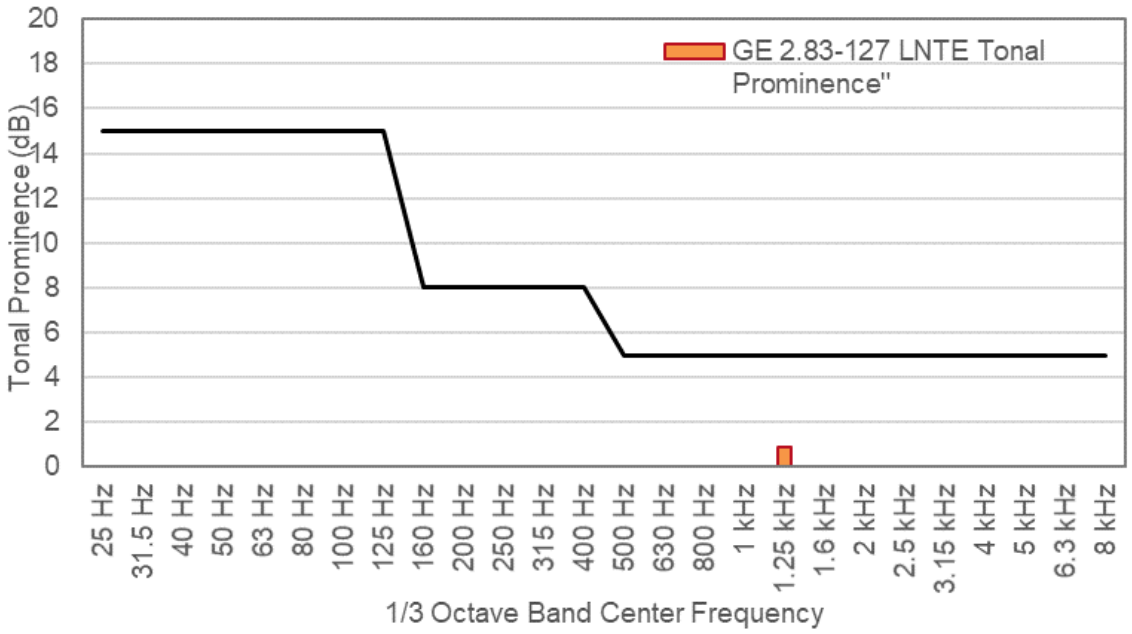

FIGURE 3: REPORTED 1/3 OCTAVE BAND TONAL PROMINENCE COMPARED TO ANSI S12.9 PART 4 TONALITY CRITERIA

Tones are generated by transformers but are often masked when cooling fans are operating. In addition, as one moves away from the substation, the sound is further masked by background sound (including the wind turbines). Under ANSI S12.9 Part 4, if tonal sounds are present, 5 dB

[1] Kaliski, et al, 2010, "Calculating annualized sound levels for a wind farm," Proceedings of Acoustical Society of America/NOISE-CON 2010, 159th Meeting, Baltimore, Maryland, April 2010.

is added to the tonal sound as a penalty. The maximum sound level from the Project substation and BESS facility transformers is 31 dBA L_{eq}. Assuming it is tonal sound and not masked, adding 5 dB would bring the transformer sound to 36 dBA L_{eq}. Thus, even with a tonal penalty, the substation and BESS facility sound would meet the Project noise criteria.

6.0 CONCLUSIONS

RSG performed sound propagation modeling of the proposed Project. The Project will be capable of generating approximately 200 MW. The modeled array consists of 85 (74 primary and 11 alternate) GE 2.83-127 LNTE wind turbines on an 89-meter tower, though other hub heights and turbine models are being considered. The Project also proposes a 222 MVA transformer at the collector substation to connect the turbine array to the electric grid and a BESS facility.

Sound propagation modeling was performed ISO 9613-2, implemented in the Cadna/A modeling package. The Project model used parameters have been shown to represent conservatively accurate $L_{eq(1h)}$ sound levels.

The results of the modeling show that Project generated sound levels would be 44 dBA $L_{eq(1h)}$ or less within 100 feet of all participating and non-participating residences and all community buildings. Modeled Project generated operational sound levels do not exceed 45 dBA L_{eq} within 100 feet of any residence or community building.

APPENDIX A. PRIMER ON SOUND

Expressing Sound in Decibel Levels

Normal human hearing is sensitive to sound fluctuations over an enormous range of pressures, from about 20 micropascals (the "threshold of audibility") to about 20 pascals (the "threshold of pain").[2] This factor of one million in sound pressure difference is challenging to convey in engineering units. Instead, sound pressure is converted to sound "levels" in units of "decibels" (dB, named after Alexander Graham Bell). Once a measured sound is converted to dB, it is denoted as a level with the letter "L" (such as "L_{eq}").

The conversion from sound pressure in pascals to sound level in dB is a four-step process. First, the sound wave's measured amplitude is squared and the mean is taken. Second, a ratio is taken between the mean square sound pressure and the square of the threshold of audibility (20 micropascals) at 1 kHz. Third, using the logarithm function, the ratio is converted to factors of 10. The final result is multiplied by 10 to give the decibel level. By this decibel scale, sound levels range from 0 dB at the threshold of audibility to 120 dB at the threshold of pain.

Typical sound sources, and their sound pressure levels, are listed on the scale in Figure 4. Typical ambient nighttime sound levels around wind turbine locations, in the absence of wind turbines, is shown in Figure 5.

Human Response to Sound Levels: Apparent Loudness

For every 20 dB increase in sound level, the sound pressure increases by a *factor* of 10; the sound *level* range from 0 dB to 120 dB covers 6 factors of 10, or one million, in sound *pressure*. However, for an increase of 10 dB in sound *level* as measured by a meter, humans perceive an approximate doubling of apparent loudness: to the human ear, a sound level of 70 dB sounds about "twice as loud" as a sound level of 60 dB. Smaller changes in sound level, less than 3 dB up or down, are generally not perceptible.

[2] The pascal is a measure of pressure in the metric system. In Imperial units, they are themselves very small: one pascal is only 145 millionths of a pound per square inch (psi). The sound pressure at the threshold of audibility is only 3 one-billionths of one psi: at the threshold of pain, it is about 3 one-thousandths of one psi.

FIGURE 4: A SCALE OF SOUND PRESSURE LEVELS FOR TYPICAL SOUND SOURCES

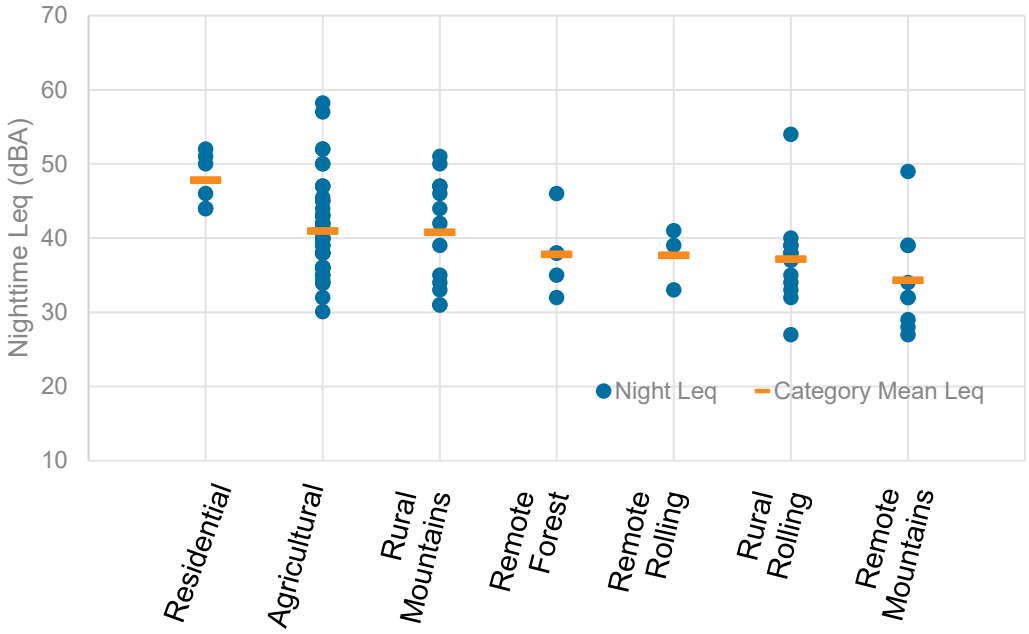

FIGURE 5: BACKGROUND NIGHTTIME L_{eq} AT 102 LOCATIONS AT POTENTIAL WIND TURBINE SITES ACROSS THE U.S. BY LAND USE CATEGORY[3]

Frequency Spectrum of Sound

The "frequency" of a sound is the rate at which it fluctuates in time, expressed in Hertz (Hz), or cycles per second. Very few sounds occur at only one frequency: most sound contains energy at many different frequencies, and it can be broken down into different frequency divisions, or bands. These bands are similar to musical pitches, from low tones to high tones. The most common division is the standard octave band. An octave is the range of frequencies whose upper frequency limit is twice its lower frequency limit, exactly like an octave in music. An octave band is identified by its center frequency: each successive band's center frequency is twice as high (one octave) as the previous band. For example, the 500 Hz octave band includes all sound whose frequencies range between 354 Hz (Hertz, or cycles per second) and 707 Hz. The next band is centered at 1,000 Hz with a range between 707 Hz and 1,414 Hz. The range of human hearing is divided into 10 standard octave bands: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1,000 Hz, 2,000 Hz, 4,000 Hz, 8,000 Hz, and 16,000 Hz. For analyses that require finer frequency detail, each octave-band can be subdivided. A commonly-used subdivision creates three smaller bands within each octave band, or so-called 1/3-octave bands.

Human Response to Frequency: Weighting of Sound Levels

The human ear is not equally sensitive to sounds of all frequencies. Sounds at some frequencies seem louder than others, despite having the same decibel level as measured by a sound level meter. In particular, human hearing is much more sensitive to medium pitches (from about 500 Hz to about 4,000 Hz) than to very low or very high pitches. For example, a tone measuring 80 dB at 500 Hz (a medium pitch) sounds quite a bit louder than a tone measuring

[3] From Kaliski, K., Bastasch, M., and O'Neal, R., "Regulating and Predicting Wind Turbine Sound in the U.S.," Proceedings of InterNoise2018, Institute of Noise Control Engineering, 2018

80 dB at 60 Hz (a very low pitch). The frequency response of normal human hearing ranges from 20 Hz to 20,000 Hz. Below 20 Hz, pitch perception is greatly reduced and sound may be “felt” as much as “heard”. Frequencies below 20 Hz are known as “infrasound”. Likewise, above 20,000 Hz, sound can no longer be heard by humans; this is known as “ultrasound”. As humans age, they tend to lose the ability to hear higher frequencies first; many adults do not hear very well above about 16,000 Hz. Most natural and man-made sound occurs in the range from about 40 Hz to about 4,000 Hz. Some insects and birdsongs reach to about 8,000 Hz.

To adjust measured sound pressure levels so that they mimic human hearing response, sound level meters apply filters, known as “frequency weightings”, to the signals. There are several defined weighting scales, including “A”, “B”, “C”, “D”, “G”, and “Z”. The most common weighting scale used in environmental noise analysis and regulation is A-weighting. This weighting represents the sensitivity of the human ear to sounds of low to moderate level. It attenuates sounds with frequencies below 1000 Hz and above 4000 Hz; it amplifies very slightly sounds between 1000 Hz and 4000 Hz, where the human ear is particularly sensitive. The C-weighting scale is sometimes used to describe louder sounds. The B- and D- scales are seldom used. All of these frequency weighting scales are normalized to the average human hearing response at 1000 Hz: at this frequency, the filters neither attenuate nor amplify. G-weighting is a standardized weighting used to evaluate infrasound.

When a reported sound level has been filtered using a frequency weighting, the letter is appended to “dB”. For example, sound with A-weighting is usually denoted “dBA” or “dB(A)”. When no filtering is applied, the level is denoted “dB” or “dBZ”. The letter is also appended as a subscript to the level indicator “L”, for example “L_A” for A-weighted levels.

Equivalent Continuous Sound Level - L_{eq}

One straightforward, common way of describing sound levels is in terms of the Continuous Equivalent Sound Level, or L_{eq}. The L_{eq} is the average sound pressure level over a defined period of time, such as one hour or one day. L_{eq} is the most commonly used descriptor in noise standards and regulations. L_{eq} is representative of the overall sound to which a person is exposed. Because of the logarithmic calculation of decibels, L_{eq} tends to favor higher sound levels: loud and infrequent sources have a larger impact on the resulting average sound level than quieter but more frequent sounds.

APPENDIX B. WIND TURBINE ACOUSTICS

Sources of Sound Generation by Wind Turbines

Wind turbines generate two principal types of noise: aerodynamic noise, produced from the flow of air around the blades, and mechanical noise, produced from mechanical and electrical components within the nacelle.

Aerodynamic noise is the primary source of noise associated with wind turbines. These acoustic emissions can be either tonal or broad band. Tonal noise occurs at discrete frequencies, whereas broadband noise is distributed with little peaking across the frequency spectrum.

While unusual, tonal noise can also originate from unstable air flows over holes, slits, or blunt trailing edges on blades. Most modern wind turbines have upwind rotors designed to prevent blade impulsive noise. Therefore, the majority of audible aerodynamic noise from wind turbines is broadband at the middle frequencies, roughly between 200 Hz and 1,000 Hz.

Wind turbines emit aerodynamic broadband noise as the spinning blades interact with atmospheric turbulence and as air flows along their surfaces. This produces a characteristic "whooshing" sound through several mechanisms (Figure 6):

- Inflow turbulence noise occurs when the rotor blades encounter atmospheric turbulence as they pass through the air. Uneven pressure on a rotor blade causes variations in the local angle of attack, which affects the lift and drag forces, causing aerodynamic loading fluctuations. This generates noise that varies across a wide range of frequencies but is most significant at frequencies below 500 Hz.
- Trailing edge noise is produced as boundary-layer turbulence as the air passes into the wake, or trailing edge, of the blade. This noise is distributed across a wide frequency range but is most notable at high frequencies between 700 Hz and 2 kHz.
- Tip vortex noise occurs when tip turbulence interacts with the surface of the blade tip. While this is audible near the turbine, it tends to be a small component of the overall noise further away.
- Stall or separation noise occurs due to the interaction of turbulence with the blade surface.

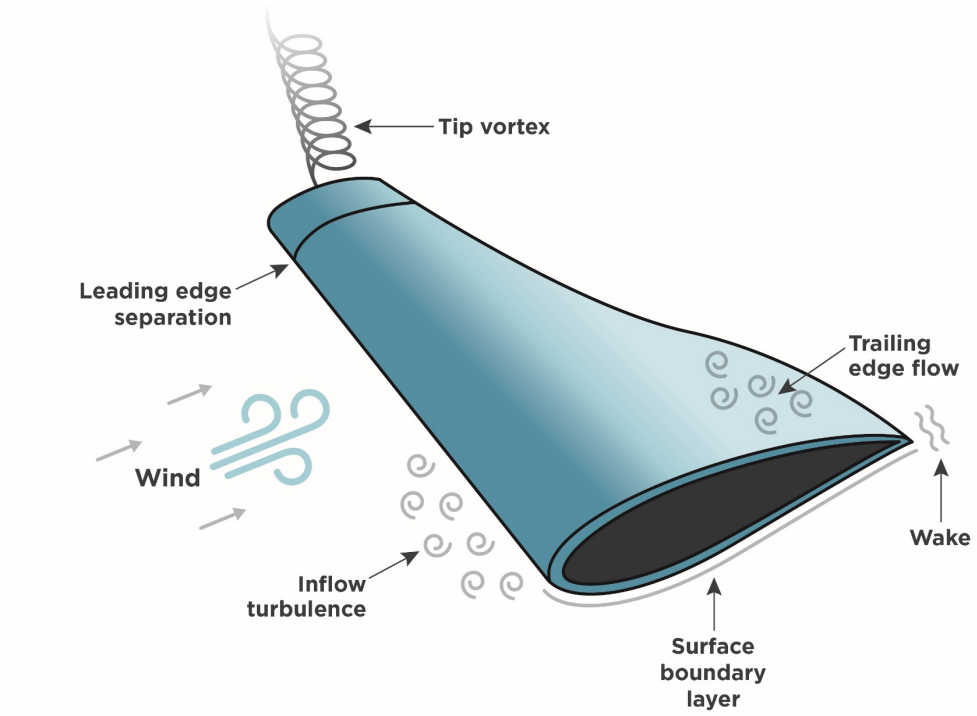

FIGURE 6: AIRFLOW AROUND A ROTOR BLADE

Mechanical sound from machinery inside the nacelle tends to be tonal in nature but can also have a broadband component. Potential sources of mechanical noise include the gearbox, generator, yaw drives, cooling fans, and auxiliary equipment. These components are housed within the nacelle, whose surfaces, if untreated, radiate the resulting noise. However modern wind turbines have nacelles that are designed to reduce internal noise, and rarely is the mechanical noise a significant portion of the total noise from a wind turbine.

Meteorology

Meteorological conditions can significantly affect sound propagation. The two most important conditions to consider are wind shear and temperature lapse. Wind shear is the difference in wind speeds by elevation and temperature lapse rate is the temperature gradient by elevation. In conditions with high wind shear (large wind speed gradient), sound levels upwind from the source tend to decrease and sound levels downwind tend to increase due to the refraction, or bending, of the sound (Figure 7).

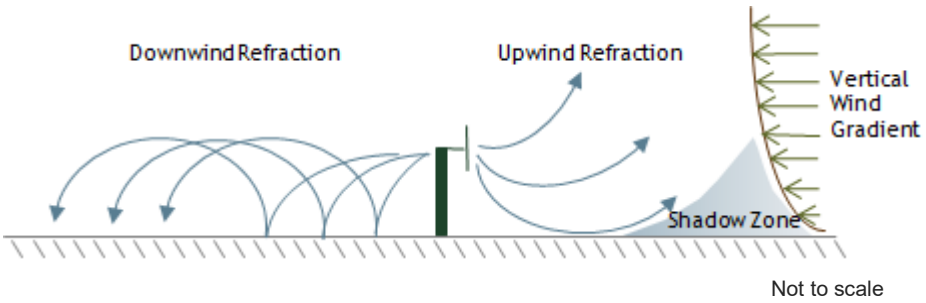

FIGURE 7: SCHEMATIC OF THE REFRACTION OF SOUND DUE TO VERTICAL WIND GRADIENT (WIND SHEAR)

With temperature lapse, when ground surface temperatures are higher than those aloft, sound will tend to refract upwards, leading to lower sound levels near the ground. The opposite is true when ground temperatures are lower than those aloft (an inversion condition).

High winds and high solar radiation can create turbulence which tends to break up and dissipate sound energy. Highly stable atmospheres, which tend to occur on clear nights with low ground-level wind speeds, tend to minimize atmospheric turbulence and are generally more favorable to downwind propagation.

In general terms, sound propagates along the ground best under stable conditions with a strong temperature inversion. This tends to occur during the night and is characterized by low ground-level winds. As a result, worst-case conditions for wind turbines tend to occur downwind under moderate nighttime temperature inversions. Therefore, this is the default condition for modeling wind turbine sound.

Masking

As mentioned above, sound levels from wind turbines are a function of wind speed. Background sound is also a function of wind speed, i.e., the stronger the winds, the louder the resulting background sound. This effect is amplified in areas covered by trees and other vegetation.

The sound from a wind turbine can often be masked by wind noise at downwind receivers because the frequency spectrum from wind is similar to the frequency spectrum from a wind turbine. Figure 8 compares the shape of the sound spectrum measured during a 5 m/s wind event to that of the GE 3.0-140 LNTE wind turbine. As shown, the shapes of the spectra are similar at lower frequencies. At higher frequencies, the sounds from the masking wind noise are higher than the wind turbine. As a result, the masking of turbine noise occurs at higher wind speeds for some meteorological conditions. Masking will occur most, when ground wind speeds are relatively high, creating wind-caused noise such as wind blowing through the trees and interaction of wind with structures.

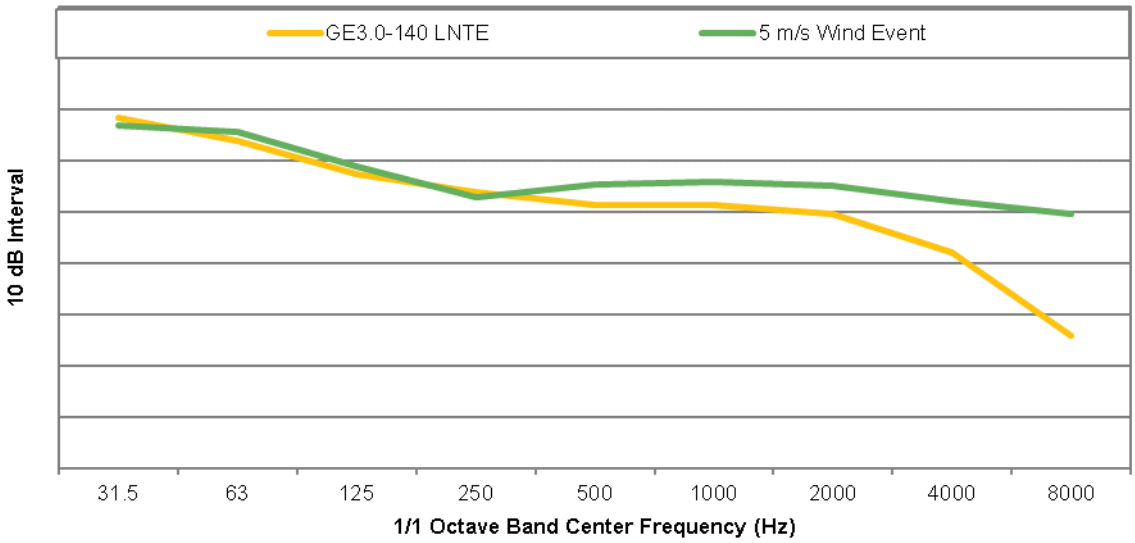

FIGURE 8: COMPARISON OF NORMALIZED FREQUENCY SPECTRA MEASURED FROM A 5 M/S WIND EVENT AND THE SOUND POWER SPECTRA FROM THE GE 3.0-140 LNTE[4]

It is important to note that while winds may be blowing at turbine height, there may be little to no wind at ground level. This is especially true during strong wind gradients (high wind shear), which mostly occur at night. This can also occur on the leeward side of ridges where the ridge blocks the wind.

[4] The purpose of this Figure is to show the shapes to two spectra relative to one another and not the actual sound level of the two sources of sound. The level of each source was normalized independently.

APPENDIX C. SOURCE INFORMATION

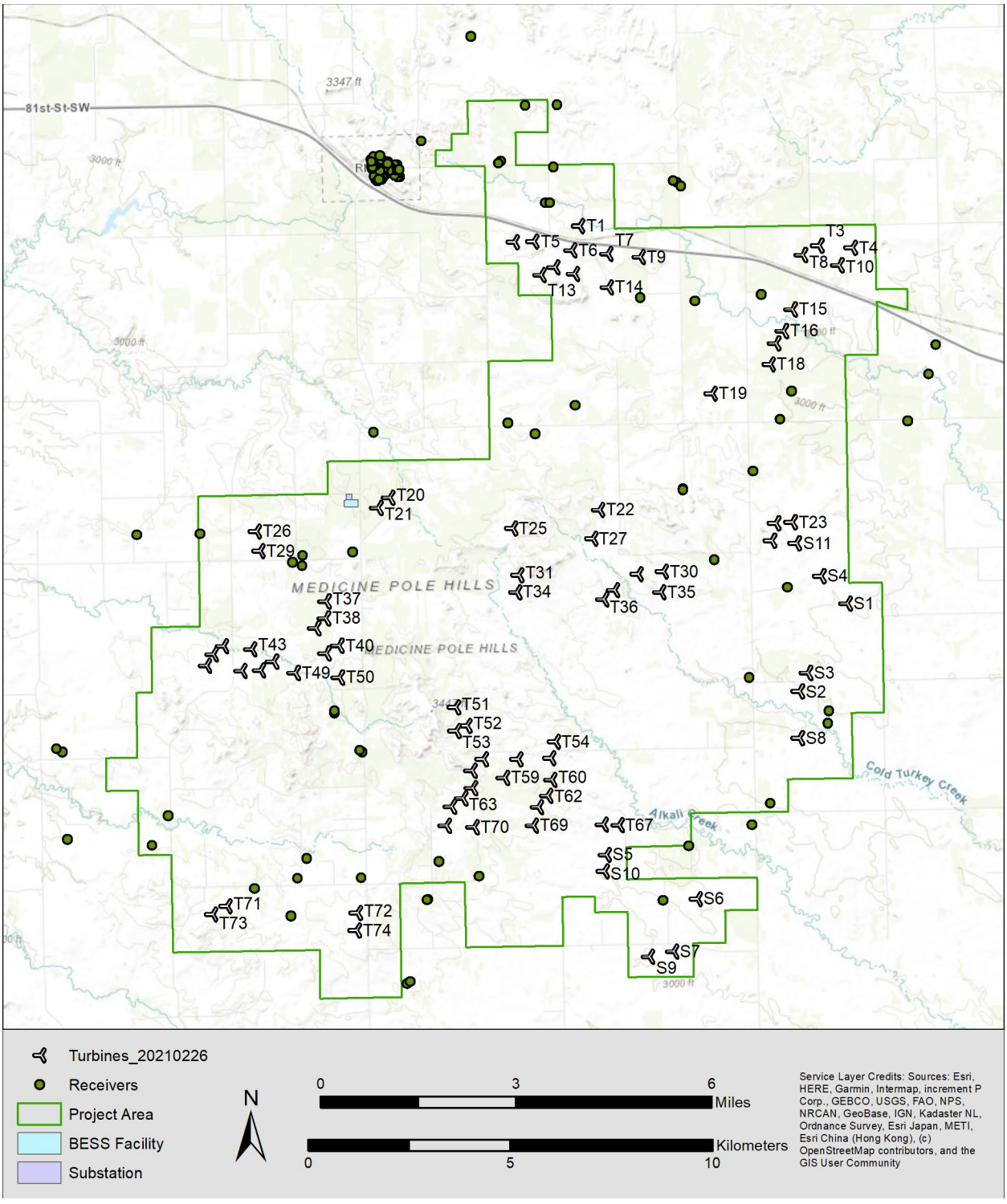

FIGURE 9: WIND TURBINE LOCATION MAP

TABLE 2: NOISE SOURCE INFORMATION TABLE

ID	Type	Sound Power Level (dBA)	Hub Height (m)	Coordinates (UTM NAD83 Z13N)		
				X (m)	Y (m)	Z (m)
T1	GE 2.82 - 127 LNTE-Enhanced	111	89	608840	5119564	1031
T2	GE 2.82 - 127 LNTE-Enhanced	111	89	607222	5119163	1061
T3	GE 2.82 - 127 LNTE-Enhanced	111	89	614751	5119077	1023
T4	GE 2.82 - 127 LNTE-Enhanced	111	89	615575	5119024	1021
T5	GE 2.82 - 127 LNTE-Enhanced	111	89	607711	5119179	1056
T6	GE 2.82 - 127 LNTE-Enhanced	111	89	608643	5118959	1043
T7	GE 2.82 - 127 LNTE-Enhanced	111	89	609536	5118875	1039
T8	GE 2.82 - 127 LNTE-Enhanced	111	89	614344	5118851	1020
T9	GE 2.82 - 127 LNTE-Enhanced	111	89	610331	5118793	1040
T10	GE 2.82 - 127 LNTE-Enhanced	111	89	615253	5118591	1026
T11	GE 2.82 - 127 LNTE-Enhanced	111	89	608227	5118542	1053
T12	GE 2.82 - 127 LNTE-Enhanced	111	89	608710	5118383	1052
T13	GE 2.82 - 127 LNTE-Enhanced	111	89	607880	5118354	1059
T14	GE 2.82 - 127 LNTE-Enhanced	111	89	609548	5118053	1035
T15	GE 2.82 - 127 LNTE-Enhanced	111	89	614094	5117507	1009
T16	GE 2.82 - 127 LNTE-Enhanced	111	89	613884	5116973	1007
T17	GE 2.82 - 127 LNTE-Enhanced	111	89	613688	5116670	1019
T18	GE 2.82 - 127 LNTE-Enhanced	111	89	613555	5116146	1019
T19	GE 2.82 - 127 LNTE-Enhanced	111	89	612115	5115426	1026
T20	GE 2.82 - 127 LNTE-Enhanced	111	89	604153	5112854	1068
T21	GE 2.82 - 127 LNTE-Enhanced	111	89	603861	5112601	1071
T22	GE 2.82 - 127 LNTE-Enhanced	111	89	609338	5112554	1069
T23	GE 2.82 - 127 LNTE-Enhanced	111	89	614099	5112243	1023
T24	GE 2.82 - 127 LNTE-Enhanced	111	89	613689	5112222	1031
T25	GE 2.82 - 127 LNTE-Enhanced	111	89	607180	5112089	1116
T26	GE 2.82 - 127 LNTE-Enhanced	111	89	600850	5112020	1046
T27	GE 2.82 - 127 LNTE-Enhanced	111	89	609163	5111833	1050
T28	GE 2.82 - 127 LNTE-Enhanced	111	89	613587	5111791	1040
T29	GE 2.82 - 127 LNTE-Enhanced	111	89	600938	5111532	1061
T30	GE 2.82 - 127 LNTE-Enhanced	111	89	610910	5111022	1047
T31	GE 2.82 - 127 LNTE-Enhanced	111	89	607343	5110935	1077
T32	GE 2.82 - 127 LNTE-Enhanced	111	89	610283	5110961	1049
T33	GE 2.82 - 127 LNTE-Enhanced	111	89	609697	5110564	1046
T34	GE 2.82 - 127 LNTE-Enhanced	111	89	607283	5110522	1062
T35	GE 2.82 - 127 LNTE-Enhanced	111	89	610844	5110516	1032
T36	GE 2.82 - 127 LNTE-Enhanced	111	89	609429	5110338	1029

ID	Type	Sound Power Level (dBA)	Hub Height (m)	Coordinates (UTM NAD83 Z13N)		
				X (m)	Y (m)	Z (m)
T37	GE 2.82 - 127 LNTE-Enhanced	111	89	602573	5110289	1058
T38	GE 2.82 - 127 LNTE-Enhanced	111	89	602562	5109873	1063
T39	GE 2.82 - 127 LNTE-Enhanced	111	89	602325	5109633	1055
T40	GE 2.82 - 127 LNTE-Enhanced	111	89	602893	5109198	1068
T41	GE 2.82 - 127 LNTE-Enhanced	111	89	600036	5109180	1037
T42	GE 2.82 - 127 LNTE-Enhanced	111	89	601274	5108808	1045
T43	GE 2.82 - 127 LNTE-Enhanced	111	89	600738	5109103	1040
T44	GE 2.82 - 127 LNTE-Enhanced	111	89	602573	5109005	1063
T45	GE 2.82 - 127 LNTE-Enhanced	111	89	599788	5108975	1037
T46	GE 2.82 - 127 LNTE-Enhanced	111	89	599617	5108695	1044
T47	GE 2.82 - 127 LNTE-Enhanced	111	89	600946	5108585	1046
T48	GE 2.82 - 127 LNTE-Enhanced	111	89	600497	5108577	1040
T49	GE 2.82 - 127 LNTE-Enhanced	111	89	601812	5108523	1048
T50	GE 2.82 - 127 LNTE-Enhanced	111	89	602905	5108412	1055
T51	GE 2.82 - 127 LNTE-Enhanced	111	89	605772	5107673	1069
T52	GE 2.82 - 127 LNTE-Enhanced	111	89	606053	5107219	1067
T53	GE 2.82 - 127 LNTE-Enhanced	111	89	605783	5107088	1089
T54	GE 2.82 - 127 LNTE-Enhanced	111	89	608234	5106816	1042
T55	GE 2.82 - 127 LNTE-Enhanced	111	89	608122	5106416	1036
T56	GE 2.82 - 127 LNTE-Enhanced	111	89	607310	5106385	1045
T57	GE 2.82 - 127 LNTE-Enhanced	111	89	606456	5106386	1064
T58	GE 2.82 - 127 LNTE-Enhanced	111	89	606179	5106110	1084
T59	GE 2.82 - 127 LNTE-Enhanced	111	89	606984	5105936	1047
T60	GE 2.82 - 127 LNTE-Enhanced	111	89	608148	5105887	1037
T61	GE 2.82 - 127 LNTE-Enhanced	111	89	606191	5105679	1074
T62	GE 2.82 - 127 LNTE-Enhanced	111	89	608046	5105484	1040
T63	GE 2.82 - 127 LNTE-Enhanced	111	89	605949	5105422	1058
T64	GE 2.82 - 127 LNTE-Enhanced	111	89	607819	5105203	1038
T65	GE 2.82 - 127 LNTE-Enhanced	111	89	605669	5105224	1051
T66	GE 2.82 - 127 LNTE-Enhanced	111	89	609415	5104782	1017
T67	GE 2.82 - 127 LNTE-Enhanced	111	89	609809	5104758	1023
T68	GE 2.82 - 127 LNTE-Enhanced	111	89	605545	5104754	1048
T69	GE 2.82 - 127 LNTE-Enhanced	111	89	607697	5104754	1043
T70	GE 2.82 - 127 LNTE-Enhanced	111	89	606238	5104714	1047
T71	GE 2.82 - 127 LNTE-Enhanced	111	89	600122	5102755	1052
T72	GE 2.82 - 127 LNTE-Enhanced	111	89	603350	5102590	1076
T73	GE 2.82 - 127 LNTE-Enhanced	111	89	599775	5102549	1067
T74	GE 2.82 - 127 LNTE-Enhanced	111	89	603331	5102160	1076
S1	GE 2.82 - 127 LNTE-Enhanced	111	89	615448	5110235	1003

ID	Type	Sound Power Level (dBA)	Hub Height (m)	Coordinates (UTM NAD83 Z13N)		
				X (m)	Y (m)	Z (m)
S2	GE 2.82 - 127 LNTE-Enhanced	111	89	614270	5108061	999
S3	GE 2.82 - 127 LNTE-Enhanced	111	89	614475	5108524	1013
S4	GE 2.82 - 127 LNTE-Enhanced	111	89	614801	5110917	1013
S5	GE 2.82 - 127 LNTE-Enhanced	111	89	609497	5104030	1019
S6	GE 2.82 - 127 LNTE-Enhanced	111	89	611745	5102937	1017
S7	GE 2.82 - 127 LNTE-Enhanced	111	89	611161	5101641	998
S8	GE 2.82 - 127 LNTE-Enhanced	111	89	614268	5106908	999
S9	GE 2.82 - 127 LNTE-Enhanced	111	89	610565	5101517	1004
S10	GE 2.82 - 127 LNTE-Enhanced	111	89	609445	5103616	1008
S11	GE 2.82 - 127 LNTE-Enhanced	111	89	614202	5111718	1032
Substation Trans	222 MVA Transformer ONAF2	112	2.5	603163	5112872	974
BESS Trans1	4.2 MVA Transformer ONAF2	84	2.5	603298	5112631	976
BESS Trans2	4.2 MVA Transformer ONAF3	84	2.5	603298	5112649	976
BESS Trans3	4.2 MVA Transformer ONAF4	84	2.5	603298	5112667	976
BESS Trans4	4.2 MVA Transformer ONAF5	84	2.5	603298	5112685	976
BESS Trans5	4.2 MVA Transformer ONAF6	84	2.5	603298	5112703	975
BESS Trans6	4.2 MVA Transformer ONAF7	84	2.5	603298	5112721	975
BESS Trans7	4.2 MVA Transformer ONAF8	84	2.5	603298	5112739	974
BESS Trans8	4.2 MVA Transformer ONAF9	84	2.5	603298	5112757	974
BESS Trans9	4.2 MVA Transformer ONAF10	84	2.5	603298	5112775	974
BESS Trans10	4.2 MVA Transformer ONAF11	84	2.5	603308	5112631	976
BESS Trans11	4.2 MVA Transformer ONAF12	84	2.5	603308	5112649	976
BESS Trans12	4.2 MVA Transformer ONAF13	84	2.5	603308	5112667	976
BESS Trans13	4.2 MVA Transformer ONAF14	84	2.5	603308	5112685	975
BESS Trans14	4.2 MVA Transformer ONAF15	84	2.5	603308	5112703	975
BESS Trans15	4.2 MVA Transformer ONAF16	84	2.5	603308	5112721	975
BESS Trans16	4.2 MVA Transformer ONAF17	84	2.5	603308	5112739	974
BESS Trans17	4.2 MVA Transformer ONAF18	84	2.5	603308	5112757	973
BESS Trans18	4.2 MVA Transformer ONAF19	84	2.5	603308	5112775	973
BESS Trans19	4.2 MVA Transformer ONAF20	84	2.5	603318	5112631	976
BESS Trans20	4.2 MVA Transformer ONAF21	84	2.5	603318	5112649	976
BESS Trans21	4.2 MVA Transformer ONAF22	84	2.5	603318	5112667	976
BESS Trans22	4.2 MVA Transformer ONAF23	84	2.5	603318	5112685	975
BESS Trans23	4.2 MVA Transformer ONAF24	84	2.5	603318	5112703	975
BESS Trans24	4.2 MVA Transformer ONAF25	84	2.5	603318	5112721	974
BESS Trans25	4.2 MVA Transformer ONAF26	84	2.5	603318	5112739	974
BESS Trans26	4.2 MVA Transformer ONAF27	84	2.5	603318	5112757	973
BESS Trans27	4.2 MVA Transformer ONAF28	84	2.5	603318	5112775	973
BESS Trans28	4.2 MVA Transformer ONAF29	84	2.5	603328	5112631	976

ID	Type	Sound Power Level (dBA)	Hub Height (m)	Coordinates (UTM NAD83 Z13N)		
				X (m)	Y (m)	Z (m)
BESS Trans29	4.2 MVA Transformer ONAF30	84	2.5	603328	5112649	976
BESS Trans30	4.2 MVA Transformer ONAF31	84	2.5	603328	5112667	975
BESS Trans31	4.2 MVA Transformer ONAF32	84	2.5	603328	5112685	975
BESS Trans32	4.2 MVA Transformer ONAF33	84	2.5	603328	5112703	975
BESS Trans33	4.2 MVA Transformer ONAF34	84	2.5	603328	5112721	974
BESS Trans34	4.2 MVA Transformer ONAF35	84	2.5	603328	5112739	974
BESS Trans35	4.2 MVA Transformer ONAF36	84	2.5	603328	5112757	973
BESS Trans36	4.2 MVA Transformer ONAF37	84	2.5	603328	5112775	973
BESS Trans37	4.2 MVA Transformer ONAF38	84	2.5	603338	5112631	975
BESS Trans38	4.2 MVA Transformer ONAF39	84	2.5	603338	5112649	975
BESS Trans39	4.2 MVA Transformer ONAF40	84	2.5	603338	5112667	975
BESS Trans40	4.2 MVA Transformer ONAF41	84	2.5	603338	5112685	975
BESS Trans41	4.2 MVA Transformer ONAF42	84	2.5	603338	5112703	974
BESS Inverter42	SMA Inverter	92	2.5	603338	5112721	974
BESS Inverter43	SMA Inverter	92	2.5	603338	5112739	973
BESS Inverter44	SMA Inverter	92	2.5	603338	5112757	973
BESS Inverter45	SMA Inverter	92	2.5	603338	5112775	973
BESS Inverter46	SMA Inverter	92	2.5	603348	5112631	975
BESS Inverter47	SMA Inverter	92	2.5	603348	5112649	975
BESS Inverter48	SMA Inverter	92	2.5	603348	5112667	975
BESS Inverter49	SMA Inverter	92	2.5	603348	5112685	975
BESS Inverter50	SMA Inverter	92	2.5	603348	5112703	974
BESS Inverter51	SMA Inverter	92	2.5	603348	5112721	974
BESS Inverter52	SMA Inverter	92	2.5	603348	5112739	973
BESS Inverter53	SMA Inverter	92	2.5	603348	5112757	973
BESS Inverter54	SMA Inverter	92	2.5	603348	5112775	973
BESS Inverter55	SMA Inverter	92	2.5	603358	5112631	975
BESS Inverter56	SMA Inverter	92	2.5	603358	5112649	975
BESS Inverter57	SMA Inverter	92	2.5	603358	5112667	975
BESS Inverter58	SMA Inverter	92	2.5	603358	5112685	974
BESS Inverter59	SMA Inverter	92	2.5	603358	5112703	974
BESS Inverter60	SMA Inverter	92	2.5	603358	5112721	973
BESS Inverter61	SMA Inverter	92	2.5	603358	5112739	973
BESS Inverter62	SMA Inverter	92	2.5	603358	5112757	972
BESS Inverter63	SMA Inverter	92	2.5	603358	5112775	972
BESS Inverter64	SMA Inverter	92	2.5	603368	5112631	974
BESS Inverter65	SMA Inverter	92	2.5	603368	5112649	974
BESS Inverter66	SMA Inverter	92	2.5	603368	5112667	974
BESS Inverter67	SMA Inverter	92	2.5	603368	5112685	974

ID	Type	Sound Power Level (dBA)	Hub Height (m)	Coordinates (UTM NAD83 Z13N)		
				X (m)	Y (m)	Z (m)
BESS Inverter68	SMA Inverter	92	2.5	603368	5112703	974
BESS Inverter69	SMA Inverter	92	2.5	603368	5112721	973
BESS Inverter70	SMA Inverter	92	2.5	603368	5112739	973
BESS Inverter71	SMA Inverter	92	2.5	603368	5112757	972
BESS Inverter72	SMA Inverter	92	2.5	603368	5112775	972
BESS Inverter73	SMA Inverter	92	2.5	603378	5112631	974
BESS Inverter74	SMA Inverter	92	2.5	603378	5112649	974
BESS Inverter75	SMA Inverter	92	2.5	603378	5112667	974
BESS Inverter76	SMA Inverter	92	2.5	603378	5112685	974
BESS Inverter77	SMA Inverter	92	2.5	603378	5112703	973
BESS Inverter78	SMA Inverter	92	2.5	603378	5112721	973
BESS Inverter79	SMA Inverter	92	2.5	603378	5112739	973
BESS Inverter80	SMA Inverter	92	2.5	603378	5112757	972
BESS Inverter81	SMA Inverter	92	2.5	603378	5112775	972
BESS Inverter82	SMA Inverter	92	2.5	603388	5112631	974
BESS Inverter83	SMA Inverter	92	2.5	603388	5112649	974
BESS Inverter84	SMA Inverter	92	2.5	603388	5112667	973
BESS Inverter85	SMA Inverter	92	2.5	603388	5112685	973
BESS Inverter86	SMA Inverter	92	2.5	603388	5112703	973
BESS Inverter87	SMA Inverter	92	2.5	603388	5112721	973
BESS Inverter88	SMA Inverter	92	2.5	603388	5112739	972
BESS Inverter89	SMA Inverter	92	2.5	603388	5112757	972
BESS Inverter90	SMA Inverter	92	2.5	603388	5112775	972

APPENDIX D. RECEIVER LEVEL RESULTS

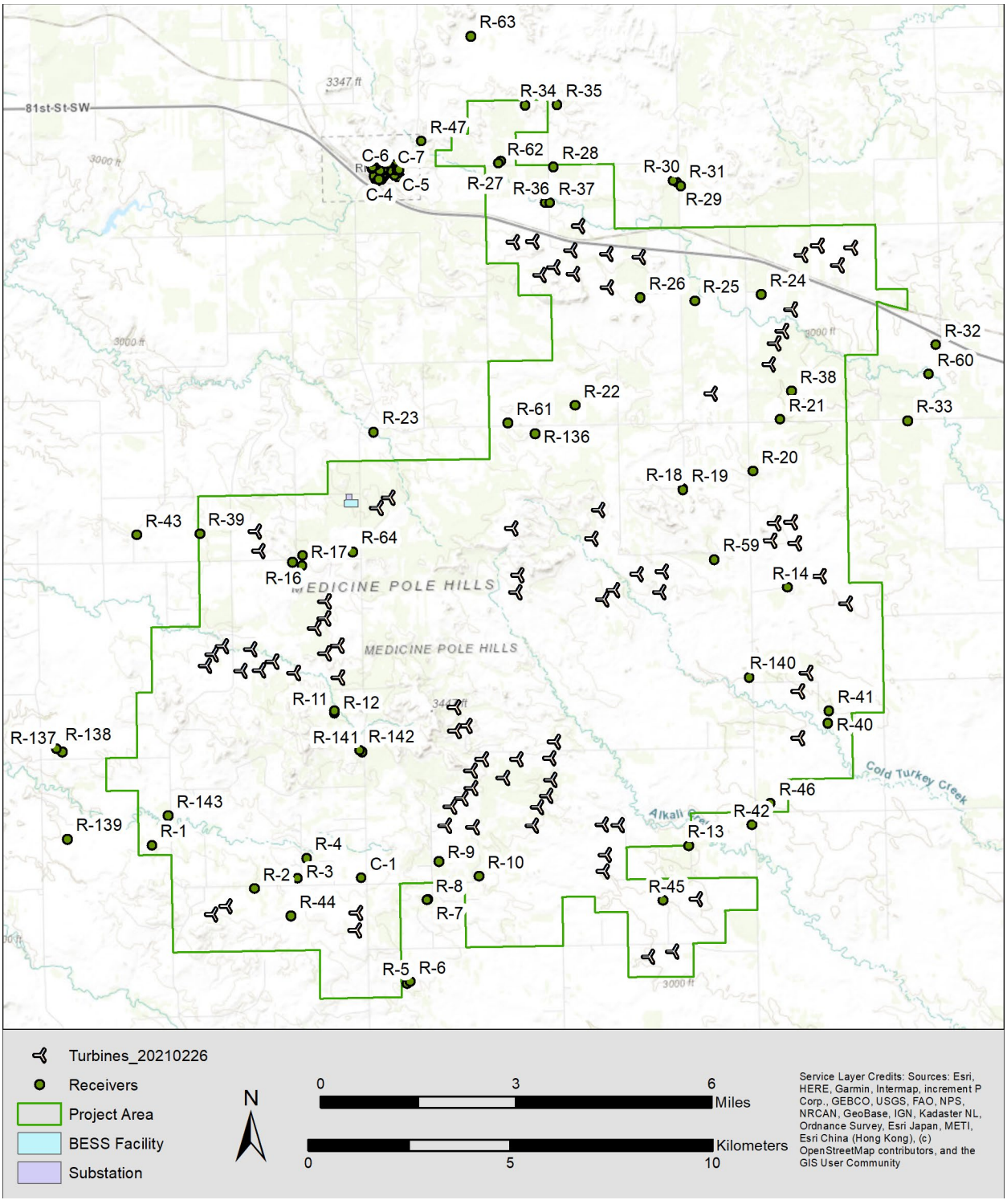

FIGURE 10: RECEIVER MAP

TABLE 3: RECEPTOR SOUND LEVEL RESULTS AND COORDINATES

Receptor	Land Use	Overall Sound Level (dBA)	Coordinates (UTM Zone 13N, NAD 83)		
			X (m)	Y (m)	Z (m)
R-1	Residential Non Participating	32	598290	5104261	941
R-2	Residential Participant	41	600826	5103183	956
R-3	Residential Participant	37	601890	5103448	959
R-4	Residential Participant	36	602113	5103942	953
R-5	Residential Non Participating	34	604593	5100844	960
R-6	Residential Non Participating	35	604671	5100890	959
R-7	Residential Non Participating	39	605115	5102927	974
R-8	Residential Non Participating	38	605095	5102912	974
R-9	Residential Participant	43	605382	5103866	969
R-10	Residential Participant	41	606371	5103492	952
R-11	Residential Participant	42	602810	5107530	977
R-12	Residential Participant	43	602807	5107585	976
R-13	Residential Non Participating	39	611554	5104249	921
R-14	Residential Participant	44	613992	5110632	929
R-15	Residential Non Participating	44	601761	5111255	975
R-16	Residential Non Participating	43	602011	5111415	974
R-17	Residential Participant	43	602001	5111159	969
R-18	Residential Non Participating	34	611420	5113066	960
R-19	Residential Non Participating	34	611415	5113039	961
R-20	Residential Non Participating	39	613145	5113499	949
R-21	Residential Non Participating	39	613815	5114783	920
R-22	Residential Non Participating	36	608753	5115123	962
R-23	Residential Non Participating	38	603772	5114469	962
R-24	Residential Non Participating	44	613349	5117872	930
R-25	Residential Non Participating	39	611703	5117712	935
R-26	Residential Participant	43	610366	5117791	944
R-27	Residential Participant	36	606912	5121157	964
R-28	Residential Non Participating	38	608220	5121018	955
R-29	Residential Non Participating	36	611264	5120638	944
R-30	Residential Non Participating	35	611177	5120682	945
R-31	Residential Non Participating	36	611358	5120554	944
R-32	Residential Non Participating	33	617660	5116624	914
R-33	Residential Non Participating	33	616971	5114750	909
R-34	Residential Participant	32	607517	5122547	981
R-35	Residential Non Participating	32	608309	5122556	981
R-36	Residential Non Participating	43	608011	5120136	953
R-37	Residential Participant	44	608128	5120127	952
R-38	Residential Non Participating	42	614096	5115483	928
R-39	Residential Non Participating	39	599477	5111956	947
R-40	Residential Participant	43	614996	5107279	914

Receptor	Land Use	Overall Sound Level (dBA)	Coordinates (UTM Zone 13N, NAD 83)		
			X (m)	Y (m)	Z (m)
R-41	Residential Participant	43	615024	5107579	916
R-42	Residential Non Participating	35	613120	5104763	915
R-43	Residential Non Participating	34	597921	5111924	945
R-44	Residential Non Participating	37	601725	5102516	964
R-45	Residential Participant	43	610922	5102894	914
R-46	Residential Non Participating	36	613577	5105297	920
R-47	Residential Non Participating	30	604953	5121651	987
R-48	Residential Non Participating	25	604367	5120914	984
R-49	Residential Non Participating	25	604349	5121071	983
R-50	Residential Non Participating	24	604213	5121073	983
R-51	Residential Non Participating	25	604364	5120814	987
R-52	Residential Non Participating	25	604381	5120816	987
R-53	Residential Non Participating	25	604397	5120815	987
R-54	Residential Non Participating	25	604420	5120774	990
R-55	Residential Non Participating	25	604361	5120776	988
R-56	Residential Non Participating	25	604001	5120773	980
R-57	Residential Non Participating	25	603960	5120722	979
R-58	Residential Non Participating	24	604134	5120870	981
R-59	Residential Non Participating	41	612193	5111321	944
R-60	Residential Non Participating	31	617489	5115898	908
R-61	Residential Non Participating	35	607087	5114694	977
R-62	Residential Participant	36	606856	5121105	961
R-63	Residential Non Participating	20	606176	5124251	949
R-64	Residential Participant	43	603249	5111512	995
R-65	Residential Non Participating	24	604294	5121067	982
R-66	Residential Non Participating	24	604181	5121033	982
R-67	Residential Non Participating	24	604130	5121044	983
R-68	Residential Non Participating	25	604063	5121124	986
R-69	Residential Non Participating	24	604085	5121076	984
R-70	Residential Non Participating	24	604134	5120870	981
R-71	Residential Non Participating	25	604363	5120859	987
R-72	Residential Non Participating	25	604296	5120816	986
R-73	Residential Non Participating	25	604356	5120934	984
R-74	Residential Non Participating	25	604400	5120958	983
R-75	Residential Non Participating	25	604023	5121081	985
R-76	Residential Non Participating	25	604000	5121062	984
R-77	Residential Non Participating	25	603977	5121074	985
R-78	Residential Non Participating	25	603985	5121117	986
R-79	Residential Non Participating	29	603852	5121246	997
R-80	Residential Non Participating	25	603893	5121202	992
R-81	Residential Non Participating	25	603857	5121057	984

Receptor	Land Use	Overall Sound Level (dBA)	Coordinates (UTM Zone 13N, NAD 83)		
			X (m)	Y (m)	Z (m)
R-82	Residential Non Participating	25	603891	5121094	986
R-83	Residential Non Participating	25	603938	5121037	983
R-84	Residential Non Participating	25	603999	5121036	983
R-85	Residential Non Participating	25	603923	5121129	988
R-86	Residential Non Participating	24	603926	5121162	989
R-87	Residential Non Participating	25	603828	5121192	990
R-88	Residential Non Participating	25	603880	5120787	973
R-89	Residential Non Participating	25	603960	5120800	977
R-90	Residential Non Participating	25	603923	5120769	974
R-91	Residential Non Participating	25	603954	5120712	978
R-92	Residential Non Participating	25	603980	5120748	980
R-93	Residential Non Participating	24	604023	5120801	981
R-94	Residential Non Participating	25	603982	5120828	978
R-95	Residential Non Participating	25	603901	5120811	974
R-96	Residential Non Participating	25	603834	5120824	974
R-97	Residential Non Participating	25	603824	5120713	973
R-98	Residential Non Participating	25	603807	5120783	974
R-99	Residential Non Participating	25	603853	5120738	973
R-100	Residential Non Participating	25	603834	5120759	973
R-101	Residential Non Participating	25	603863	5120860	976
R-102	Residential Non Participating	25	603876	5120870	977
R-103	Residential Non Participating	25	603865	5120963	980
R-104	Residential Non Participating	25	603886	5120919	979
R-105	Residential Non Participating	25	603970	5120920	979
R-106	Residential Non Participating	25	604022	5120990	981
R-107	Residential Non Participating	25	603996	5120964	980
R-108	Residential Non Participating	25	603880	5120970	980
R-109	Residential Non Participating	25	603915	5120745	974
R-110	Residential Non Participating	25	603882	5120705	973
R-111	Residential Non Participating	25	603872	5120733	973
R-112	Residential Non Participating	25	603787	5120787	975
R-113	Residential Non Participating	25	603916	5120958	980
R-114	Residential Non Participating	25	603916	5120924	979
R-115	Residential Non Participating	25	603718	5121051	985
R-116	Residential Non Participating	25	603729	5121065	985
R-117	Residential Non Participating	25	603764	5121112	987
R-118	Residential Non Participating	25	603810	5121098	987
R-119	Residential Non Participating	25	603826	5121076	985
R-120	Residential Non Participating	25	603776	5121056	985
R-121	Residential Non Participating	25	603747	5121085	986
R-122	Residential Non Participating	25	603729	5120979	983

Receptor	Land Use	Overall Sound Level (dBA)	Coordinates (UTM Zone 13N, NAD 83)		
			X (m)	Y (m)	Z (m)
R-123	Residential Non Participating	25	603743	5121020	983
R-124	Residential Non Participating	28	603707	5121202	995
R-125	Residential Non Participating	24	603811	5121164	988
R-126	Residential Non Participating	29	603770	5121271	1000
R-127	Residential Non Participating	25	603722	5121151	989
R-128	Residential Non Participating	26	603963	5121214	992
R-129	Residential Non Participating	24	603947	5121164	989
R-130	Residential Non Participating	24	603966	5121186	990
R-131	Residential Non Participating	30	603926	5121303	1004
R-132	Residential Non Participating	24	604108	5121142	986
R-133	Residential Non Participating	24	604110	5121100	985
R-134	Residential Non Participating	25	603853	5120666	973
R-135	Residential Non Participating	25	603894	5120716	974
R-136	Residential Non Participating	35	607753	5114434	972
R-137	Residential Non Participating	29	596075	5106566	937
R-138	Residential Non Participating	29	595936	5106648	944
R-139	Residential Non Participating	29	596205	5104411	925
R-140	Residential Non Participating	40	613058	5108413	918
R-141	Residential Non Participating	36	603495	5106574	989
R-142	Residential Non Participating	36	603424	5106602	990
R-143	Residential Participant	32	598695	5104987	932
C-1	Church	41	603470	5103451	974
C-2	School	25	604273	5120933	983
C-3	School	25	604275	5120888	984
C-4	School	25	604206	5120889	982
C-5	School	25	604269	5120952	983
C-6	School	25	604306	5120948	984
C-7	School	24	604161	5120915	981

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Appendix H
Soil Types for the Bowman Wind Project

Bowman Wind, LLC
March 2021

Map Unit Name	Soil Name	Study Area		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
		Acres	%	Acres	%					
Ae	Alluvial land, strongly saline, 0 to 2 percent slopes	13.5	0.0%	5.5	0.0%	Not prime farmland	Yes	.17	6	0-5
Af	Alluvial land, wet, 0 to 2 percent slopes	6.5	0.0%	--	--	Not prime farmland	Yes	.17	6	0-5
AmB	Amor-Shambo loams, 3 to 6 percent slopes	149.8	0.1%	92.8	0.2%	Farmland of statewide importance	No	.28	6	0-5
ArA	Arnegard loam, 0 to 2 percent slopes	37.0	0.0%	6.3	0.0%	All areas are prime farmland	No	.24	6	0-5
ArB	Arnegard loam, 2 to 6 percent slopes	144.0	0.1%	60.0	0.1%	All areas are prime farmland	No	.24	6	0-5
Ba	Badland, 6 to 70 percent slopes	226.4	0.2%	3.9	0.0%	Not prime farmland	No	.37	4L	>30
BeA	Belfield silt loam, 0 to 2 percent slopes	254.1	0.2%	87.1	0.2%	Farmland of statewide importance	No	.37	6	0-5
BeB	Belfield silt loam, 2 to 6 percent slopes	299.5	0.3%	98.3	0.2%	Farmland of statewide importance	No	.37	6	0-5
BfA	Belfield silty clay loam, 0 to 2 percent slopes	44.1	0.0%	37.0	0.1%	Farmland of statewide importance	No	.32	6	0-5
BfB	Belfield silty clay loam, 2 to 6 percent slopes	82.5	0.1%	36.7	0.1%	Farmland of statewide importance	No	.32	6	0-5
Bk	Blown-out land-Ladner-Ekalaka complex, 0 to 15 percent slopes	204.0	0.2%	--	--	Not prime farmland	No	.02	1	0-5
BoC	Boxwell loam, 6 to 9 percent slopes	47.5	0.0%	13.0	0.0%	Farmland of statewide importance	No	.28	6	>5-8
BrD	Boxwell-Cabbart loams, 6 to 15 percent slopes	114.7	0.1%	38.1	0.1%	Not prime farmland	No	.28	6	>5-8
BtB	Boxwell-Kremlin loams, 0 to 6 percent slopes	59.4	0.1%	31.9	0.1%	Farmland of statewide importance	No	.28	6	0-5
BuD	Brandenburg-Cabba complex, 6 to 70 percent slopes	95.2	0.1%	57.9	0.1%	Not prime farmland	No	.15	6	>30
CbC	Cabba-Amor loams, 6 to 9 percent slopes	3.6	0.0%	3.6	0.0%	Not prime farmland	No	.28	4L	>5-8
CbD	Cabba-Amor loams, 9 to 15 percent slopes	4.4	0.0%	1.5	0.0%	Not prime farmland	No	.28	4L	>8-15
Ce	Cabba and Wayden stony soils, 3 to 35 percent slopes	958.9	0.9%	299.4	0.7%	Not prime farmland	No	.05	8	>15-30
CgC	Cabbart-Boxwell loams, 3 to 9 percent slopes	131.1	0.1%	44.1	0.1%	Not prime farmland	No	.28	4L	>5-8
CgD	Cabbart-Boxwell loams, 6 to 15 percent slopes	276.1	0.3%	97.5	0.2%	Not prime farmland	No	.28	4L	>8-15
ChE	Cabbart complex, 6 to 35 percent slopes	595.2	0.6%	159.8	0.4%	Not prime farmland	No	.37	4L	>15-30
Ck	Cabbart-Yawdim-Shale outcrop complex, 3 to 70 percent slopes	718.7	0.7%	34.1	0.1%	Not prime farmland	No	.37	4L	>30
CmB	Chama and Morton silty clay loams, 3 to 6 percent slopes	8.3	0.0%	7.9	0.0%	Farmland of statewide importance	No	.32	4L	0-5
CoA	Chanta loam, 0 to 2 percent slopes	11.4	0.0%	0.6	0.0%	Farmland of statewide importance	No	.28	6	0-5
CoB	Chanta loam, 2 to 6 percent slopes	29.4	0.0%	--	--	Farmland of statewide importance	No	.28	6	0-5
CrB	Cherry clay loam, 2 to 6 percent slopes	6.4	0.0%	--	--	Farmland of statewide importance	No	.37	4L	0-5
DaB	Daglum fine sandy loam, 0 to 6 percent slopes	25.7	0.0%	--	--	Not prime farmland	No	.24	3	0-5
E0315B	Watrous loam, 0 to 6 percent slopes	198.9	0.2%	85.3	0.2%	Farmland of statewide importance	No	.24	6	0-5
E0403A	Belfield-Daglum-Farland silt loams, 0 to 2 percent slopes	1,448.1	1.4%	681.2	1.6%	Not prime farmland	No	.37	6	0-5
E0403B	Belfield-Daglum-Farland silt loams, 2 to 6 percent slopes	1,207.2	1.2%	481.4	1.1%	Not prime farmland	No	.37	6	0-5
E0415A	Belfield-Daglum complex, 0 to 2 percent slopes	1,864.0	1.8%	761.9	1.8%	Not prime farmland	No	.37	6	0-5
E0431B	Daglum fine sandy loam, 0 to 6 percent slopes	336.4	0.3%	32.5	0.1%	Not prime farmland	No	.24	3	0-5
E0454B	Daglum-Rhoades complex, 0 to 6 percent slopes	606.5	0.6%	324.6	0.8%	Not prime farmland	No	.43	6	0-5
E0515B	Rhoades-Daglum complex, 0 to 6 percent slopes	10,679.0	10.2%	4123.6	9.8%	Not prime farmland	No	.37	6	0-5
E0531B	Rhoades-Rhoades, severely eroded complex, 0 to 6 percent slopes	3,022.1	2.9%	1350.7	3.2%	Not prime farmland	No	.37	6	0-5
E0609A	Belfield-Grail-Arnegard complex, saline, 0 to 2 percent slopes	24.0	0.0%	9.1	0.0%	Not prime farmland	No	.24	6	0-5
E0617B	Belfield-Savage-Daglum complex, 2 to 6 percent slopes	601.1	0.6%	311.5	0.7%	Farmland of statewide importance	No	.43	6	0-5
E0627A	Farnuf-Belfield-Rhoades complex, 0 to 2 percent slopes	781.4	0.7%	425.5	1.0%	Farmland of statewide importance	No	.24	6	0-5
E0634A	Lawther-Daglum complex, 0 to 2 percent slopes	19.2	0.0%	17.9	0.0%	Not prime farmland	No	.28	4	0-5
E0651A	Regent-Janesburg complex, 0 to 3 percent slopes	109.8	0.1%	64.2	0.2%	Not prime farmland	No	.32	6	0-5

Map Unit Name	Soil Name	Study Area		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
		Acres	%	Acres	%					
E0651B	Regent-Janesburg complex, 3 to 6 percent slopes	338.3	0.3%	115.5	0.3%	Not prime farmland	No	.32	6	0-5
E0679A	Savage-Daglum complex, 0 to 2 percent slopes	234.4	0.2%	151.0	0.4%	Not prime farmland	No	.32	6	0-5
E0701F	Dogtooth-Janesburg-Cabba complex, 6 to 35 percent slopes	279.4	0.3%	62.2	0.1%	Not prime farmland	No	.43	6	>15-30
E0811A	Grail silty clay loam, 0 to 2 percent slopes	339.3	0.3%	184.9	0.4%	All areas are prime farmland	No	.28	6	0-5
E0812A	Grail silt loam, 0 to 2 percent slopes	1,057.8	1.0%	287.4	0.7%	All areas are prime farmland	No	.32	6	0-5
E0813B	Grail-Savage silty clay loams, 2 to 6 percent slopes	382.1	0.4%	232.4	0.6%	Farmland of statewide importance	No	.28	6	0-5
E0814B	Grail-Farland silt loams, 2 to 6 percent slopes	179.8	0.2%	46.9	0.1%	Farmland of statewide importance	No	.32	6	0-5
E0821A	Lawther silty clay, 0 to 2 percent slopes	25.4	0.0%	15.8	0.0%	Farmland of statewide importance	No	.28	4	0-5
E0835A	Savage-Grail silty clay loams, 0 to 2 percent slopes	106.5	0.1%	100.9	0.2%	Farmland of statewide importance	No	.32	6	0-5
E0913C	Moreau-Wayden silty clays, 6 to 9 percent slopes	310.1	0.3%	190.1	0.5%	Not prime farmland	No	.24	4	>5-8
E0931C	Wayden-Moreau silty clays, 3 to 9 percent slopes	276.2	0.3%	84.1	0.2%	Not prime farmland	No	.24	4	>5-8
E1009A	Moreau-Barkof silty clays, 0 to 3 percent slopes	220.2	0.2%	30.9	0.1%	Farmland of statewide importance	No	.24	4	0-5
E1009B	Moreau-Barkof silty clays, 3 to 6 percent slopes	736.3	0.7%	365.3	0.9%	Farmland of statewide importance	No	.24	4	0-5
E1025A	Regent-Savage silty clay loams, 0 to 3 percent slopes	69.9	0.1%	7.9	0.0%	Farmland of statewide importance	No	.28	6	0-5
E1025B	Regent-Savage silty clay loams, 3 to 6 percent slopes	585.0	0.6%	268.8	0.6%	Farmland of statewide importance	No	.28	6	0-5
E1031C	Regent-Moreau-Cabba complex, 6 to 9 percent slopes	289.7	0.3%	177.2	0.4%	Not prime farmland	No	.24	4	>5-8
E1227B	Desart-Ekalaka-Telfer complex, 0 to 6 percent slopes	2,679.5	2.6%	913.3	2.2%	Not prime farmland	No	.24	3	0-5
E1237B	Ekalaka-Seroco-Lakota loamy fine sands, 0 to 6 percent slopes	1,423.9	1.4%	733.7	1.7%	Not prime farmland	No	.20	2	0-5
E1249D	Beisigl, severely eroded-Lakota-Ekalaka complex, 0 to 15 percent slopes	312.7	0.3%	103.6	0.2%	Not prime farmland	No	.02	1	0-5
E1263D	Evridge-Whitebird fine sandy loams, 6 to 15 percent slopes	536.1	0.5%	254.3	0.6%	Not prime farmland	No	.24	3	>8-15
E1333C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	1,919.6	1.8%	673.0	1.6%	Not prime farmland	No	.15	3	>5-8
E1355D	Vebar-Flasher-Tally complex, 9 to 15 percent slopes	794.0	0.8%	379.4	0.9%	Not prime farmland	No	.15	3	>8-15
E1403D	Beisigl-Flasher-Telfer loamy fine sands, 6 to 15 percent slopes	2,423.4	2.3%	908.2	2.2%	Not prime farmland	No	.15	2	>8-15
E1423F	Flasher-Vebar-Parshall complex, 9 to 35 percent slopes	327.7	0.3%	90.5	0.2%	Not prime farmland	No	.24	2	>15-30
E1431F	Flasher-Beisigl, very stony-Parshall complex, 6 to 70 percent slopes	385.6	0.4%	152.8	0.4%	Not prime farmland	No	.20	2	>30
E1475F	Flasher-Rock outcrop-Vebar complex, 9 to 70 percent slopes	40.2	0.0%	1.3	0.0%	Not prime farmland	No	.20	2	>30
E1625B	Vebar-Parshall fine sandy loams, 3 to 6 percent slopes	5,097.7	4.9%	1770.5	4.2%	Farmland of statewide importance	No	.15	3	0-5
E1823A	Parshall fine sandy loam, 0 to 2 percent slopes	102.2	0.1%	23.7	0.1%	Farmland of statewide importance	No	.17	3	0-5
E1853D	Seroco-Beisigl, severely eroded complex, 2 to 15 percent slopes	49.6	0.0%	13.3	0.0%	Not prime farmland	No	.02	1	>5-8
E1863A	Tally fine sandy loam, 0 to 2 percent slopes	733.2	0.7%	295.5	0.7%	Farmland of statewide importance	No	.15	3	0-5
E1863B	Tally fine sandy loam, 2 to 6 percent slopes	238.8	0.2%	127.1	0.3%	Farmland of statewide importance	No	.15	3	0-5
E1863C	Tally fine sandy loam, 6 to 9 percent slopes	44.9	0.0%	27.3	0.1%	Not prime farmland	No	.15	3	>5-8
E1875B	Telfer loamy fine sand, 0 to 6 percent slopes	252.2	0.2%	100.6	0.2%	Not prime farmland	No	.20	2	0-5
E1875D	Telfer loamy fine sand, 6 to 15 percent slopes	182.1	0.2%	83.5	0.2%	Not prime farmland	No	.20	2	>8-15
E2107A	Arnegard loam, 0 to 2 percent slopes	1,909.0	1.8%	783.8	1.9%	All areas are prime farmland	No	.24	6	0-5
E2107B	Arnegard loam, 2 to 6 percent slopes	557.6	0.5%	286.5	0.7%	All areas are prime farmland	No	.24	6	0-5
E2117A	Shambo-Arnegard loams, 0 to 2 percent slopes	957.7	0.9%	262.4	0.6%	Farmland of statewide importance	No	.24	6	0-5
E2117B	Shambo-Arnegard loams, 2 to 6 percent slopes	289.8	0.3%	131.1	0.3%	Farmland of statewide importance	No	.24	6	0-5
E2145A	Shambo loam, 0 to 2 percent slopes	476.7	0.5%	214.5	0.5%	Farmland of statewide importance	No	.28	6	0-5
E2145B	Shambo loam, 2 to 6 percent slopes	267.8	0.3%	108.4	0.3%	Farmland of statewide importance	No	.28	6	0-5

Map Unit Name	Soil Name	Study Area		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
		Acres	%	Acres	%					
E2317A	Reeder-Janesburg complex, 0 to 3 percent slopes	847.7	0.8%	258.2	0.6%	Not prime farmland	No	.24	6	0-5
E2317B	Reeder-Janesburg complex, 3 to 6 percent slopes	3,681.2	3.5%	1539.3	3.7%	Not prime farmland	No	.24	6	0-5
E2317C	Reeder-Janesburg complex, 6 to 9 percent slopes	688.1	0.7%	194.6	0.5%	Not prime farmland	No	.24	6	>5-8
E2601C	Amor-Cabba loams, 6 to 9 percent slopes	1,125.9	1.1%	506.8	1.2%	Not prime farmland	No	.28	6	>5-8
E2601D	Amor-Cabba loams, 9 to 15 percent slopes	478.9	0.5%	187.5	0.4%	Not prime farmland	No	.24	6	>8-15
E2617C	Cabba-Amor loams, 6 to 9 percent slopes	949.1	0.9%	560.3	1.3%	Not prime farmland	No	.28	4L	>5-8
E2617D	Cabba-Amor loams, 9 to 15 percent slopes	1,614.6	1.5%	616.5	1.5%	Not prime farmland	No	.28	4L	>8-15
E2617F	Cabba-Chama-Shambo loams, 9 to 50 percent slopes	2,108.2	2.0%	1120.5	2.7%	Not prime farmland	No	.37	4L	>30
E2642C	Reeder-Cabba loams, 6 to 9 percent slopes	1,617.7	1.6%	663.0	1.6%	Farmland of statewide importance	No	.24	6	>5-8
E2655F	Cabba-Amor-Savage complex, 9 to 70 percent slopes, very stony	1,290.0	1.2%	432.4	1.0%	Not prime farmland	No	.28	4L	>30
E2707C	Cabba-Chama silt loams, 3 to 9 percent slopes	353.8	0.3%	241.6	0.6%	Not prime farmland	No	.37	4L	>5-8
E2709F	Cabba-Lantry-Golva silt loams, 9 to 50 percent slopes	731.5	0.7%	368.6	0.9%	Not prime farmland	No	.37	4L	>30
E2737C	Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	627.4	0.6%	361.1	0.9%	Not prime farmland	No	.37	4L	>5-8
E2775F	Cabba-Rock outcrop-Chama complex, 15 to 70 percent slopes	803.2	0.8%	337.3	0.8%	Not prime farmland	No	.28	4L	>30
E2801A	Amor-Arnegard loams, 0 to 3 percent slopes	102.3	0.1%	9.9	0.0%	Farmland of statewide importance	No	.28	6	0-5
E2803B	Amor-Shambo loams, 3 to 6 percent slopes	2,345.7	2.2%	1085.4	2.6%	Farmland of statewide importance	No	.28	6	0-5
E2813B	Amor-Vebar complex, 0 to 6 percent slopes	14.9	0.0%	10.9	0.0%	Farmland of statewide importance	No	.28	6	0-5
E2819A	Reeder-Farnuf loams, 0 to 3 percent slopes	724.9	0.7%	376.1	0.9%	Farmland of statewide importance	No	.24	6	0-5
E2819B	Reeder-Farnuf loams, 3 to 6 percent slopes	3,755.0	3.6%	1724.9	4.1%	Farmland of statewide importance	No	.24	6	0-5
E2903A	Chama-Sen silt loams, 0 to 3 percent slopes	52.0	0.0%	34.1	0.1%	Farmland of statewide importance	No	.37	4L	0-5
E2913B	Chama-Sen-Cabba silt loams, 3 to 6 percent slopes	841.0	0.8%	374.8	0.9%	Farmland of statewide importance	No	.37	4L	0-5
E2997D	Amor-Cabba loams, 6 to 15 percent slopes, very stony	197.7	0.2%	116.0	0.3%	Not prime farmland	No	.24	6	>8-15
E3005F	Brandenburg-Cabba complex, 6 to 70 percent slopes	1,537.7	1.5%	386.8	0.9%	Not prime farmland	No	.15	6	>30
E3043B	Searing-Ringling loams, 3 to 6 percent slopes	706.8	0.7%	312.0	0.7%	Farmland of statewide importance	No	.24	6	0-5
E3043C	Searing-Ringling loams, 6 to 9 percent slopes	158.5	0.2%	66.7	0.2%	Not prime farmland	No	.24	6	>5-8
E3101F	Badland-Cabba complex, 9 to 70 percent slopes	103.0	0.1%	97.0	0.2%	Not prime farmland	No	.37	4L	>30
E3107F	Cabba-Badland complex, 6 to 70 percent slopes	1,705.1	1.6%	1131.5	2.7%	Not prime farmland	No	.28	4L	>30
E3197F	Badland, 9 to 150 percent slopes	190.0	0.2%	120.3	0.3%	Not prime farmland	No	.37	4L	>30
E3203B	Cherry silt loam, 0 to 6 percent slopes	205.6	0.2%	185.1	0.4%	Farmland of statewide importance	No	.49	4L	0-5
E3203C	Cherry silt loam, 6 to 9 percent slopes	19.3	0.0%	14.9	0.0%	Farmland of statewide importance	No	.49	4L	>5-8
E3241B	Lambert silt loam, 0 to 6 percent slopes	40.9	0.0%	8.0	0.0%	Farmland of statewide importance	No	.37	4L	0-5
E3241D	Lambert silt loam, 6 to 15 percent slopes	5.1	0.0%	3.8	0.0%	Not prime farmland	No	.37	4L	>8-15
E3245D	Lambert-Lambert, gullied complex, 2 to 15 percent slopes	235.6	0.2%	92.0	0.2%	Not prime farmland	No	.37	4L	>8-15
E4005A	Harriet loam, 0 to 2 percent slopes, occasionally flooded	125.7	0.1%	45.3	0.1%	Not prime farmland	Yes	.37	6	0-5
E4007A	Harriet-Lallie complex, 0 to 2 percent slopes, occasionally flooded	6.6	0.0%	2.7	0.0%	Not prime farmland	Yes	.37	6	0-5
E4139A	Korchea-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	1,888.7	1.8%	791.6	1.9%	Not prime farmland	No	.24	6	0-5
E4147A	Korell loam, 0 to 2 percent slopes, rarely flooded	174.2	0.2%	104.1	0.2%	Farmland of statewide importance	No	.28	6	0-5
E4180A	Korell-Daglum-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	152.2	0.1%	60.2	0.1%	Not prime farmland	Yes	.17	3	0-5
E4184A	Korchea, saline-Fluvaquents, channeled-Harriet complex, 0 to 2 percent slopes, frequently flooded	524.7	0.5%	344.4	0.8%	Not prime farmland	Yes	.17	3	0-5
E4187A	Trembles fine sandy loam, 0 to 2 percent slopes, occasionally flooded	158.6	0.2%	44.2	0.1%	Farmland of statewide importance	No	.20	3	0-5

Map Unit Name	Soil Name	Study Area		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
		Acres	%	Acres	%					
E4537A	Stady loam, 0 to 2 percent slopes	2,236.6	2.1%	828.0	2.0%	Farmland of statewide importance	No	.28	5	0-5
E4538B	Stady-Lehr loams, 2 to 6 percent slopes	744.0	0.7%	286.1	0.7%	Farmland of statewide importance	No	.28	5	0-5
E4553A	Tally fine sandy loam, gravelly substratum, 0 to 2 percent slopes	155.3	0.1%	91.5	0.2%	Farmland of statewide importance	No	.15	3	0-5
E4553B	Tally fine sandy loam, gravelly substratum, 2 to 6 percent slopes	46.2	0.0%	10.5	0.0%	Farmland of statewide importance	No	.15	3	0-5
E4559C	Manning-Wabek complex, 6 to 9 percent slopes	256.9	0.2%	133.0	0.3%	Not prime farmland	No	.15	3	>5-8
E4561F	Manning-Schaller-Wabek complex, 6 to 35 percent slopes	1,226.7	1.2%	668.0	1.6%	Not prime farmland	No	.15	3	>8-15
E4570A	Stady-Shambo, gravelly substratum loams, 0 to 2 percent slopes	853.1	0.8%	247.8	0.6%	Farmland of statewide importance	No	.28	5	0-5
E4571A	Shambo loam, gravelly substratum, 0 to 2 percent slopes	185.8	0.2%	91.5	0.2%	Farmland of statewide importance	No	.24	6	0-5
E4581A	Parshall, gravelly substratum-Manning fine sandy loams, 0 to 2 percent slopes	3.1	0.0%	3.1	0.0%	Farmland of statewide importance	No	.17	3	0-5
E4585A	Manning fine sandy loam, 0 to 2 percent slopes	142.2	0.1%	73.6	0.2%	Not prime farmland	No	.15	3	0-5
E4585B	Manning fine sandy loam, 2 to 6 percent slopes	173.7	0.2%	50.1	0.1%	Not prime farmland	No	.15	3	0-5
E4719A	McKenzie silty clay, 0 to 1 percent slopes	24.7	0.0%	4.4	0.0%	Not prime farmland	Yes	.24	4	0-5
E4729A	Heil silty clay loam, 0 to 1 percent slopes	95.5	0.1%	40.8	0.1%	Not prime farmland	Yes	.32	6	0-5
E4767A	Regan silt loam, saline, 0 to 2 percent slopes, occasionally flooded	123.6	0.1%	57.4	0.1%	Not prime farmland	Yes	.32	4L	0-5
E4907B	Haplustolls-Ustorthents complex, 0 to 6 percent slopes	123.4	0.1%	--	--	Not prime farmland	No	.24	6	0-5
E4995F	Pits, gravel and sand	138.0	0.1%	11.3	0.0%	Not prime farmland	No	.02	5	>15-30
E4999	Water	172.5	0.2%	78.4	0.2%	Not prime farmland	Not Rated	Not Rated	Not Rated	Not Rated
E6155A	Lefor-Vebar fine sandy loams, 0 to 3 percent slopes	105.7	0.1%	29.6	0.1%	Farmland of statewide importance	No	.17	3	0-5
E6155B	Lefor-Vebar fine sandy loams, 3 to 6 percent slopes	694.1	0.7%	349.1	0.8%	Farmland of statewide importance	No	.17	3	0-5
E6155C	Lefor-Vebar fine sandy loams, 6 to 9 percent slopes	369.2	0.4%	204.1	0.5%	Not prime farmland	No	.17	3	>5-8
EdB	Ekalaka-Desart fine sandy loams, 0 to 6 percent slopes	360.6	0.3%	61.1	0.1%	Not prime farmland	No	.28	3	0-5
ElC	Ekalaka-Ladner complex, 6 to 15 percent slopes	60.6	0.1%	6.0	0.0%	Not prime farmland	No	.28	3	>5-8
EmB	Ekalaka-Zeona-Ladner loamy fine sands, 0 to 6 percent slopes	149.7	0.1%	--	--	Not prime farmland	No	.20	2	0-5
FhD	Flasher-Vebar complex, 9 to 15 percent slopes	128.7	0.1%	46.6	0.1%	Not prime farmland	No	.10	2	>8-15
Fm	Flasher and Vebar very stony soils, 3 to 25 percent slopes	13.0	0.0%	7.4	0.0%	Not prime farmland	No	.02	8	>8-15
FnD	Fleak-Rhame complex, 3 to 15 percent slopes	228.0	0.2%	99.6	0.2%	Not prime farmland	No	.15	3	>8-15
FtE	Fleak-Tusler complex, 15 to 40 percent slopes	44.0	0.0%	2.2	0.0%	Not prime farmland	No	.20	2	>30
GeB	Grail silt loam, 2 to 6 percent slopes	54.6	0.1%	18.8	0.0%	All areas are prime farmland	No	.32	6	0-5
GlA	Grail silty clay loam, 0 to 2 percent slopes	7.5	0.0%	3.3	0.0%	All areas are prime farmland	No	.32	6	0-5
GlB	Grail silty clay loam, 2 to 6 percent slopes	72.4	0.1%	40.1	0.1%	All areas are prime farmland	No	.32	6	0-5
GoA	Grail-Rhoades silty clay loams, 0 to 2 percent slopes	279.2	0.3%	118.9	0.3%	Farmland of statewide importance	No	.32	6	0-5
GoB	Grail-Rhoades silty clay loams, 2 to 6 percent slopes	284.9	0.3%	41.3	0.1%	Farmland of statewide importance	No	.32	6	0-5
Ha	Hanly loamy fine sand, 0 to 6 percent slopes	0.9	0.0%	--	--	Not prime farmland	No	.20	2	0-5
He	Havre loam, 0 to 2 percent slopes	23.0	0.0%	1.2	0.0%	Farmland of statewide importance	No	.32	4L	0-5
Kn	Korchea and Havre soils, channeled, 0 to 6 percent slopes	365.3	0.4%	115.3	0.3%	Not prime farmland	No	Not Rated	Not Rated	>8-15
Ko	Korchea and Straw soils, channeled, 0 to 2 percent slopes	13.6	0.0%	6.4	0.0%	Not prime farmland	No	Not Rated	Not Rated	>8-15
KrA	Kremlin loam, 0 to 2 percent slopes	26.5	0.0%	24.1	0.1%	Farmland of statewide importance	No	.28	6	0-5
KrB	Kremlin loam, 2 to 6 percent slopes	41.4	0.0%	--	--	Farmland of statewide importance	No	.28	6	0-5
KsA	Kremlin-Belfield-Rhoades complex, 0 to 6 percent slopes	184.1	0.2%	79.4	0.2%	Farmland of statewide importance	No	.28	6	0-5
La	Lawther silty clay, 0 to 2 percent slopes	7.0	0.0%	--	--	Farmland of statewide importance	No	.28	4	0-5

Map Unit Name	Soil Name	Study Area		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
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LeB	Lefor-Vebar fine sandy loams, 0 to 6 percent slopes	8.0	0.0%	6.6	0.0%	Farmland of statewide importance	No	.17	3	0-5
MaB	Manning fine sandy loam, 2 to 6 percent slopes	13.2	0.0%	13.2	0.0%	Not prime farmland	No	.15	3	0-5
MeB	Marmarth loam, 0 to 6 percent slopes	194.9	0.2%	71.4	0.2%	Farmland of statewide importance	No	.28	6	0-5
MgC	Marmarth-Cabbart complex, 6 to 9 percent slopes	150.7	0.1%	46.6	0.1%	Farmland of statewide importance	No	.28	6	>5-8
MhB	Marmarth-Rhame fine sandy loams, 0 to 6 percent slopes	43.0	0.0%	10.4	0.0%	Farmland of statewide importance	No	.17	3	0-5
MhC	Marmarth-Rhame fine sandy loams, 6 to 9 percent slopes	58.1	0.1%	35.5	0.1%	Not prime farmland	No	.17	3	>5-8
MkA	Marmarth-Rhoades complex, 0 to 3 percent slopes	72.6	0.1%	35.3	0.1%	Farmland of statewide importance	No	.32	6	0-5
MkB	Marmarth-Rhoades complex, 3 to 6 percent slopes	267.7	0.3%	89.4	0.2%	Farmland of statewide importance	No	.32	6	0-5
MkC	Marmarth-Rhoades complex, 6 to 9 percent slopes	201.0	0.2%	60.1	0.1%	Not prime farmland	No	.32	6	>5-8
Mo	McKenzie and Heil silty clays, 0 to 1 percent slopes	7.1	0.0%	--	--	Not prime farmland	Yes	.17	4	0-5
MwC	Moreau-Wayden silty clays, 6 to 9 percent slopes	12.6	0.0%	12.6	0.0%	Not prime farmland	No	.24	4	>5-8
PaA	Parshall fine sandy loam, 0 to 2 percent slopes	15.3	0.0%	15.3	0.0%	Farmland of statewide importance	No	.15	3	0-5
PeB	Patent loam, 0 to 6 percent slopes	9.4	0.0%	--	--	Not prime farmland	No	.24	4L	0-5
RcC	Reeder-Cabba loams, 6 to 9 percent slopes	8.4	0.0%	8.4	0.0%	Farmland of statewide importance	No	.24	6	>5-8
RdA	Reeder-Dogtooth complex, 0 to 3 percent slopes	41.5	0.0%	35.2	0.1%	Farmland of statewide importance	No	.24	6	0-5
RdB	Reeder-Dogtooth complex, 3 to 6 percent slopes	126.5	0.1%	86.6	0.2%	Farmland of statewide importance	No	.24	6	0-5
RdC	Reeder-Dogtooth complex, 6 to 9 percent slopes	101.4	0.1%	87.8	0.2%	Not prime farmland	No	.24	6	>5-8
ReA	Reeder-Shambo loams, 0 to 3 percent slopes	38.2	0.0%	32.6	0.1%	Farmland of statewide importance	No	.24	6	0-5
ReB	Reeder-Shambo loams, 3 to 6 percent slopes	184.5	0.2%	167.7	0.4%	Farmland of statewide importance	No	.24	6	0-5
Rf	Reeder and Amor very stony loams, 3 to 9 percent slopes	35.7	0.0%	9.7	0.0%	Not prime farmland	No	.10	8	0-5
RhB	Regent silty clay loam, 3 to 6 percent slopes	27.4	0.0%	27.4	0.1%	Farmland of statewide importance	No	.32	6	0-5
RkC	Regent-Moreau silty clay loams, 6 to 9 percent slopes	15.3	0.0%	12.5	0.0%	Farmland of statewide importance	No	.32	6	>5-8
RlB	Regent-Moreau-Dogtooth complex, 3 to 9 percent slopes	49.9	0.0%	22.3	0.1%	Not prime farmland	No	.32	6	>5-8
RnB	Rhame fine sandy loam, 3 to 6 percent slopes	241.9	0.2%	50.5	0.1%	Farmland of statewide importance	No	.15	3	0-5
RoC	Rhame-Fleak fine sandy loams, 6 to 9 percent slopes	308.6	0.3%	70.9	0.2%	Not prime farmland	No	.15	3	>5-8
RoD	Rhame-Fleak fine sandy loams, 9 to 15 percent slopes	161.3	0.2%	32.5	0.1%	Not prime farmland	No	.15	3	>8-15
RrA	Rhoades-Absher complex, 0 to 2 percent slopes	778.4	0.7%	272.9	0.6%	Not prime farmland	No	.32	6	0-5
RrB	Rhoades-Absher complex, 2 to 6 percent slopes	3,745.7	3.6%	932.6	2.2%	Not prime farmland	No	.32	6	>5-8
Rt	Rhoades complex, terrace, 0 to 6 percent slopes	306.4	0.3%	99.0	0.2%	Not prime farmland	No	.32	6	0-5
SaA	Savage silty clay loam, 0 to 2 percent slopes	12.4	0.0%	--	--	Farmland of statewide importance	No	.28	6	0-5
SeB	Searing loam, 0 to 6 percent slopes	7.6	0.0%	--	--	Farmland of statewide importance	No	.24	6	0-5
SeC	Searing loam, 6 to 9 percent slopes	9.2	0.0%	--	--	Not prime farmland	No	.24	6	>5-8
Sg	Sham soils and gullied land, 2 to 9 percent slopes	80.2	0.1%	--	--	Not prime farmland	No	.43	4L	>5-8
TaB	Tally fine sandy loam, 2 to 6 percent slopes	4.0	0.0%	4.0	0.0%	Farmland of statewide importance	No	.15	3	0-5
ToA	Chinook fine sandy loam, 0 to 2 percent slopes	92.4	0.1%	48.1	0.1%	Farmland of statewide importance	No	.20	3	0-5
ToB	Chinook fine sandy loam, 2 to 6 percent slopes	141.7	0.1%	39.3	0.1%	Farmland of statewide importance	No	.17	3	0-5
ToC	Chinook fine sandy loam, 6 to 9 percent slopes	49.6	0.0%	7.4	0.0%	Not prime farmland	No	.17	3	>5-8
VfC	Vebar-Flasher fine sandy loams, 6 to 9 percent slopes	21.9	0.0%	15.6	0.0%	Not prime farmland	No	.15	3	>5-8
VfD	Vebar-Flasher fine sandy loams, 9 to 15 percent slopes	7.4	0.0%	7.4	0.0%	Not prime farmland	No	.15	3	>8-15
VtB	Vebar-Tally fine sandy loams, 3 to 6 percent slopes	11.4	0.0%	7.0	0.0%	Farmland of statewide importance	No	.15	3	0-5

Map Unit Name	Soil Name	Study Area		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
		Acres	%	Acres	%					
W	Water	42.9	0.0%	10.3	0.0%	Not prime farmland	Not Rated	Not Rated	Not Rated	Not Rated
Wa	Wabek complex, 6 to 15 percent slopes	10.4	0.0%	10.4	0.0%	Not prime farmland	No	.28	6	>8-15
YaC	Yawdim silty clay, 6 to 9 percent slopes	10.8	0.0%	--	--	Not prime farmland	No	.24	4	>5-8
ZfB	Zeona loamy fine sand, 0 to 6 percent slopes	380.7	0.4%	68.5	0.2%	Not prime farmland	No	.20	2	0-5
ZtC	Zeona-Tusler loamy fine sands, 6 to 15 percent slopes	206.6	0.2%	73.3	0.2%	Not prime farmland	No	.20	2	>8-15
	Totals	**104,296.1**	**100.0%**	**42,143.4**	**100.0%**					

Source: Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed 11/2020.

Appendix I
Bird and Bat Conservation Strategy

Bowman Wind, LLC
March 2021

Bird and Bat Conservation Strategy

for the Bowman Wind Project

Prepared for Bowman Wind, LLC
March 18, 2021

List of Contributors

Company	Key Contributors	Contact Information
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ACRONYMS AND ABBREVIATIONS

ac	acres
AMMs	Avoidance and Minimization Measures
APLIC	Avian Power Line Interaction Committee
Audubon	National Audubon Society
BBCS	Bird and Bat Conservation Strategy
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
Bowman Wind	Bowman Wind, LLC
CFR	Code of Federal Regulations
ECPG	Eagle Conservation Plan Guidance
EEI	Eagle Environmental, Inc.
ESA	Endangered Species Act
GPS	Global Positioning System
IBA	Important Bird Area
ID	Identification
IPaC	Information for Planning and Consultation
m	meter
MBTA	Migratory Bird Treaty Act
mi	mile(s)
min	minute(s)
MW	megawatt(s)
NAIP	National Agriculture Imagery Program
NDGFD	North Dakota Game and Fish Department
NLCD	National Land Cover Database
NLEB	northern long-eared bat
OAA	Original Assessment Area
O&M	Operations and Maintenance
Project	Bowman Wind Project
SCP	Species of Conservation Priority
SHFC	Species of Habitat Fragmentation Concern
SWAP	State Wildlife Action Plan
SWCA	SWCA Environmental Consultants
U.S.C.	US Code
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WEG	Land-based Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WIRS	Wildlife Incident Reporting System
WTGs	wind turbine generators

1.0 INTRODUCTION

1.1 Purpose of the Bird and Bat Conservation Strategy

Bowman Wind, LLC (Bowman Wind) is proposing the development of the Bowman Wind Project (Project) located in Bowman County, North Dakota (Figure 1.1). Consistent with the tiered approach presented in the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012) and the *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013a), Bowman Wind has completed iterative desktop assessments and field surveys to evaluate risk in coordination with the USFWS and North Dakota Game and Fish Department (NDGFD). Results from these studies and recommendations from USFWS and NDGFD have been used to inform development of appropriate impact avoidance, minimization, monitoring, and adaptive management measures for the Project, including development of this Bird and Bat Conservation Strategy (BBCS).

The Bowman Wind BBCS follows USFWS Region 6 guidance for identifying and implementing actions to conserve birds and bats during project development, planning, construction, operation, maintenance, and decommissioning (USFWS 2020). The BBCS documents Bowman Wind's compliance with relevant wildlife laws and regulations, adherence to the processes outlined in the WEG and ECPG for developing, constructing, and operating wind energy projects, and to explain the analyses, studies, and reasoning that support progressing from one tier to the next in the tiered approach presented in the WEG. The Tier 4 monitoring program proposed in this BBCS has been designed to evaluate risk conclusions along with an Adaptive Management Plan to respond to findings, if necessary. This BBCS also documents the measures to be implemented during siting, construction, and operations that avoid and minimize impacts to federal-listed species and to sensitive species and habitats in North Dakota.

With respect to the Project site, a key concern identified by the agencies was potential impact to unbroken grasslands (i.e., native prairie grassland) and the potential displacement of grassland birds, as documented in Shaffer and Buhl (2016) at other wind project sites. Bowman Wind has met with the USFWS and NDGF to discuss a number of design measures incorporated into the turbine layout that avoid and minimize potential impacts to unbroken grasslands compared to previous layouts presented to the agencies. Ongoing Project layouts have incorporated avoidance of the direct placement of primary and spare turbine locations on unbroken grasslands.

To further offset the indirect impacts of displacement of grassland nesting birds per the Shaffer and Buhl (2016) study, Bowman Wind will implement the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). Based on the results of this model, Bowman Wind will implement additional conservation actions, including the acquisition and protection of additional habitat through the use of various conservation partnerships and funding opportunities. The intent from this process is to provide mitigation in a manner that is equivalent to the recommendations provided through use of the Shaffer et al. 2019 model.

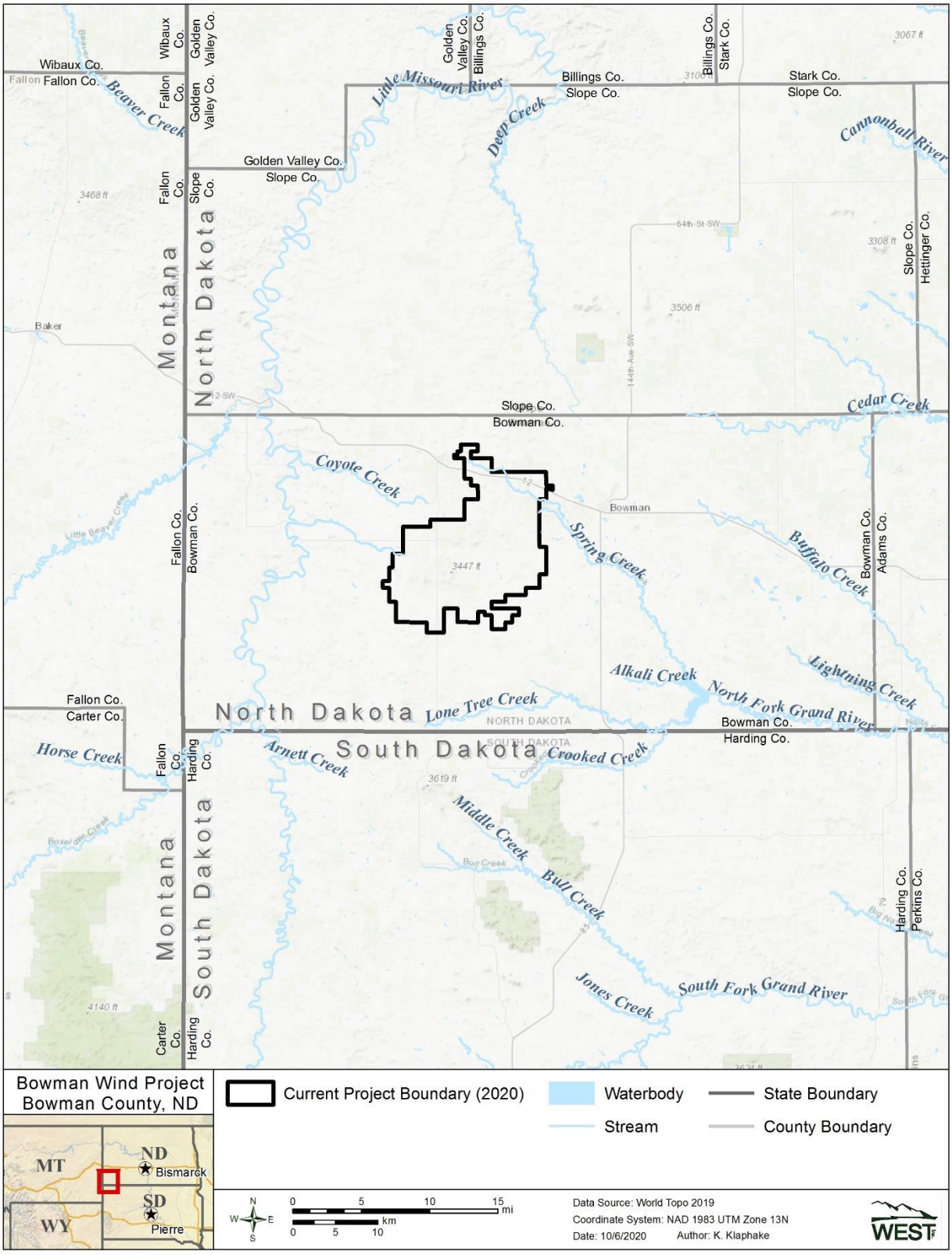

Figure 1.1. Location of the Bowman Wind Project in Bowman County, North Dakota.

1.2 Key Avian and Bat Laws, Regulations, Authorizations

This BBCS was developed to document compliance with applicable wildlife laws and regulations. The federal regulatory framework for protecting birds includes the Migratory Bird Treaty Act (MBTA; 1918), the Bald and Golden Eagle Protection Act (BGEPA) of 1940, Endangered Species Act of 1973, as amended (ESA), and Executive Order (EO) 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds* of 2001. The state of North Dakota does not have an endangered or threatened species list; however, North Dakota identifies and maintains a list of the 115 Species of Conservation Priority (SCP) in its State Wildlife Action Plan (SWAP; Dyke et al. 2015).

1.2.1 Migratory Bird Treaty Act (MBTA)

The MBTA is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of a USFWS permit or regulatory authorization, are a violation. The MBTA states, "Unless and except as permitted by regulations … it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill … possess, offer for sale, sell … purchase … ship, export, import …transport or cause to be transported… any migratory bird, any part, nest, or eggs of any such bird …" 16 US Code (U.S.C.) 703. The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" 50 Code of Federal Regulations (CFR) 10.12. The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

1.2.2 Bald and Golden Eagle Protection Act (BGEPA)

Under authority of the BGEPA, 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection. The BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof, 16 U.S.C. 668. The BGEPA also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," 16 U.S.C. 668c, and includes criminal and civil penalties for violating the statute. See 16 U.S.C. 668. The term "disturb" is defined as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury to an eagle, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior, 50 CFR 22.3.

1.2.3 Endangered Species Act (ESA)

The ESA directs the USFWS to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Among its other provisions, the ESA requires the USFWS to assess civil and criminal penalties for violations of the Act or its regulations. Section 9 of the ESA prohibits take of federally-listed species. Take is defined as

"harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" 16 U.S.C. 1532. The term "harm" includes significant habitat alteration which kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, 50 CFR 17.3. Projects involving Federal lands, funding or authorizations will require consultation between the Federal agency and the USFWS, pursuant to Section 7 of the ESA. Projects without a Federal nexus should work directly with USFWS to avoid adversely impacting listed species and their critical habitats.

1.2.4 State of North Dakota

A species identified as an SCP is placed into one of three levels to prioritize conservation efforts. Level I species are either in decline and have a high conservation priority or North Dakota constitutes part of their core breeding range. Level II species have a moderate level of conservation priority, but a substantial level of non-State Wildlife Grant funding available. Level III species have a moderate level of conservation priority, but are peripheral or non-breeding in North Dakota.

1.3 Facility Description

The Project will include the construction and operation of up to a maximum 74 wind turbine generators (WTGs), ranging from 2.82 megawatts (MW) to 6.2 MW capacity, for a Project nameplate capacity of approximately 200 MW. In addition to the WTGs, the Project will include access roads, an underground electric collection system, a substation, a transmission line extending approximately 0.74 miles (mi) from the Project substation to an existing transmission line designed consistent with Avian Power-Line Interaction Committee (APLIC) 2012 guidance., an operations and maintenance (O&M) building, a temporary construction laydown area, and up to two permanent meteorological towers (Figure 1.2). Down lit lights at the substations would be illuminated only when maintenance workers are present. The two permanent, unguyed meteorological towers would be about 120 m (394 feet) in height. The turbines and met towers would be equipped with red flashing L-864 type Federal Aviation Administration (FAA) lights for aviation safety. Subject to FAA approval and commercial availability, the required FAA lights would be controlled with Aircraft Detection Lighting System (ADLS) and turned on only when the system's radar detects approaching aircraft.

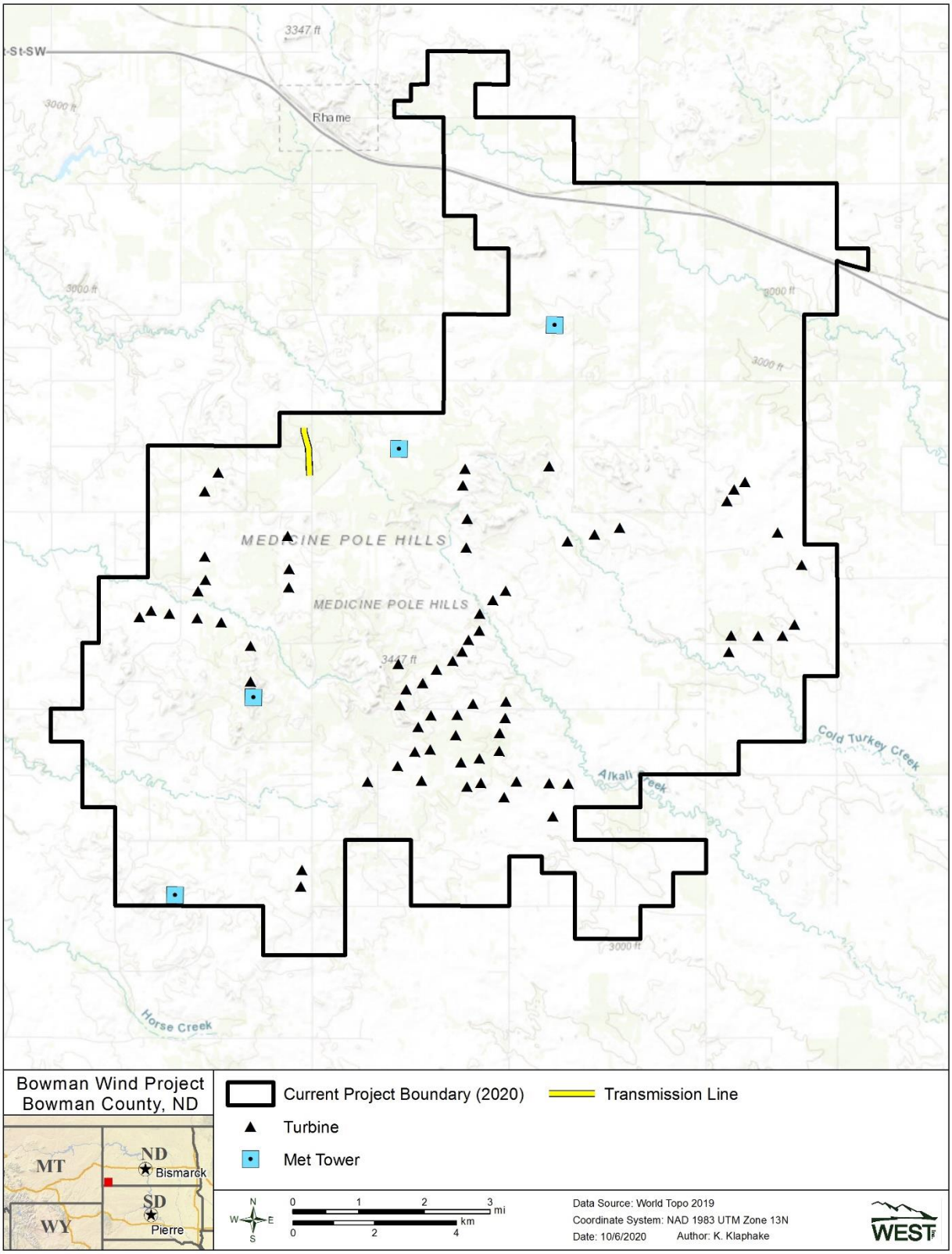

Figure 1.2. Project infrastructure of the Bowman Wind Project, in Bowman County, North Dakota.
*Layout is not yet final.

1.4 Environmental Setting and Habitat

The Project encompasses 61,325 acres (ac) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands.

Two named streams are present within the Project and include portions of Spring Creek and Coyote Creek (Figure 1.1). The Project is approximately 10 mi east of the Little Missouri River (Figure 1.1). Elevations within the Project range from approximately 896–1,050 meters (m; US Geological Survey [USGS] 2019), with the greater topographic relief associated with the Medicine Pole Hills in the center of the Project (Figure 1.2).

According to the National Land Cover Database (NLCD; 2016), the dominant land cover type in the Project is shrub/scrub (43.8%), followed by herbaceous (31.9%), cultivated crops (19.7%); developed (2.1%), and hay/pasture (1.8%), the remaining land covers account for less than 0.5% of the Project, individually (Table 1.1, Figure 1.3).

Table 1.1. Land cover types, area, and percent (%) composition within the Bowman Wind Project, Bowman County, North Dakota.

Land Cover Type	Area (acres)	% Composition
Shrub/Scrub	26,877	43.8
Herbaceous	19,589	31.9
Cultivated Crops	12,073	19.7
Developed	1,266	2.1
Hay/Pasture	1,118	1.8
Emergent Herbaceous Wetlands	164	0.3
Open Water	106	0.2
Woody Wetlands	46	<0.1
Evergreen Forest	45	<0.1
Deciduous Forest	31	<0.1
Mixed Forest	7	<0.1
Barren Land	2	<0.1
Total[1]	**61,325**	**100**

Source: National Land Cover Database 2016

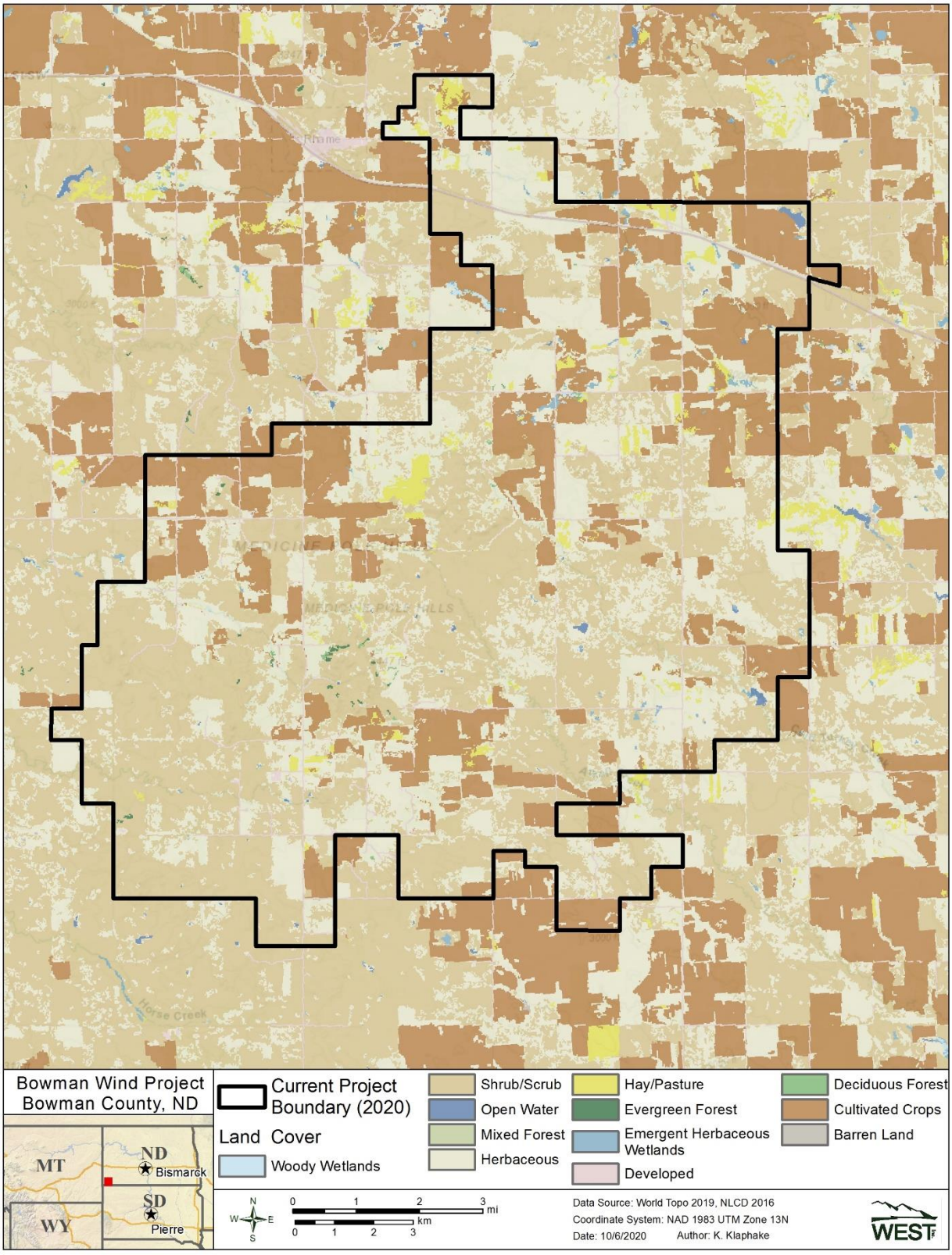

Figure 1.3. Land cover at the Bowman Wind Project, Bowman County, North Dakota.

1.5 Background and Consultation History

Bowman Wind initiated Project development January 2016 within an Original Assessment Area (OAA) that included portions of Bowman and Slope counties, North Dakota and Harding County, South Dakota (Figure 1.4). The OAA was refined based on the results of the Tier 1 review to focus within a 72,310 ac 2017 Project boundary. The Project boundary was revised in March 2018, April 2020, and August 2020 in an effort to reduce impacts to flora and fauna. The current and final Project boundary encompasses 61,325 ac (Figure 1.4).

Tier 1 and 2 studies were completed for the OAA and the 2017 Project Boundary. Tier 3 studies were initiated in August 2017 by Western EcoSystems Technology, Inc. (WEST), SWCA Environmental Consultants (SWCA), and Eagle Environmental, Inc. (EEI) throughout the Project area and completed in 2020. The spatial extent of the Tier 3 studies was adapted in response to the Project changes as they occurred in order to consistently capture and represent the Project boundary in its current state. The purpose of these studies was to characterize the avian, bat and vegetation communities, assess potential risks to wildlife, and inform Project siting.

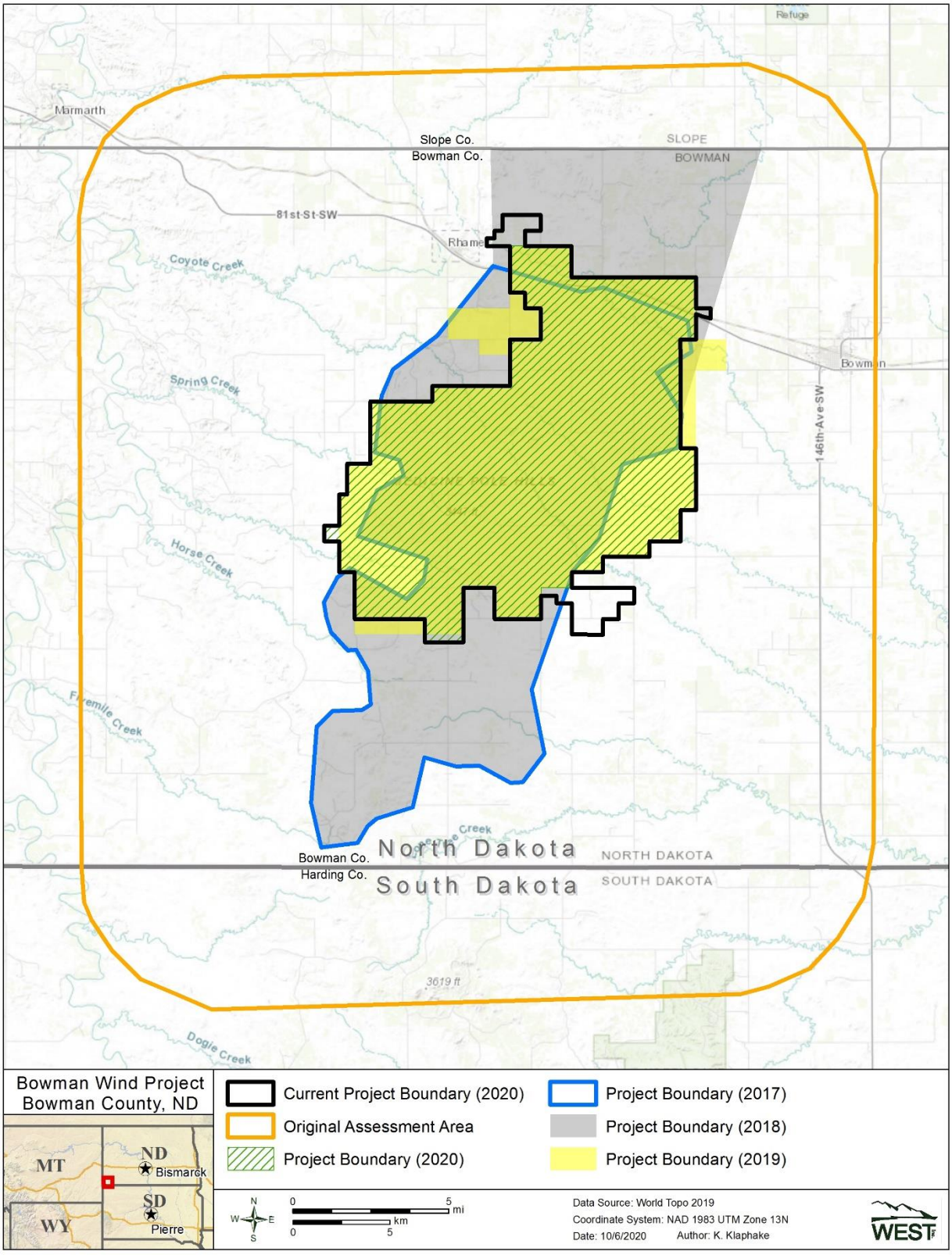

Figure 1.4. Original Assessment Area and Project boundaries for the Bowman Wind Project, Bowman County, North Dakota.

Consistent with recommendations in the WEG and ECPG for agency consultation, Bowman Wind has coordinated with USFWS and NDGFD regarding wildlife survey methods, data and results, and siting considerations related to wildlife, as illustrated in Table 1.2. Agency correspondence records can be found in Appendix A.

Table 1.2. Agency consultation history for the Bowman Wind Project, Bowman County, North Dakota.

Date	Subject
June 20, 2017	Bowman Wind, LLC (Bowman Wind) met with US Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department (NDGFD) to discuss Tiers 1 and 2 of the *Land-based Wind Energy Guidelines* (WEG) and Stage 1 *Eagle Conservation Plan Guidance* (ECPG) risk reviews for the Bowman Wind Project (Project) and discuss a Tier 3/Stage 2 survey plan.
January 30, 2018	Bowman Wind met with USFWS and NDGFD to provide a Project update and agree upon Tier 3 WEG/Stage 2 ECPG survey expectations.
July 5, 2018	Bowman Wind discussed bat surveys and northern long-eared bat risk at the Project with USFWS.
October 9, 2018	Bowman Wind met with USFWS to discuss changes to the Project area, review Tier 3 WEG/Stage 2 ECPG survey results and agree on next steps to ensure regulatory compliance.
October 24, 2018	Bowman Wind and USFWS discussed seeking an eagle take permit with Region 6 for the Bowman Wind Project.
May 28, 2020	Bowman Wind met with USFWS and NDGFD to discuss results of the Tier 3 WEG, Stage 2 ECPG survey results and discuss the NDPSC permit application.
June 19, 2020	Bowman Wind received a letter from NDGFD that expressed their concerns on native habitats and species, as well as on communications with the Agency.
July 10, 2020	Bowman Wind received a letter from NDGFD that addressed Tier 3 WEG study results provided by Bowman Wind.
July 31, 2020	Bowman Wind, USFWS, and NDGFD discussed the results of surveys completed to date and agreed upon the next steps to ensure regulatory compliance.
August 6, 2020	Bowman Wind sent the USFWS and NDGFD the narrative / methodology for the proposed (Shaffer – Loesch) model to estimate offsets for potential breeding grassland bird displacement effects.
September 22, 2020	Bowman Wind received a letter from the USFWS with recommendations for the Bird and Bat Conservation Strategy.
December 16, 2020	Bowman Wind, USFWS, and NDGFD discussed the results of layout 054 and the corresponding use of the Shaffer et al 2019 model that incorporated the updated unbroken grassland field data to calculate grassland bird displacement impacts and the corresponding voluntary offset mitigation acreage.
December 21, 2020	Bowman Wind sent the USFWS and NDGFD the updated layout 054 narrative / methodology for the proposed (Shaffer – Loesch) model and estimate of the voluntary offset acreage for potential breeding grassland bird displacement effects on unbroken native grasslands.

2.0 SITE CHARACTERIZATION SURVEYS (TIERS 1, 2, AND 3)

2.1 Preliminary Site Evaluation and Characterization (Tiers 1 and 2)

2.1.1 Tier 1

Tier 1 of the WEG calls for an initial screening of the broad geographic area in which a project is proposed. Such screening is useful for identifying regions where wind energy development poses significant risks to species of concern and their habitats, including the fragmentation of large-scale habitats and threats to regional populations of federal- or state-listed species, for screening a landscape or set of multiple potential sites to avoid those sites with the highest habitat values, and for beginning to determine if a single identified potential site poses serious risk to species of concern or their habitats (USFWS 2012).

As part of the preliminary site evaluation and consistent with Tier 1 of the WEG, a desktop review was completed to evaluate types of habitat within the OAA and identify areas with reduced potential for species of concern. In addition, preliminary agency input was requested from USFWS and NDGFD regarding any instances of federal- and state-listed animals and plants, natural communities, and other species of concern or significant habitats that could occur within the initial area of interest (Appendix A).

The Project area is fairly arid and the land cover within the OAA is primarily shrub/scrub with limited wetlands, waterbodies, riparian corridors, or forested areas (see Table 1.1). Field delineations completed for the Project found that 205 locations exhibited wetland or stream characteristics. Of the 205 delineated areas, 10 were classified as perennial streams; 115 were classified as intermittent streams; 25 were classified as ephemeral streams; and 54 were classified as wetlands, ponds, or impoundments. Overall, there are very few wetlands within the Project and the vast majority of the site contains intermittent streams with limited adjacent wetlands. The Project has been designed to avoid permanent impacts to delineated wetlands. Turbines and met towers will be constructed on higher ground within the Project Area to maximize the wind resource, and as such, will not permanently impact wetlands. Additionally, the preliminary design of access roads, the O&M facility and Project Substation are also designed to avoid permanent impacts on delineated wetlands.

Native grasslands are present (NLCD 2016) that may have the potential to support a variety of wildlife and plant species, including migratory birds, species of habitat fragmentation concern, and other species of concern. The OAA is within the Central Flyway for waterfowl and Central Americas flyway for migratory birds; however, it does not appear to have any topographic relief for funneling birds or unique attractants. The OAA has the typical rolling topography for the region with no significant ridges or rock outcrops; although the Medicine Pole Hills, Mud Buttes, and Sunset Butte offer greater topographic relief than the surrounding areas, which may attract raptors. The OAA is a generally dry site with few wetlands, with surface water features consisting of small ponds or impoundments, with minor drainages on site (USGS National Hydrography Dataset 2017, USFWS National Wetlands Inventory 2017). Within the OAA, important

conservation lands include Big Gumbo Audubon Important Bird Area (IBA) and Custer National Forest IBA, (National Audubon Society [Audubon] 2017), State Trust Lands, Bureau of Land Management areas, greater sage-grouse (*Centrocercus urophasianus*) Priority Areas of Conservation (PACs; USFWS 2014) and NDGFD priority sage-grouse habitat (Robinson 2014). No private conservation lands or other state and federal lands are found within the OAA.

2.1.2 Tier 2

Following the Tier 1 evaluation, the OAA was reduced to the 2017 Project boundary and a Tier 2 evaluation was conducted. While the Tier 2 evaluation was conducted using the 2017 Project boundary, the results are representative of the Current Project Boundary because the areas overlap substantially and because the type of assessment occurs at the landscape level. A discussion of minor differences between 2017 Project boundary and Current Project Boundary can be found in Section 3 - Discussion and Impact Analysis.

In accordance with Tier 2 of the WEG, a further review of readily available desktop information was completed to assess potential adverse effects to wildlife and their habitats. Data sources included data requests and personal communications with agencies, USFWS Information for Planning and Consultation (IPaC) website, NDGFD Native Grassland Conservation Areas, USGS Breeding Bird Survey, aerial imagery, and non-governmental organization websites (e.g., Audubon, American Wind Wildlife Institute Landscape Assessment Tool, eBird).

A review of federally listed species with the potential to occur within the 2017 Project boundary was completed using the USFWS IPaC system on May 5, 2017. Results of this search identified gray wolf (*Canis lupus*; endangered), northern long-eared bat (NLEB; *Myotis septentrionalis*; threatened), and whooping crane (*Grus americana*; endangered) as the only federally listed species for Bowman County. In addition, 47 bird species designated as Level I or Level II Species of Conservation Priority by NDGFD were listed in the NDGFD SWAP on May 5, 2017, as potentially occurring within the 2017 Project boundary (Dyke et al. 2015). Also, twenty-four species designated as birds of particular concern were listed in the USFWS IPaC report on May 5, 2017, as potentially occurring within the 2017 Project boundary (Table 2.1).

No designated critical habitats for federally-listed ESA species were identified through the IPaC review as potentially occurring within the 2017 Project boundary. However, greater sage-grouse PACs and areas NDGFD have identified as priority sage-grouse habitat were located within the 2017 Project boundary and the SWAP identifies nine primary Landscape Components and 21 Focus Areas. These Focus Areas represent an area of native vegetation or natural community rare to North Dakota. The NDGFD considers native prairie as a key habitat in North Dakota (Dyke et. al. 2015) and recommends avoiding or minimizing impacts to these areas due to their unique conservation value. Native grassland survey results are referenced below in Section 2.2.3.

Table 2.1. Birds of particular concern by habitat type and season, with potential to occur within the 2017 Bowman Wind Project boundary.

Grassland	Marsh/Waterbodies	Open Woodlands/Shrub	Forest
Baird's sparrow[1] (b)	American bittern[1] (b)	Brewer's sparrow (b)	Black-billed cuckoo[1] (b)
Burrowing owl[1] (b)*	Bald eagle[1] (w)	Peregrine falcon (b)	
Dickcissel[1] (b)	Hudsonian godwit (m)	Red-headed woodpecker[1] (b)	
Ferruginous hawk[1] (b)*	Long-billed curlew[1] (b)	Loggerhead shrike[1] (b)	
Golden eagle[1] (yr)	Marbled godwit[1] (b)		
Grasshopper sparrow[1] (b)	Western grebe (b)		
Greater sage-grouse[1] (yr)	Willow flycatcher (b)		
Prairie falcon[1] (yr)			
Short-eared owl[1] (yr)			
Sprague's pipit[1] (b)			
Swainson's hawk[1] (b)*			
Upland sandpiper[1] (b)			

Source: US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) search of Project Boundary. (May 5, 2017). https://ecos.fws.gov/ipac.

b = breeding, w = wintering, yr = year-round, m = migrating

[1] Species also listed as Level I or Level II Species of Conservation Priority by the North Dakota Game and Fish Department (NDGFD)

* Species known to occur within Project based on NDGFD data provided on June 1, 2017.

Results of the Tier 1 and 2 studies are presented in Table 2.2. This information was reviewed with USFWS and NDGFD on June 20, 2017, and a Tier 3 study plan was recommended and agreed upon on January 30, 2018, by both agencies for Project implementation.

Table 2.2. Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Are known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?	The federally listed gray wolf (*Canis lupus*; endangered) is unlikely to occur in the Project area based on no known population in North Dakota. The Project area is outside of the federally listed whooping crane (*Grus americana;* endangered) migration corridor and is unlikely to occur. Northern long-eared bat (NLEB; *Myotis septentrionalis*; federally threatened), have potential to occur; however limited forested habitat occurs within the Project area. Whooping crane and NLEB are also North Dakota Game and Fish Department (NDGFD) Species of Conservation Priority (SCP). Twenty-four birds are listed as birds of particular concern (US Fish and Wildlife Service Information for Planning and Consultation) have potential to occur within the Project area (Table 2.1). Of these, 22 species have potential to breed within the Project area. Forty-seven SCP bird species have the potential to occur within the Project area (Dyke et al. 2015). Additionally, four bat species are listed as SCP: big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), and Townsend's big-eared bat (*Corynorhinus townsendii*).

Table 2.2. Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
	Bald eagles (*Haliaeetus leucocephalus*) have potential to use the Project area; however, limited habitat is available. Only one bald eagle observation is on record with eBird (2020) within the Project area. No bald eagles have been observed during Breeding Bird Surveys (BBS; Pardieck et al. 2020) in the history of the Bowman BBS (1967 − 2016). Golden eagles (*Aquila chrysaetos*) will likely use the Project area; the Project avoids the primary breeding range for this species (North Dakota Geographic Information Systems 2017). One golden eagle observation has been recorded in the Project area (eBird 2020) and one golden eagle observation has been recorded in the history of the Bowman BBS route. Greater sage-grouse (*Centrocercus urophasianus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) leks are known to occur within the Project area and NDGFD has identified priority sage-grouse habitat within the Project area (2014). No known bat hibernacula or maternity colonies are known to occur within the Project area. Suitable bat habitat is limited within the Project area.
Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to, federally designated critical habitat, high-priority conservation areas for nongovernment organizations, or other local, state, regional, federal, tribal, or international categorizations.	The Project area does not include any areas where development is precluded by law. NDGFD designates native prairie and sage-grouse priority conservation areas as sensitive habitat; however, these areas are not precluded from development.
Are there plant communities of concern present or likely to be present at the site(s)?	Undisturbed native prairie is present in the Project area.
Are there known critical areas of congregation of species of concern, including, but not limited to, maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?	Known sage-grouse and sharp-tailed grouse leks occur within the Original Assessment Area but no known critical areas of congregation including active sage-grouse leks occur within the Project area.

Table 2.2. Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Using best available scientific information, has the developer or relevant federal, state, tribal, and/or local agency identified the potential presence of a population of a species of habitat fragmentation concern (SHFC)?	Baird's sparrow (*Ammodramus bairdii*), grasshopper sparrow (*Ammodramus savannarum*), greater sage-grouse, Sprague's pipit (*Anthus spragueii*) and upland sandpiper (*Bartramia longicauda*) have the potential to occur in the Project area and are SHFC.
Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?	Eagles, along with a variety of other raptor species are likely to occur within the Project area. Waterfowl, waterbirds, and passerines are also likely to occur, especially during migration, but generally have low risk profiles with wind energy facilities. Eight species of bats have potential to occur in the Project area: Townsend's big-eared bat (*Corynorhinus townsendii)*, silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), eastern red bat (*L. borealis*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), western small-footed bat (*M. ciliolabrum*), and NLEB. There is limited habitat for roosting and foraging, and no known caves or hibernacula exist in the Project area.
Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above, and considering the design of the proposed project?	The potential for significant impacts to species of concern is low, based on available data. Although the Project area is likely to be used by eagles and has potential to be used by other sensitive bird and bat species, with the exception of grasslands, limited preferred habitat is available and is unlikely to support any concentration of species.

2.2 Tier 3 Surveys Completed to Date

Based on the results of the Tier 1 and 2 reviews and in coordination with USFWS and NDGFD input, Tier 3 surveys were designed and completed at the Project area and vicinity to understand wildlife usage, evaluate risk, and inform siting and operational protocols. The studies listed in Table 2.3 and discussed in the following sections were developed using various Project boundaries as Bowman Wind progressed through the WEG. A discussion of applicability of these survey results relative to the Current Project Boundary can be found in Section 3 - Discussion and Impact Analysis. Final reports that provide details on the methods and results are included in Appendix B.

Table 2.3. Avian, bat and habitat monitoring and survey efforts conducted for the Bowman Wind Project.

Study Type	Study Period	Reference
Avian Use Surveys	August 2017 − July 2018	LeBeau et al. 2020b
Avian Use Surveys	August 2018 − July 2019	LeBeau et al. 2020a
Raptor Nest Survey and Monitoring	March, June 2018	SWCA Environmental Consultants (SWCA) 2018b
Prairie Grouse Lek Monitoring	April 2018	SWCA 2018c
Prairie Dog Colony Mapping	June 2018, March 2019	SWCA 2018d, Eagle Environmental, Inc. (EEI) 2019a
Native Grassland Assessment	August 2018	SWCA 2018a
Raptor Nest Check Survey	October 2018	Chodachek 2019b
Raptor Nest Survey	March, May 2019	EEI 2019b
Prairie Grouse Lek Monitoring	April 2019	Chodachek 2019a
Northern Long-eared Bat Habitat Assessment	September 2019	Chodachek and Bishop-Boros 2019
Native Grassland Assessment	May 2020 and October 2020	Chodachek and LeBeau 2020
Bat Acoustic Monitoring	July 2020 − October 2020	Bishop-Boros and Chodachek 2020

2.2.1 Birds

2.2.1.1 Avian Use Surveys

Fixed-point avian use surveys to quantify avian use of the Project area were completed from August 2017 to July 2019 (LeBeau et al. 2020a; LeBeau et al. 2020b; Appendix B). The objective of these surveys was to evaluate species composition and seasonal and spatial use of the Project area by birds, with a particular focus on eagles and species of concern. Survey methods were developed in accordance with recommendations outlined in the WEG (USFWS 2012), Appendix C(1)(a) of the ECPG (USFWS 2013), December 2016 Final Eagle Rule (USFWS 2016) and recommendations from USFWS and the NDGFD. Data presented below was collected in the Current Project Boundary. Figures 2.1 and 2.2 provide an overview of the points inside the Current Project Boundary that were included in the analysis and outside of the boundary that were excluded from the analysis.

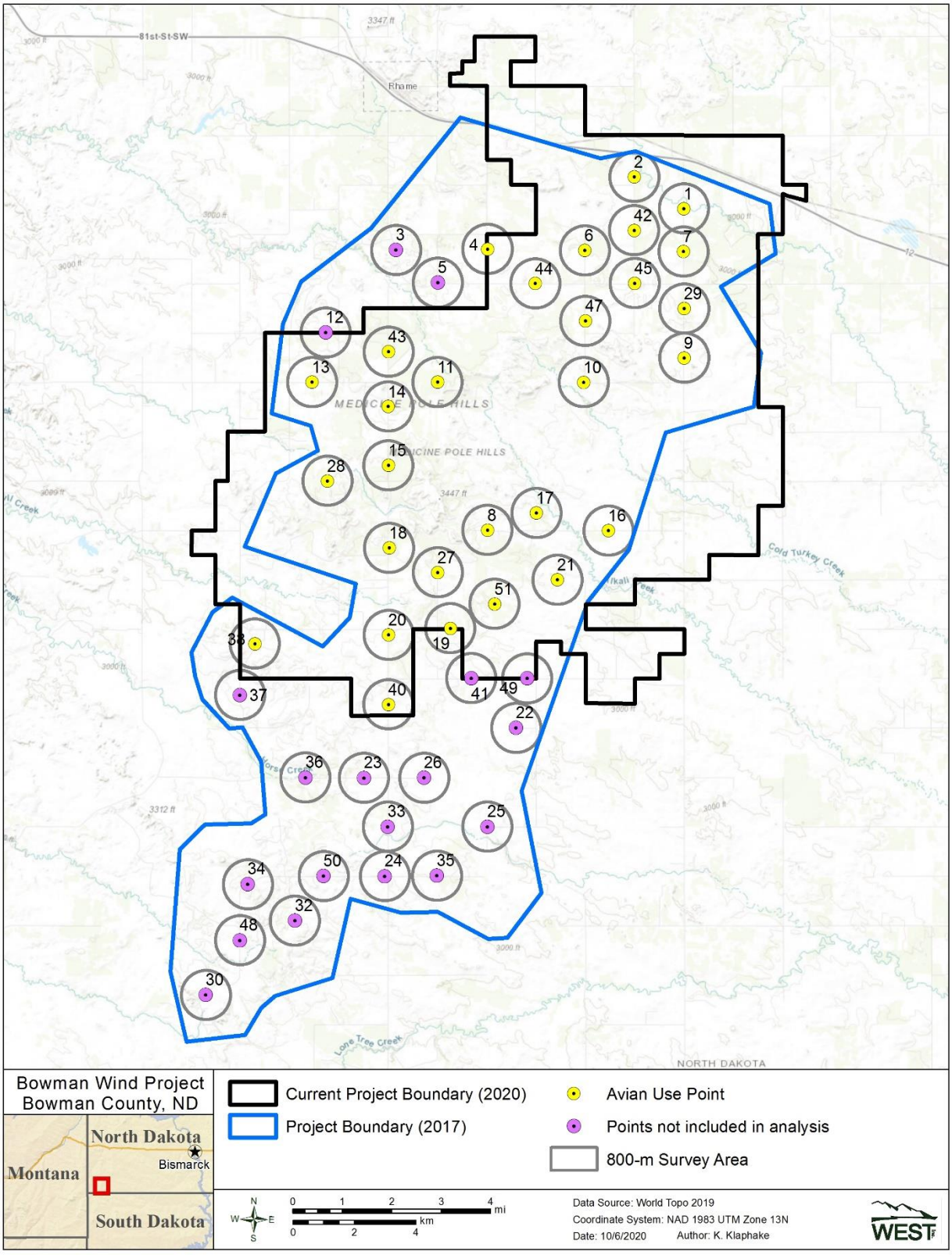

Figure 2.1. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from August 7, 2017 – July 22, 2018, at the Bowman Wind Project, Bowman County, North Dakota.

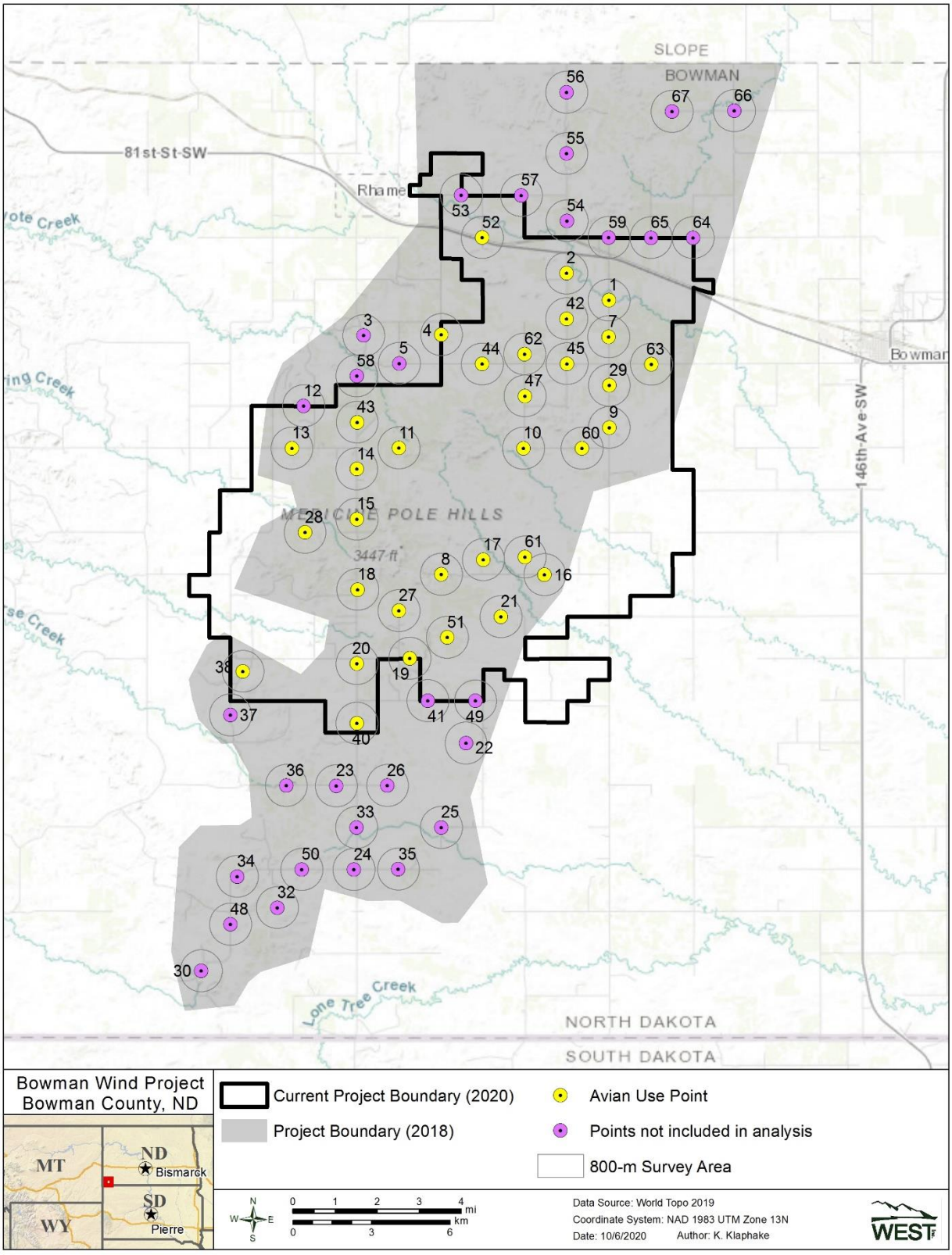

Figure 2.2. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from August 23, 2018 – July 23, 2019, at the Bowman Wind Project, Bowman County, North Dakota.

2017 − 2018

Monthly surveys were completed from August 7, 2017, to July 22, 2018, at 29 points established throughout the 2017 Project boundary (Figure 2.1). Surveys consisted of 10-minute (min) counts of small birds only within a 100-m radius plot, followed by 60-min counts of large birds (including eagles) within 800 m. The 60-min count was further divided into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. WEST completed an analysis of avian use data collected over the 12-month period by SWCA to present results for the Current Project Boundary (LeBeau et al. 2020b).

No federally listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations and 72 golden eagle observations, were recorded during surveys. In addition, five species of concern (ferruginous hawk [*Buteo regalis*], Swainson's hawk [*B. swainsoni*], chestnut-collared longspur [*Calcarius ornatus*], Brewer's sparrow [*Spizella breweri*], and lark bunting [*Calamospiza melanocorys*]) were recorded during surveys.

Thirteen unique large bird species and 29 unique small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (*Branta canadensis*; 80.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 18.5% of large bird species recorded. Swainson's hawk (26 observations) and northern harrier (*Circus hudsonius*; 28 observations) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (*Eremophila alpestris*; 39.7%), western meadowlark (*Sturnella neglecta*; 15.3%), and Lapland longspur (*Calcarius lapponicus*; 10.2%).

2018 − 2019

A second year of avian use surveys were completed monthly from August 23, 2018, to July 23, 2019, at 33 points established throughout the 2018 Project boundary (Figure 2.2). Surveys consisted of 5-min counts of small birds only within a 100-m radius plot, followed by 60-min counts recording large birds (including eagles) within 800 m. The 60-min count was further divided into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. Year 2 data was updated to only present results within the Current Project Boundary.

No federally listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations, 47 golden eagle observations, and two unidentified eagle observations were recorded during use surveys and incidentally. Ten bald eagle observations were recorded during surveys. Forty-three golden eagle observations were recorded during surveys. Two unidentified eagle observations were recorded during surveys, resulting in three risk min. In addition, eight bird species of concern (ferruginous hawk, marbled godwit [*Limosa fedoa*], Swainson's hawk, Wilson's phalarope [*Phalaropus tricolor*], Baird's sparrow [*Ammodramus bairdii*], chestnut-collared longspur, grasshopper sparrow [*A. savannarum*], and lark bunting) were recorded during surveys or incidentally.

Thirty-seven large bird species and 38 small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (45.0% of large bird observations). Nine

identified diurnal raptor species were observed during surveys, accounting for 10% of large bird observations recorded. Northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (25.0% of observations), western meadowlark (19.9%), and red-winged blackbird (*Agelaius phoeniceus*; 14.2%).

2.2.1.2 Raptor Nest Surveys and Follow-up Monitoring

The primary objective of the surveys was to document nesting bald and golden eagles within the 2018 and 2019 Project boundary and respective 10-mi buffer. Additionally, the aerial survey effort included surveys for all raptor nests within the 2018 and 2019 Project boundaries and respective 1-mi buffer. The details of the survey methods and results are found in Appendix B (SWCA 2018b; Chodachek 2018; EEI 2019a). Summarized survey results of the 2018 and 2019 surveys are below.

2018

Aerial raptor nest surveys were completed by SWCA on March 9, 11, and 21, 2018, from a fixed-wing aircraft (SWCA 2018a; Appendix B) and completed in accordance with the ECPG survey protocol. Forty-five non-eagle raptor nests were observed within the 2018 Project boundary and 1-mi buffer, of which 42 (four were occupied and 38 were unoccupied) were within the 2018 Project boundary.

No bald eagle nests were recorded during surveys. Eleven golden eagle nests were located within the 10-mi buffer, four of which were occupied and seven unoccupied (Figure 2.3). The nearest occupied golden eagle nest (SD6) was 5.5 mi south of the 2018 Project boundary in South Dakota, while the three other occupied nests (US21, 11, and 53) are greater than 9.0 mi from the 2018 Project boundary. An additional 14 large stick nests of undetermined occupancy with potential for use by an eagle were recorded during the survey (two within the 2018 Project boundary and 12 are within the 10-mi buffer; Figure 2.3).

Follow-up monitoring for three large stick nests (31, 32, and 52; Figure 2.3) located within the 2018 Project boundary was completed June 22 and 24, 2018, and October 15, 2018 (Appendix B). Based on the follow-up surveys, Nest 31 did not have features consistent with an eagle nest and as such was not classified as an eagle nest, Nest 32 was determined to not be a nest, but rather matted down vegetation, and Nest 52 was confirmed unoccupied during the June nest check and inaccessible during the October nest check (SWCA 2018a; Chodachek 2019b; Appendix B).

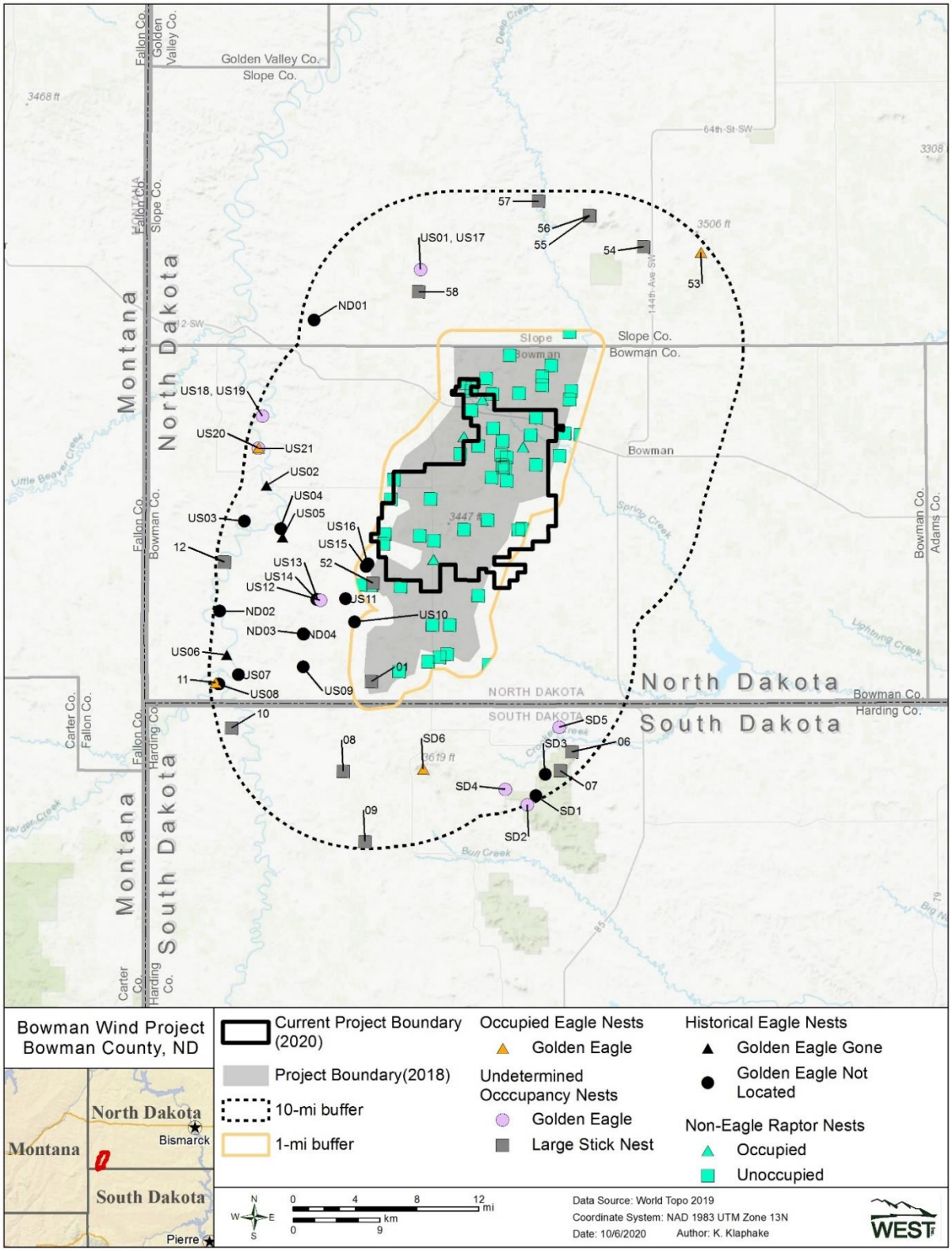

Figure 2.3. Location of eagle nests identified during the 2018 raptor nest surveys completed at the Bowman Wind Project in Bowman County, North Dakota, in March, June, and October 2018.

2019

EEI completed an aerial raptor nest survey from a Robinson R44 helicopter on March 26 and March 27, 2019, following the recommended ECPG survey protocol (EEI 2019). Nest status and terminology was consistent with the methods used during the 2018 eagle nests surveys.

Thirty-five non-eagle raptor nests were recorded within the 2019 Project boundary and 1-mi buffer during surveys (Figure 2.4). Nine of the 35 non-eagle raptor nests were occupied and 26 nests were unoccupied. Three of the unoccupied non-eagle raptor nests were large stick nests of undetermined occupancy with potential for use by an eagle, although more likely to be Buteo nests. Six of the nests were occupied by great horned owls (*Bubo virginianus)* and three were occupied by ferruginous hawks (*Buteo regalis*).

No occupied eagle nests were recorded in the 2019 Project boundary. Two occupied golden eagle nests and one occupied bald eagle nest were recorded within the 10-mi buffer of the 2019 Project boundary during surveys (Figure 2.4). The nearest occupied golden eagle nest (86) and bald eagle nest (81) are located 8.2 mi and 9.1 mi, respectively, west of the 2019 Project boundary. An additional four large stick nests (one within the one-mi buffer to the SW of the Project and three within the 10-mi buffer [to the southwest, west, and north of the Project]) of undetermined occupancy were identified by EEI as having the potential for use by an eagle (Figure 2.4). Of the remaining 17 historical golden eagle nest locations provided by agencies, eight were considered undetermined occupancy and six nests were not located, one was gone and two were missed (Figure 2.4).

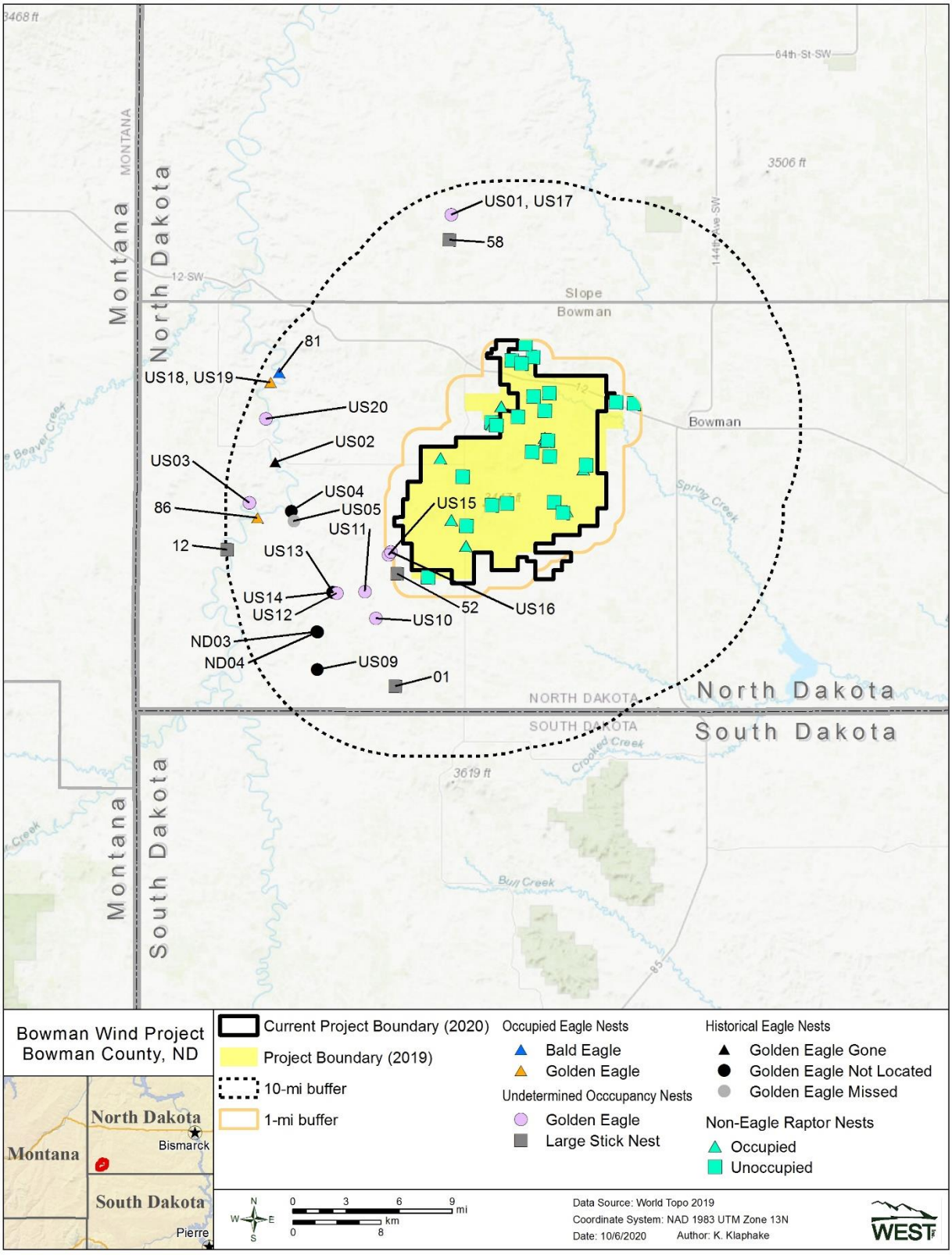

Figure 2.4. Location of eagle nests identified during the 2019 raptor nest survey completed at the Bowman Wind Project in Bowman County, North Dakota, in March 2019.

2.2.1.3 Prairie Grouse Lek Monitoring Surveys

Ground-based grouse lek monitoring surveys were completed to document greater sage-grouse and sharp-tailed grouse (*Tympanuchus phasianellus*) lek activity at known lek locations within the 2017 Project boundary and 2018 Project boundary and associated 1-mi buffers (SWCA 2018c; Chodachek 2018a; Appendix B). Prior to the survey, NDGFD historical lek data was reviewed to determine if any greater sage-grouse and sharp-tailed grouse leks were located within the associated Project boundary and 1.0-mi buffer. Six historical greater sage-grouse and three historical sharp-tailed grouse leks were monitored in spring 2018 and 2019. Surveys followed NDGFD monitoring survey protocol; each lek was surveyed twice, separated by a minimum of seven days. Monitoring surveys were completed from a vehicle from public roads only, with the observer located at an optimal viewing location to observe each lek (between 0.09 – 0.70 mi from lek locations).

Greater sage-grouse lek surveys were conducted by the NDGFD in the spring of 2019 and 2020. Data from these surveys was provided by the NDGFD on August 31, 2020.

2018

Lek surveys were completed on April 11, 2018, and April 23-24, 2018. Lekking activity was recorded at one greater sage-grouse lek (Identification [ID] 25085) and two sharp-tailed grouse leks (ID 23640 and 25129; Figure 2.5). One male and two female greater sage-grouse were visually observed at lek ID 25085. Five male and two male sharp-tailed grouse were heard calling at lek IDs 23640 and 25129, respectively. No activity was recorded at sharp-tailed grouse lek ID 25152 or at greater sage-grouse lek IDs 25530/23681, 25067, 25086, or 25087 (Figure 2.5).

2019

Lek surveys were completed April 2-12, 2019, and April 12-24, 2019. Lekking activity was recorded at sharp-tailed grouse lek ID 23640 on April 11, 2019, where two males were visually observed displaying and sharp-tailed lek ID 25129 on April 24, 2019, where two males were heard calling (Figure 2.6). No grouse lekking activity was recorded at Lek IDs 25530/23681, 25067, 25085, 25086, 25087, or 25152 (Figure 2.6).

2019/2020 (North Dakota Game and Fish Department)

Based on information provided by NDGFD (Kolar 2020), greater sage-grouse lek surveys were completed in April 2019 and April 2020 near the Project. Lekking activity was recorded in 2019 and 2020 at lek ID 25530/23681 (Kolar 2020), which is outside of the Project boundary. A total of three males were visually observed displaying during each survey year. Additionally, the NDGFD stated that greater sage-grouse hen and chicks have been observed in the vicinity of the lek area recently and were likely bred at this lek due to the lack of other known greater sage-grouse leks in the area. Lek ID 25085, approximately eight mi southwest of the Project, was recorded as active. Lek IDs 25067 and 25087 were inactive during surveys conducted in 2019 and 2020 (Kolar 2020).

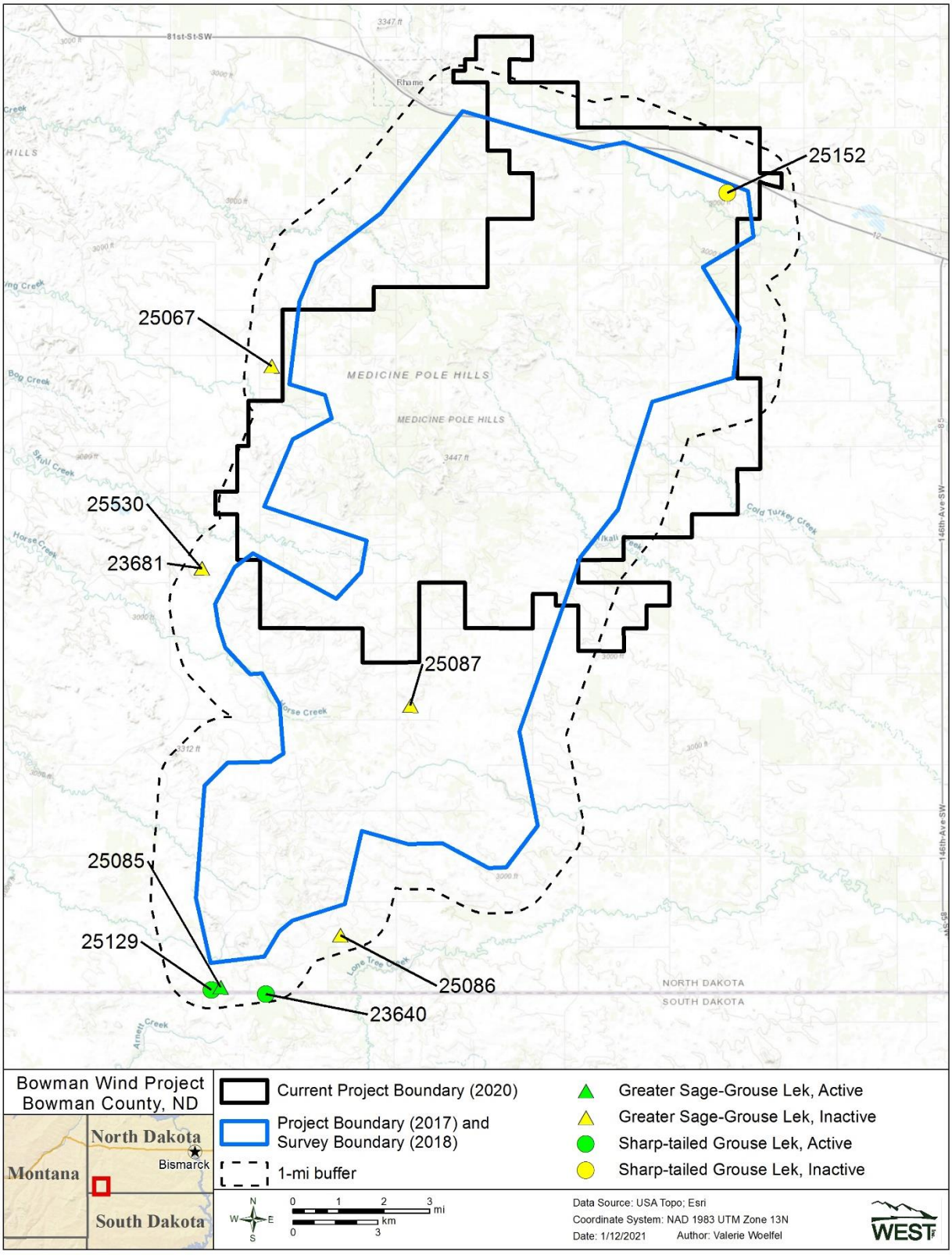

Figure 2.5. Greater sage-grouse and sharp-tailed grouse lek locations surveyed in April 2018 at the Bowman Wind Project, Bowman County, North Dakota.

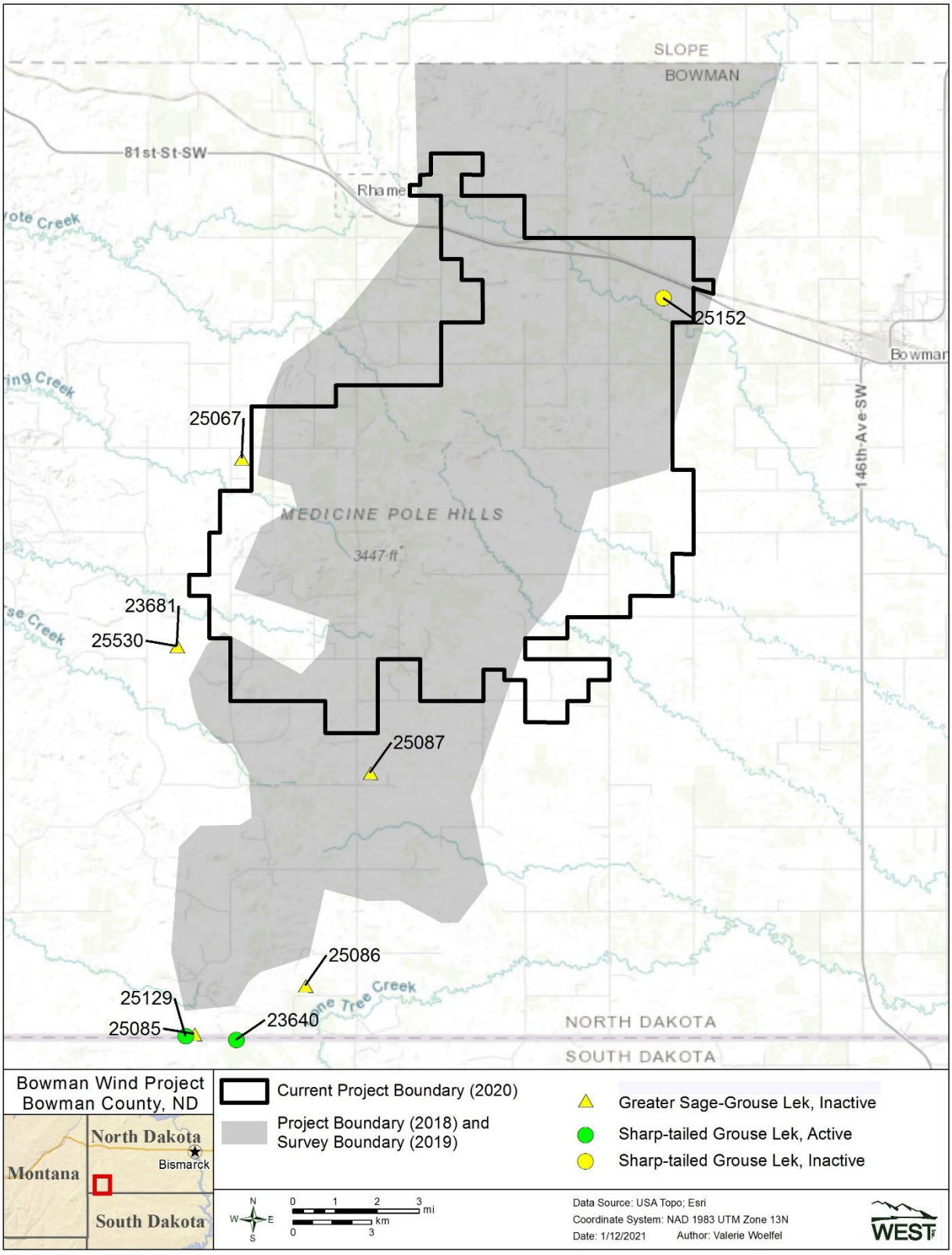

Figure 2.6. Greater sage-grouse and sharp-tailed grouse lek locations surveyed in April 2019 at the Bowman Wind Project, Bowman County, North Dakota.

2.2.2 Bats

2.2.2.1 Northern Long-eared Bat Habitat Assessment

A Phase I Bat Habitat Desktop Assessment for the federally threatened NLEB was completed to identify potentially suitable NLEB summer habitat (roosting and foraging; Chodachek and Bishop-Boros 2019; Appendix B). The desktop assessment was completed in accordance with the recommendations provided by the USFWS *Range-Wide Indiana Bat Survey Guidelines* (USFWS 2019), which also applies to NLEB.

The desktop review of potentially suitable NLEB summer habitat within the 2018 Project boundary and 1,000-ft buffer was completed by reviewing the NLCD (2016) and delineating potential suitable habitat types (i.e., deciduous forest, evergreen forest, mixed forest, and woody wetlands) using Esri Software (ArcGIS 10.3.1). The habitat delineation was cross-checked and edited based on the most recent publicly available aerial imagery from the National Agriculture Imagery Program (NAIP; US Department of Agriculture NAIP 2018).

A total of 171 ac of forested habitat were identified during the desktop review; however, the largest woodlot or forest patch was only 9.3 ac and, therefore, deemed unsuitable for NLEB summer habitat (Figure 2.7). Additionally, NLCD identified 754.0 ac of woody wetlands and four of these patches were determined to be greater than 15 ac. However, upon review of the most updated aerial photography, two of the four woody wetlands were cropland and the other two were ditches with a few trees that were unsuitable for NLEB.

2.2.2.2 Bat Acoustic Monitoring Surveys

The objective of the bat acoustic monitoring surveys was to provide a characterization of the activity levels and seasonality of use of the Current Project Boundary by bats, which conforms to a specific recommendation contained within the WEG. WEST completed bat acoustic monitoring surveys from July 8, 2020 – October 28, 2020, using two ground based SM3 detectors (Bishop-Boros and Chodachek 2020; Figure 2.8; Appendix B). Each SM3 detector was placed at a meteorological tower in cropland or grassland habitat, the dominant land cover type within the Current Project Boundary and representative of likely future turbine locations. Each SM3 detector was placed near the ground at 5 ft above ground level. Batteries and compact flash cards were changed every two weeks.

A total of 976 bat passes were recorded during 216 detector nights for a combine mean (± standard error) of 4.43 ± 0.62 bat passes per detector night. A total of 33.4% of bat passes were classified as low frequency (e.g., big brown bats, hoary bats, and silver-haired bats) and 66.6% of bat passes were classified as high frequency (e.g., eastern red bat and *Myotis* bats). Bat activity (bat passes per detector night) recorded within the Current Project Boundary was relatively low compared to other projects in the Midwest that have completed similar studies of bat activity.

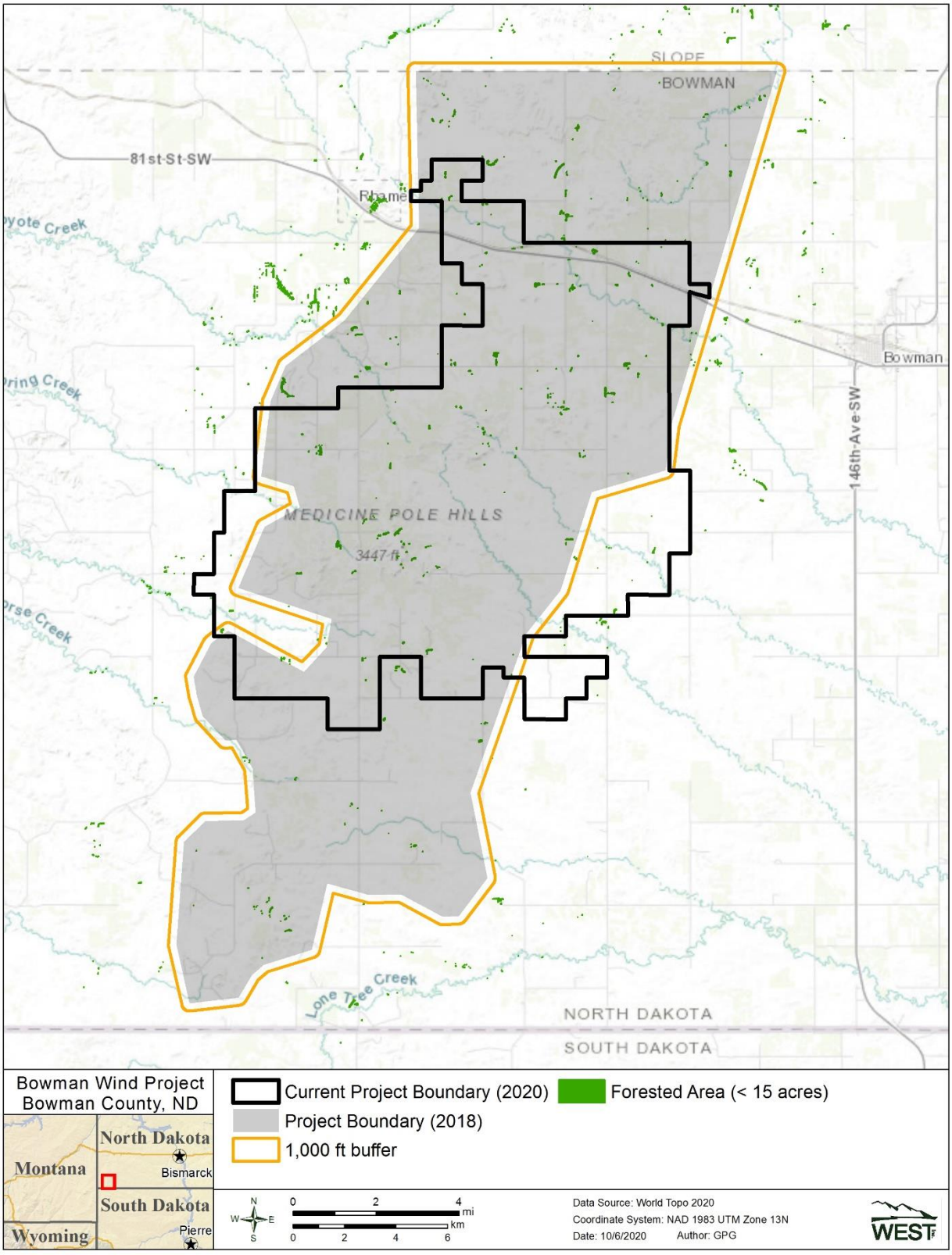

Figure 2.7. Forested habitat areas located within the Project boundary (2018) and associated 1,000-foot buffer at Bowman Wind Project, Bowman County, North Dakota.

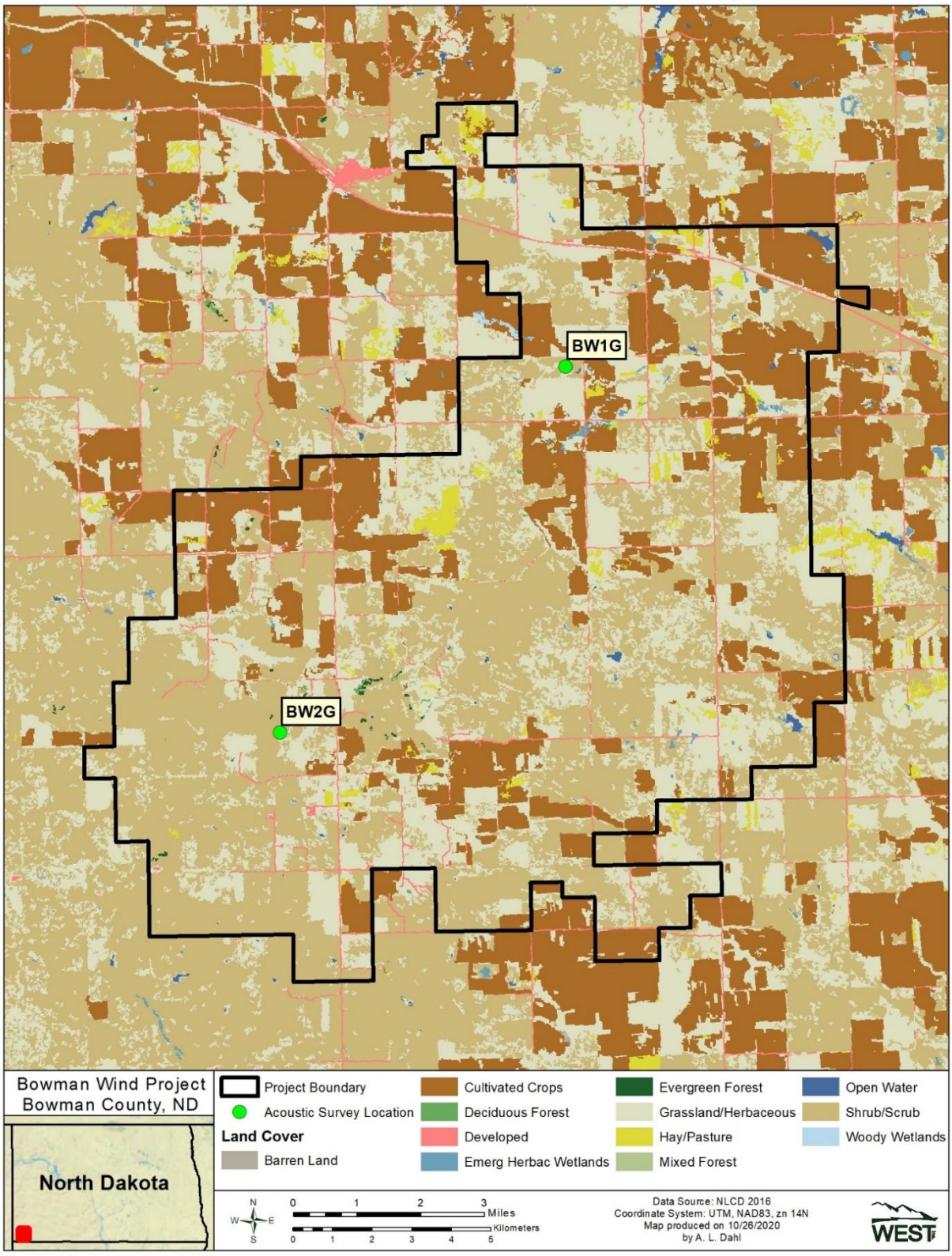

Figure 2.8. Location of acoustic bat monitoring survey stations from July 8 – October 28, 2020, at the Bowman Wind Project, Bowman County, North Dakota.

2.2.3 Grassland Assessment

A grassland assessment was conducted to identify unbroken native prairie (i.e., shows no evidence of soil disturbance) or previously broken grasslands (i.e., soil has been disturbed in some fashion) to help inform siting within the proposed development areas.

2.2.3.1 2018

A desktop assessment identified unbroken grassland habitats that were greater than 160 ac in size within the 2018 Project boundary (SWCA 2018a; Appendix B). The desktop review included a review of current publicly available datasets (e.g., aerial photography, existing land cover data) and datasets provided by Bowman Wind. The assessment concluded approximately 50.0% of the area assessed consisted of unbroken (i.e., not previously tilled/disturbed) grasslands, with 90.0% of these unbroken grasslands occurring in large, contiguous parcels (Figure 2.9).

2.2.3.2 2020

The 2020 grassland assessment was a two-step process that included a desktop review and a field assessment of grassland habitat within a 400-meter buffer of proposed turbines completed within the Current Project Boundary (Chodachek and LeBeau 2020). The desktop review included a review of current publicly available datasets (e.g., aerial photography, existing land cover data) and NDGFD Native Habitat Layer using Esri software (ArcGIS 10.7). A digital data layer classifying polygons as unbroken or broken grasslands was created and used in the field assessment. Field surveys were completed May 20-21, 2020, May 27, 2020, and October 13-15, 2020. Grasslands were visually assessed from public roads and on foot where access was permitted. Areas that differed from the desktop review were delineated using a tablet with ArcCollector and sod types were identified as unbroken native prairie or previously broken grassland. Approximately 51.7% (4,427 ac [1,792 ha]) of the 8,561 ac (3,464 ha) of the assessment area was classified as potential grassland, with 2,365 ac (957 ha) assessed as unbroken native prairie and 2,058 ac (833 ha) assessed as previously broken grassland (Figure 2.10). A small percentage (<0.07%) of grasslands identified during the desktop review were not included in the field survey (Figure 2.10).

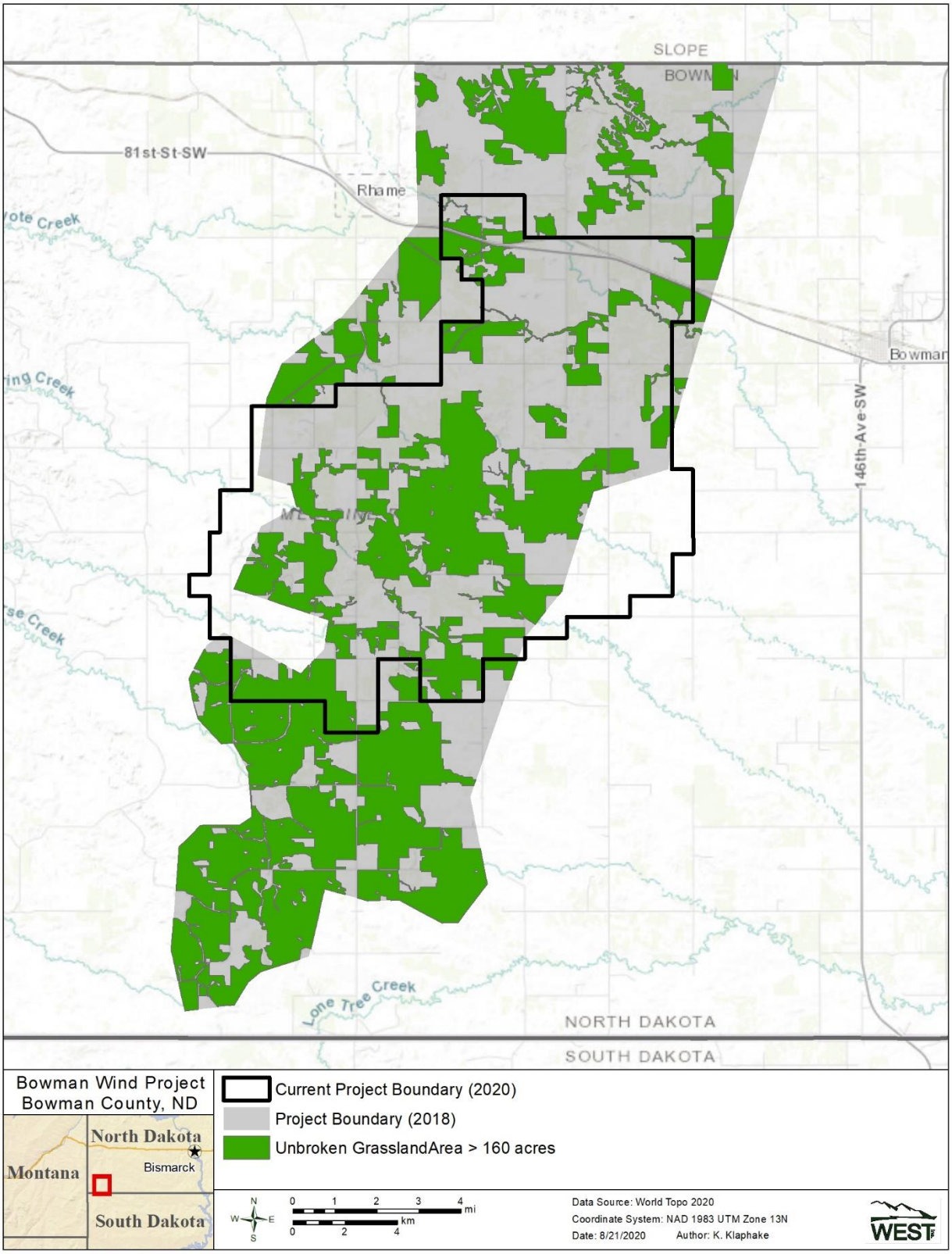

Figure 2.9. SWCA Environmental Consultants Desktop Grassland Assessment results for 2018 at the Bowman Wind Project, Bowman County, North Dakota, in 2018.

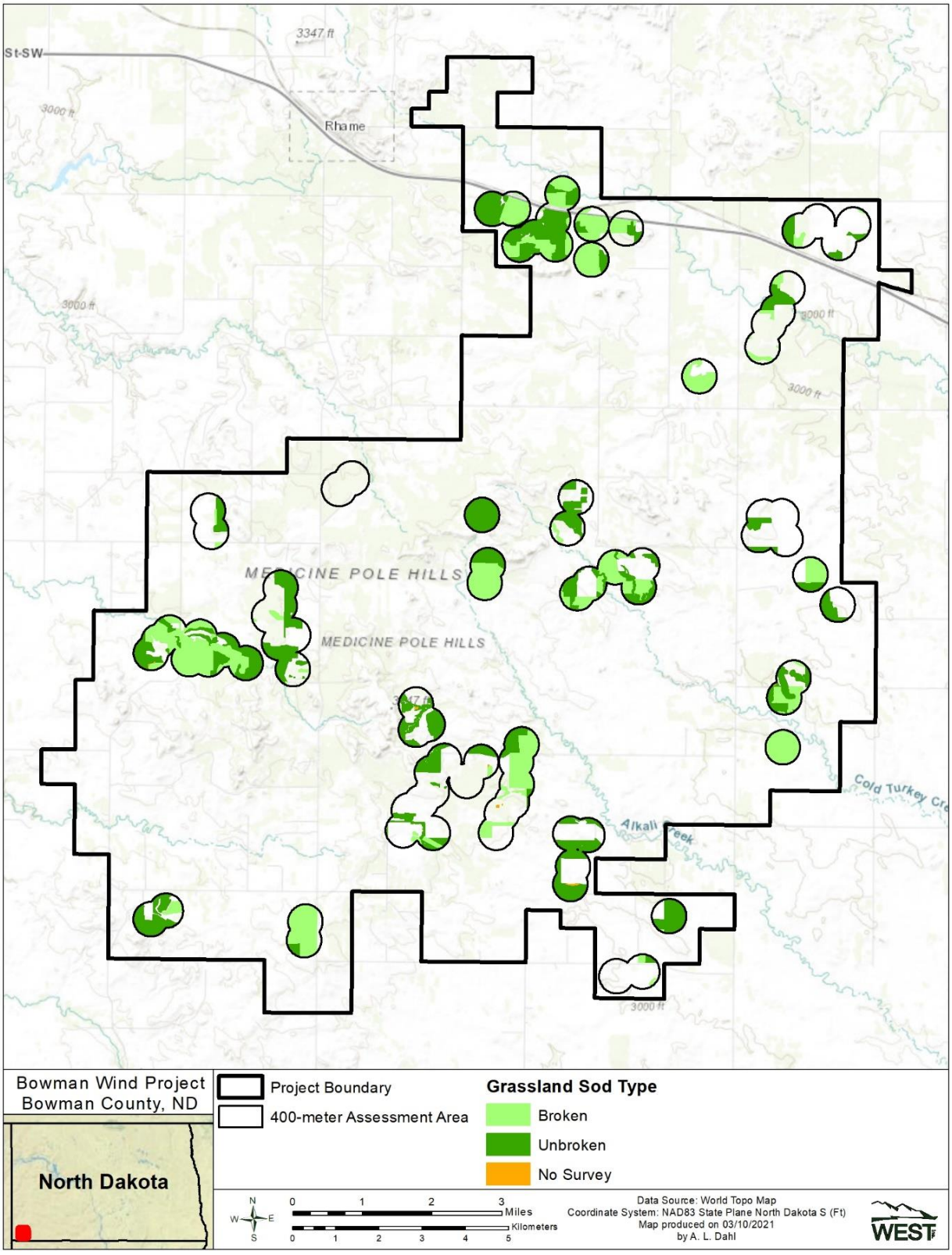

Figure 2.10. Western EcoSystems Technology, Inc. grassland sod types assessed during the Grassland Assessment completed May 13 – 14, 2020, May 27, 2020, and October 13 – 15, 2020, at the Bowman Wind Project, Bowman County, North Dakota.

2.2.4 Black-tailed Prairie Dog Colony Mapping

Black-tailed prairie dogs (*Cynomys ludovicianus*) are a potential prey resource for eagles. As such, black-tailed prairie dog colonies were mapped within the 2017 Project boundary from the ground in June 2018 (SWCA 2018d; Appendix B) and were recorded when incidentally observed within the 2019 Project boundary during aerial raptor nest surveys in March 2019 (EEI 2019b).

2.2.4.1 2018

SWCA completed ground-based mapping surveys from accessible roads and two-tracks within the 2017 Project boundary on June 19 and 21, 2019. When accessible on foot, black-tailed prairie dog colonies were mapped by walking the perimeter of the town and recording locations on a Global Positioning System (GPS) unit. If the colony was not accessible on foot, the biologist mapped the estimated boundaries using aerial photos, topographic maps, and ground features. Data recorded included activity status when possible.

Three active colonies (e.g., colonies with burrows showing fresh signs of use; colonies A, B, and C) were identified within the 2017 Project boundary (Figure 2.11). Colonies ranged in size from 2.7 ac to 112.5 ac. Colony C was the largest at 112.5 ac and was located in the southern portion of the 2017 Project boundary.

2.2.4.2 2019

Prairie dog colonies observed incidentally during aerial raptor nest surveys were recorded on March 27, 2019 (EEI 2019b). The center of the prairie dog colony was recorded with a GPS unit and colonies were estimated using aerial photos, topographic maps, and ground features. Data recorded included activity status when possible.

Seven colonies were identified within the 2019 Project boundary and vicinity (Figure 2.11). Within the 2019 Project boundary, colonies A and B were active and colonies E, F, and G were considered undetermined occupancy; while colonies C and D, both located outside the 2019 Project boundary were active (Figure 2.11). Colonies ranged in size from 3.7 ac to 112.5 ac. Colony C, the largest active colony with an area of 112.5 ac was located outside of the 2019 Project boundary approximately 1 mi south of the 2019 Project boundary Figure 2.12).

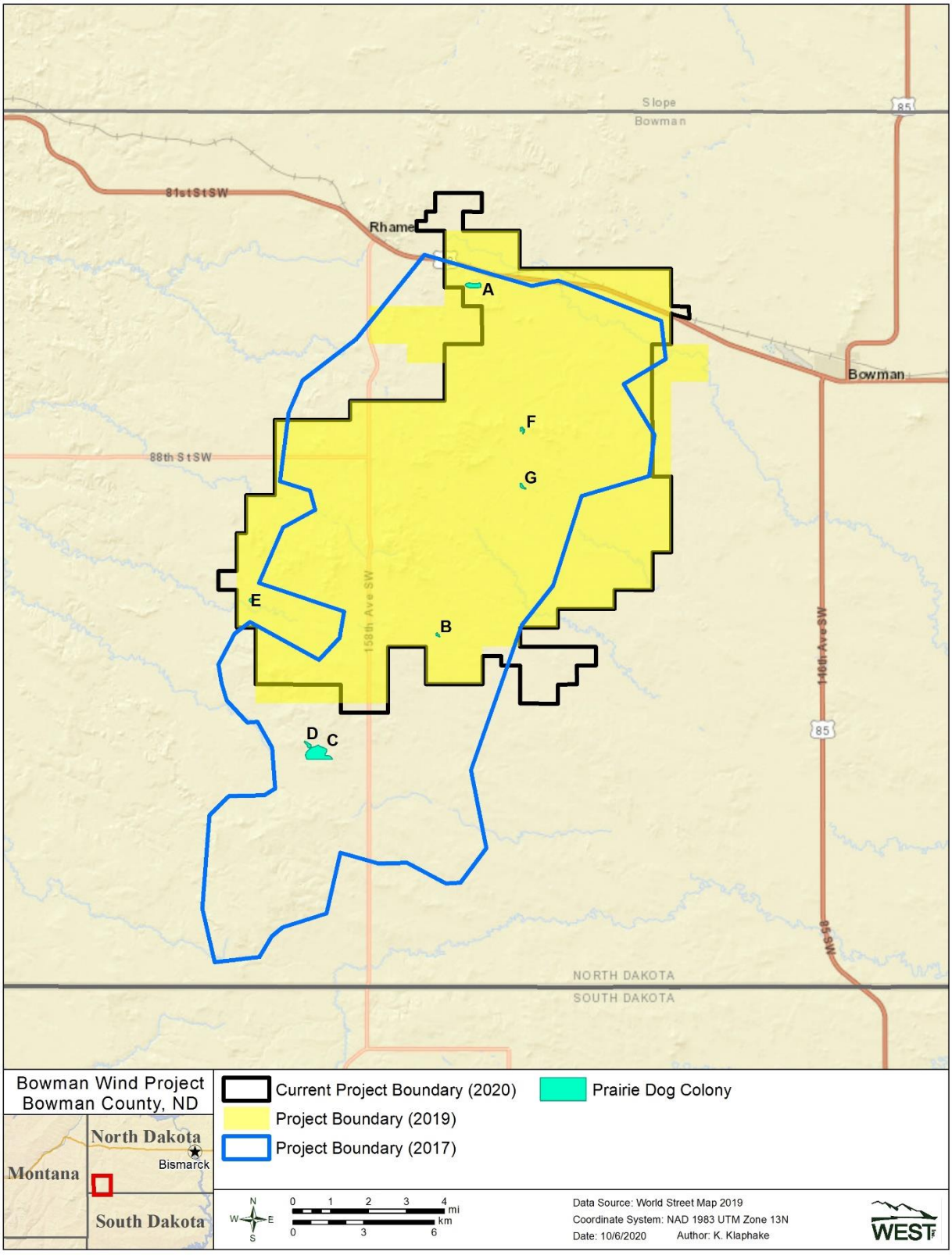

Figure 2.11. Black-tailed prairie dog colony locations for 2018 and 2019 at the Bowman Wind Project, Bowman County, North Dakota.

3.0 DISCUSSION AND IMPACT ANALYSIS

Following the WEG Tiered process, Bowman Wind's initial screening of the broad geographic area determined areas where development may pose significant risks to species of concern and refined the development area to avoid such areas. The Tier 2 evaluation reviewed readily available desktop resources to assess potential adverse effects to wildlife and their habitats within the refined area. Part of that review was to determine potential occurrence of species of concern within the Project area. This review was conducted in 2017 and given that the Project boundary was reduced in size and potential changes in species status, a further review of IPaC was completed August 21, 2020, within the Current Project Boundary (Appendix C). The 2020 IPaC search results no longer included gray wolf as a species with potential to occur within the Project. The number of birds of particular concern with the potential to occur was reduced to four (chestnut-collared longspur [*Calcarius ornatus*], lark bunting [*Calamospiza melanocorys*], long-billed curlew [*Numenius americanus*], and marbled godwit [*Limosa fedoa*]), further demonstrating Bowman Wind's commitment to following the WEG (USFWS 2020). No changes were associated with the NDGFD Species of Conservation Priority, which was last updated in 2015. This section addresses Tier 3 surveys in the context of the current and final Project boundary. A summary of predicted impacts is shown in Table 3.1.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Do field studies indicate that species of concern are present on or likely to use the proposed site?	Field studies indicate species of concern are present and will likely use the Project (SWCA Environmental Consultants [SWCA] 2018b, 2018c, 2018d; Eagle Environmental, Inc. 2019a; LeBeau et al. 2020a, 2020b; Chodachek 2019a, 2019b, Chodachek 2020). Eleven bird species of concern (i.e., North Dakota Game and Fish Department [NDGFD] Species of Conservation Priority [SCP], US Fish and Wildlife Service [USFWS] Information for Planning and Consultation [IPaC], and USFWS Species of Habitat Fragmentation Concern [SHFC]), including four raptors (bald eagle, golden eagle, ferruginous hawk, and Swainson's hawk), four passerines (Baird's sparrow, chestnut-collared longspur, grasshopper sparrow, and lark bunting), two shorebirds (marbled godwit and Wilson's phalarope), and one gamebird (sharp-tailed grouse) were recorded during avian use, raptor nest, and grouse lek surveys. Siting of turbines and other infrastructure can minimize impacts to many of these species. The Project is within the range of northern long-eared bat (NLEB); however, no known hibernacula or breeding habitat exists within the Project. Inactive sage-grouse leks occur within close proximity to the Project; however, no activity was observed at these locations during the 2018 and 2019 lek surveys. During the 2019/2020 NDFGD surveys, one active lek (25530/23861) was recorded approximately 0.75 mi south of the Project and one active lek (males attending lek in the last 5-years) was was recorded more than seven miles (mi) southwest of the Project. Leks 25067 and 25087 were inactive during surveys conducted in 2019 and 2020 (Kolar 2020) No sage-grouse were observed during avian use surveys. The lack of observations suggest the likelihood of use of the Project to be low.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Do field studies indicate the potential for significant adverse impacts on affected populations of SHFC?	Several SHFC and grassland-adapted species were documented during Tier 3 surveys; therefore, there is potential for these species to use the Project. To the extent feasible, the proposed turbine layout and construction plan focuses on developing previously disturbed lands (i.e., cultivated cropland) to minimize impacts to grasslands that SHFC species rely upon. Species of habitat fragmentation concern may potentially be at risk if habitat is further fragmented.
What is the distribution, relative abundance, behavior, and site use of species of concern identified in Tiers 1 or 2, and to what extent do these factors expose these species to risk from the proposed wind energy project?	Data collected for the Project mostly indicate development of the Current Project Boundary is unlikely to trigger substantial impacts to small or large bird populations, including raptors or species of concern (USFWS IPaC, USFWS SHFC, and NDGFD SCP – see below for species included). To the extent possible Bowman Wind will minimize potential impacts to these species by siting turbines, roads, and other infrastructure in previously disturbed lands (i.e., cultivated cropland) outside of undisturbed native prairie. Species of concern, ferruginous hawk and Swainson's hawk, were observed in the Project. The Project contains preferred habitat (shrub/scrub and grasslands); for both species; although, preferred nesting habitat is limited. Historic records indicate these species of concern have nested in and around the Project; however, impacts to raptor species in general, are likely to be low based on the relatively low number of observations and stable populations in the region.
	Chestnut-collared longspur, lark bunting, grasshopper sparrow, and Baird's sparrow are shrub/scrub and grassland species of concern that are likely to breed in the Project. Impacts to these species of concern may be minimized by limiting surface disturbance to any existing, intact grassland habitats. Species of concern marbled godwit and Wilson's phalarope were only recorded during summer, indicating they were potentially nesting in the Project. In general, impacts to these shorebird species are likely to be low based on the relatively low number of observations and very limited amount of open water (0.2%) within the Project.
	Bald and golden eagles were observed throughout the Project, with neither species being concentrated in a particular portion of the Project. Prairie dog colonies (a common prey source of eagles) do exist in and around the Project. No bald or golden eagle nests were observed within the Project; however, nests for both species have been observed within ten miles of the Project. The majority of small and large bird observations were common and geographically abundant species. Populations of these widespread species are unlikely to be affected by collision related mortality associated with the Project.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
	None of the historical prairie grouse leks within the Project were active in 2018 and 2019. Although sharp-tailed grouse is not a species of concern as defined in Tier 1 and Tier 2, it is considered a USFWS SHFC. Two of the monitored sharp-tailed grouse leks were active during the surveys; both leks were located over seven mi southwest of the Current Project Boundary. It is likely sharp-tailed grouse will use unfragmented grassland habitats within the Project to satisfy their life requirements as documented during avian use surveys. Impacts to sharp-tailed grouse may be minimized by limiting surface disturbance to any existing, intact grassland habitats. Greater sage-grouse were not observed within the Project during avian use surveys. The limited available habitat and lack of breeding activity at known leks, the Project's location on the eastern edge of their range, existing level of fragmentation within the Project, and lack of observations within the Project indicate that sage-grouse are not likely to occur within the Project. The NLEB desktop habitat assessment found the assessment area contained limited isolated forested hedgerows, none of which were of sufficient size to constitute suitable NLEB summer habitat. Impacts to NLEB are unlikely due to the lack of forest cover within the Project, lack of nearby hibernaculum, lack of connectivity of small treed areas, and data from state-wide acoustic and mist-netting surveys. Bat activity (bat passes per detector night) recorded within the Current Project Boundary was relatively low compared to other wind projects in the Midwest that have completed similar studies of bat activity.
What are the potential risks of adverse impacts of the proposed wind energy project to individuals and local populations of species of concern and their habitats? (In the case of rare or endangered species, what are the possible impacts to such species and their habitats?)	Bowman Wind LLC is committed to minimizing impacts to wildlife, in particular for grasslands and grassland dependent species to the extent feasible. Turbines, roads, and other infrastructure are proposed to be sited in cultivated croplands and other disturbed areas. Impacts to flora and fauna should minimize both direct and indirect impacts to these species and their habitats. Bird and bat species are susceptible to collision impacts, but these impacts are not expected to adversely impact populations.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
How can developers mitigate identified significant adverse impacts?	Avoid or minimize the disturbance to native grasslands or forested areas during construction and operation of the wind energy facility and associated infrastructure. The proposed design of the Project is such that development will primarily occur in cultivated croplands, thereby minimizing potential impacts to species of concern and grasslands. The best management practices will be developed based on results of the Tier 3 surveys, feedback from State and Federal agencies, and other regional wind energy studies. To offset indirect impacts or displacement of grassland nesting birds, Bowman Wind will implement the application of the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). The priority and goal will be to implement mitigation through averted loss per Shaffer et al. (2019) primary recommendation.
Are there studies that should be initiated at this stage that would be continued in post-construction?	No additional studies are needed.

3.1 Birds

No federally listed threatened or endangered bird species were observed during surveys. Eleven bird species of concern, including four raptors, four passerines, two shorebirds, and one gamebird were recorded during surveys.

Bald eagles were recorded using the Project during spring, fall, and winter, which suggests bald eagles are using the area for foraging and not for breeding. Bald eagle prey resources such as waterfowl and prairie dogs can be found within the Project and bald eagles will likely scavenge on livestock carcasses and wildlife carrion when available. Spatial use was similar over two years of surveys, which indicates the potential presence of a prey base, but the lack of major water features and preferred nesting habitat suggests that the Project is not likely to attract bald eagles in large numbers.

Golden eagles were recorded during all seasons, with the highest use during winter and fall, suggesting increased use of the Project during the migration periods and winter. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat for golden eagles. Although nesting habitat is limited within the Project, primary prey resources, including black-tailed prairie dogs, lagomorphs, and livestock (including sheep and cattle) are located within the Project. Golden eagle use was slightly more concentrated in the northern and central regions of the Project, which is likely due to the presence of prey (prairie dog colonies in northern region) and greater topographic relief of the Medicine Pole Hills in the central region providing foraging

opportunities. Based on the presence of foraging habitat and availability of potential prey resources, golden eagle use within the Project is likely to occur year-round, which is typical for this region. Suitable nesting habitat for golden eagles was present in isolated patches throughout the Project, which included trees, hillsides, and cliff faces. Historic and current records indicate golden eagles have nested within the Project or near the Project.

Bowman Wind is currently preparing an Eagle Conservation Plan to address potential risks to eagles. Consultation will be reinitiated with the USFWS Region 6 Migratory Bird group to voluntarily pursue an eagle take permit for the Project. See further discussion of eagle use of the Project and avoidance and minimization measures in the Bowman Wind Eagle Conservation Plan (Chodachek et al. 2020).

During spring, migratory waterfowl were the most often-observed large bird group, with Canada goose observed more frequently than any other waterfowl species. While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project. The most commonly observed small birds were horned lark and western meadowlark during two years of surveys. These species are typical of this region and are widespread and abundant.

No prairie grouse activity was documented within the Project at known lek sites. However, sharp-tailed grouse were observed during avian use surveys conducted within the Project suggesting potential suitable breeding and nesting habitat exists within the Project. Similar to other breeding birds that rely on intact native grasslands for nesting, potential impacts to unbroken native grasslands and grassland dependent species such as sharp-tailed grouse can be minimized through siting of turbines, roads, and other infrastructure in previously disturbed lands. The lack of greater sage-grouse observations and very limited breeding activity documented by the NDGFD at one known leks suggest it is unlikely that greater sage-grouse will use the project to satisfy their life requirements. If use of the Project were to occur it would be isolated to remaining intact sagebrush habitats within close proximity of leks. Infrastructure sited in sagebrush habitats within 4 mi of an active lek could displace greater sage-grouse that are using any potential suitable habitats within 0.75 mi of infrastructure (LeBeau et al. 2017a). In addition, siting wind energy infrastructure >0.93 mi from occupied/active leks and in a manner that does not bisect leks minimizes the potential for adverse impacts to greater sage-grouse breeding activity (LeBeau et al. 2017b).

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region.

Results from Tier 1, 2, and 3 studies suggest with the implementation of the Avoidance and Minimization Measures (AMMs; Section 4.0), the Project is not likely to create substantial risk to birds.

3.2 Bats

The Project is within federally threatened NLEB range; however, the NLEB habitat assessment documented limited isolated forested hedgerows, none of sufficient size to constitute suitable NLEB summer habitat. Pasturelands, cropland, and undeveloped land, which contained no forested habitat, were discernible on aerial photographs and dominated almost the entirety of the Project.

Results from bat acoustic monitoring indicate that bat activity (bat passes per detector night) recorded within the Current Project Boundary was relatively low compared to other projects in the Midwest that have completed similar studies of bat activity.

3.3 Grasslands

Proposed turbines, roads, and other infrastructure are to be sited in disturbed lands (i.e., cultivated croplands and other disturbed areas) to the maximum extent practicable; thereby avoiding or minimizing the disturbance to native prairie grasslands during construction and operation of the Project. To offset indirect impacts or displacement of grassland nesting birds, Bowman Wind will implement the application of the model (Identification of Potential Offset Locations for 6 Species of Grassland Birds) as outlined in Shaffer et al. (2019).

3.4 Measures to Offset and/or Compensate for Habitat-related Impacts

With respect to the Project site, a key concern identified by the agencies was potential impact to unbroken grasslands (i.e., native prairie grassland) and the potential displacement of grassland birds, as documented in Shaffer and Buhl (2016) at other wind project sites. Bowman Wind met with the USFWS and NDGF on July 31, 2020, and December 16, 2020, to discuss a number of design measures incorporated into the turbine layout that avoid and minimize potential impacts to unbroken grasslands compared to the layout presented during the May 20, 2020, meeting with the agencies. Ongoing Project layouts have incorporated avoidance of the direct placement of primary and spare turbine locations on unbroken grasslands.

To further offset the indirect impacts of displacement of grassland nesting birds per the Shaffer and Buhl (2016) study, Bowman Wind will implement the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). Based on the results of this model, Bowman Wind will implement additional conservation actions, including the acquisition and protection of additional habitat through the use of various conservation partnerships and funding opportunities. The intent from this process is to provide mitigation in a manner that is equivalent to the recommendations provided through use of the Shaffer et al. 2019 model.

Table 3.2 shows the modeling results for the final Layout 059 with the current grassland data (Chodacheck and LeBeau 2020), as well as the Shaffer et al (2019) baseline / preset model assumptions of 300 m impact distance displacement, 53 percent displacement, and 1.9 pairs/ha pre-impact and offset densities.

Table 3.2. Final layout 059 grassland mapping updated based on the Western EcoSystems Technology, Inc. (WEST) field assessment used for the avian-impact offset method to estimate offsets for displaced breeding grassland birds. (Results in this table include 85 total primary and spare turbine locations. The final project layout will total 74 2.82-megawatt turbine locations.)

Parameter	Metric	Units	Source
Impact Distance	300	m	Shaffer and Buhl (2016)
Impact Area	537	ha	Derived from WEST Grassland Assessment
Pre-Impact Density	1.9	pairs/ha	Shaffer and Buhl (2016)
Percent Displacement	53	percent	Shaffer et al. (2019)
Offset Density	1.9	pairs/ha	Equal Value Habitat
Number Pairs in Impact Site	1020	pairs	--
Number Pairs Displaced	540	pairs	--
Offset Area	284	ha	--

Note: This table was replicated from Shaffer et al (2019) Appendix S1, Table S3, Example 2 calculation sheet.
ha = hectares, m = meters

Disturbance to unbroken grasslands has been and will continue to be avoided where possible. The following measures will also be implemented to offset impacts to unbroken native grassland that cannot be practically avoided.

- Disturbance to unbroken grasslands has been avoided where possible and has been discussed through three meetings with the USFWS and NDGFD.
- Bowman Wind will incorporate appropriate restoration efforts using approved native seed mixes (as appropriate and approved by the landowner) to restore temporary impact areas associated with construction activities.
- Any trees or shrubs removed during construction because they could not be avoided will be replaced per the North Dakota Public Service Commission regulations.

4.0 IMPACT AVOIDANCE AND MINIMIZATION MEASURES

This section discusses the avoidance and minimization measures (AMMs) that Bowman Wind has implemented, or plans to implement, to avoid and minimize potential impacts on birds and bats. For fatality monitoring measures, please see Section 5.1.

Bowman Wind has implemented the overarching policy of avoidance, minimization, and mitigation as part of developing the Project. In past discussions regarding the Project, the USFWS and NDGFD have outlined their preferences for avoidance and minimization of unbroken off of unbroken native prairie grasslands, where possible. Avoidance and minimization measures have included: relocating large portions of the Project to the north away from more sensitive landscapes, placing roads along edges of section lines to minimize further fragmentation, moving

turbines off of unbroken native prairie grasslands, and implementation of voluntary offsets using best available science to mitigate any remaining potential displacement to grassland birds. These AMMs were informed by results of pre-construction studies conducted for the Project (Sections 2.1, 2.2, 2.3, and 2.4) and coordination with USFWS and NDGFD.

4.1 Project Layout and Design

Bowman Wind has adopted the following industry-standard and agency informed best management practices (BMPs) to avoid, minimize, and reduce potential impacts to birds and bats during the planning and design stage of the Project:

- The Current Project Boundary has been sited to minimize disturbance to native grasslands.
- Tree clearing, in general, will be minimized by utilizing existing roads and minimizing the size of clearings needed around turbines, to the maximum extent practicable. This measure will minimize potential disturbance to bats and nesting birds as well as minimize conversion of natural areas to Project facilities (habitat loss).
- The electrical collection system will be placed underground to the extent practicable. The 0.74-mile transmission line will be built using APLIC standards to minimize collision risk and electrocution hazards for birds using the Current Project Boundary.
- The number and length of roads, power lines, fences, and other infrastructure will be minimized to the extent practicable. Permanent fencing will only be used around the substation and O&M building as necessary for security and human safety.
- Turbines will be sited as far away as practicable from any natural areas likely to have higher avian activity or diversity.
- Areas of disturbance have been minimized:
    - Infrastructure footprints associated with roads and other infrastructure have been minimized to the extent feasible
    - Area disturbed by pre-construction monitoring and testing activities and installations were minimized to the extent feasible
    - The length and number of access roads were minimized and existing roads will be used when and where feasible
- State-of-the-art facility design features are to be used:
    - To reduce the potential for avian electrocution and collision risk, low- and medium-voltage collector power lines associated with the Project are proposed to be buried to the extent practicable. In the event segments of the collector lines cannot be buried (e.g., existing cable, bedrock) and placed aboveground, structure and line design would be planned to minimize risk to area birds, as discussed below for the Project's transmission line

- The Project's aboveground transmission power lines from the Project substation to the interconnection substation shall be designed and constructed to minimize avian electrocution and collision risks, referencing guidelines outlined in the APLIC's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*, (APLIC 2012) respectively. If guidelines do not apply or measures cannot be incorporated into the Project's line designs, these will be delineated and discussed in future revisions to this BBCS.

4.2 Construction

Bowman Wind will employ the following industry standard BMPs to reduce potential impacts to birds and bats during the construction stage of the Project:

- Wildlife friendly erosion measures will be used during construction to minimize entrapment and potential mortality of small animals and reptiles.
- All employees and contractors working on the site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species and protected species. Training will include:
  - Reducing the potential for vehicle collision by adhering to posted speed limits, being alert for wildlife, and using additional caution in low visibility conditions
  - Confining construction vehicle activity to the limits of disturbance
  - Avoiding harassing or disturbing wildlife, particularly during reproductive seasons
  - Keeping any dogs on site on leashes to avoid the potential for dogs to harass wildlife within the Project
  - Storing food-related trash and waste in containers and removing the containers on a regular basis to reduce attractiveness of the Project to scavengers and prey species
  - Eliminating ponding water following construction to minimize on-site attractants to bats
  - Reviewing the Wildlife Incident Reporting System (WIRS) so the construction team understands the procedures for recording avian and bat species found within the Project area (Section 5.2).

4.3 Operations

Bowman Wind will adopt the following industry standard BMPs to reduce potential impacts to birds and bats during the operational stage of the Project:

- Lighting will be minimized, and/or downward projecting lights or motion sensor-activated lights will be installed as practicable to minimize attractants to birds/bats
- Lighting that does not escape the nacelle will be used, or nacelle lights will be turned off at night as practicable to minimize attractants to birds/bats

- Wildlife carrion and livestock carcasses in proximity to the turbines will be reported for removal as practicable. This measure reduces the attractiveness of the Project to avian scavengers and prey species
- All employees and contractors working on the site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species and protected species. Training will include:
    - Reducing the potential for impacts to wildlife by turning off lighting, adhering to posted speed limits, managing food-related trash and waste appropriately
    - Identification of state- and federally listed species, as well as eagles, so this information can be relayed to the appropriate entity in a timely manner and operational adjustments implemented, if appropriate
    - Review of the WIRS so that the operations team understands the procedures for recording avian and bat species found in the Project.

5.0 OPERATIONAL MONITORING AND WILDLIFE INCIDENT REPORTING

5.1 Fatality Monitoring

Bowman Wind will conduct post-construction mortality monitoring surveys following construction for at least one year to assess and monitor for potential direct impacts to birds and bats, the details of which will be developed through coordination with the USFWS and NDGFD. The post-construction mortality monitoring study will address Tier 4 of the WEG and is consistent with Stage 3 of the ECPG. The recommended post-construction mortality monitoring protocol is as follows:

After the first year of monitoring is complete, a mortality analysis will be completed that evaluates species, number, location, and distance from the nearest turbine for each recovered bird or bat. At a minimum, the mortality analysis will consider the following:

- Number of annual bird and bat mortalities per turbine and per MW, and estimate of facility-wide fatality rates
- Comparison of mortality rates for birds and bats by season (if possible) to determine potential riskier periods
- Comparison to existing public data on bird and bat mortality at Projects with similar habitat types and study methodology

Post-construction monitoring results will be evaluated in coordination with the USFWS and NDGFD, and Bowman Wind may submit a new monitoring plan in the future to USFWS and NDGFD for review and input if new information suggests revisions are warranted.

Appropriate handling permits (i.e., Special Purpose Utility [SPUT] permit and a North Dakota Scientific Collection License) will be secured to ensure the lawful handling of any birds or bats

found or utilized (e.g., raptor carcasses used in bias trials) as part of the implementation of fatality monitoring.

5.2 Wildlife Incident Reporting System

If injured or deceased species protected under the federal ESA or BGEPA are discovered at the Project, Bowman Wind or its representatives will contact the USFWS North Dakota Field Office (701-250-4481) within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. Any detected bird, bat, and other wildlife species carcasses will be reported regularly to the Project's environmental staff for the entire life of the project.

If species listed in the NDGFD SWAP are discovered at the Project, Bowman Wind or its representatives will contact the NDGFD within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact.

5.3 Native Grassland Revegetation Monitoring

Bowman Wind will implement a revegetation plan to re-establish native grasslands that merge with adjacent grassland communities. The general restoration monitoring protocol is described as follows. Prior to construction, those areas with native prairie grassland tracts that may be impacted within all proposed turbine locations and access routes will be identified. Any native grassland areas temporarily disturbed during construction will be revegetated and restored following construction activities. A selected native grassland seed mix that is derived from the Natural Resource Conservation Service recommendations and/or landowner guidance to assist with soil stabilization and minimize the introduction or spread of invasive plants. Bowman Wind will consider and implement additional protection measures or supplemental actions as required to treat any invasive or noxious weed infestations or areas that do not meet landowner objectives.

6.0 ADAPTIVE MANAGEMENT

The WEG describes adaptive management as the process of assessing various management actions and then designing and implementing the management action determined to be the most appropriate for the situation. The management action is then assessed through monitoring and evaluation to determine if the desired results are being met or if adjustments to the management action are warranted.

This BBCS will go into effect immediately upon Project operation to guide management measures for bird and bat species at the Project. The BBCS adaptive management and wildlife incident reporting plan will be effective immediately upon Project operation and for the life of the Project to ensure the adaptive management and reporting objectives for bird and bat species are met.

If mortality of federally listed species or significant impacts to other species of concern is demonstrated for the Project, Bowman Wind will coordinate with USFWS on appropriate adaptive management or other study measures.

The WIRS, or similar system utilized by the Project during O&M, will be used to monitor impacts to birds and bats over the life of the Project. Bird and bat carcasses will be reported regularly to the Project's environmental staff. If abnormal bird or bat mortality events occur at any point over the life of the Project, response actions will be triggered.

Bowman Wind will then investigate, based on the available data, the circumstances under which the event(s) occurred and the species affected. Bowman Wind will coordinate with the appropriate agencies regarding the conclusions of the investigation to determine if potential additional minimization or avoidance measures are necessary to reduce risk to acceptable levels.

Triggers and responses in the Project's adaptive management strategy are outlined in Table 6.1.

Table 6.1. Triggers and responses in the Bowman Wind Project Adaptive Management Strategy.

Trigger	Response
A qualified biologist positively identifies a carcass of an Endangered Species Act-listed species with take prohibitions applicable to the Project	• Notification of the US Fish and Wildlife Service (USFWS) within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. • Investigation of the circumstances under which the event occurred, the species affected, and whether population-level impacts may be occurring. • Coordination with the USFWS to determine next steps.
A qualified biologist positively identifies an eagle carcass	• Notification of the USFWS within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. • Investigation of the circumstances under which the event occurred, the species affected, and whether population-level impacts are suspected. • Re-evaluation of the Project's risk to eagles, to be summarized in a memo provided to the Project owner. Information considered will include: o Incidental observations of eagles at the Project o Bowman Wind, LLC reports of new eagle nest locations near the Project o Wildlife Information Reporting System (or similar) data. • Coordination with the USFWS to determine avoidance measures or to apply for an eagle programmatic take permit.
Discovery of a cluster (at least 5 carcasses) of bird or bat fatalities in space (i.e., at one turbine or other component of Project infrastructure) or time (i.e., found or estimated to have occurred on the same day)	• Completion of a root cause analysis and implementation of appropriate measures, or consultation with the USFWS to determine next steps or further study.
A qualified biologist positively identifies an eagle nest within the Project	• Notification of the USFWS and North Dakota Game and Fish Department within one business day or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact.

7.0 MITIGATION AND CONSERVATION DURING DECOMMISSIONING

At the end of the operational life of the Project, Bowman Wind will reclaim disturbed areas in accordance with lease requirements with landowners. Decommissioning may include removing any and all aboveground equipment, including towers, concrete pads, anchors, guy wires, fences, fixtures, materials, buildings, structures, improvements, and personal property installed by the Project or the Project's affiliates. In addition, foundations to a depth of 1.5 m (or as specified by applicable regulations or Bowman Wind approved Decommissioning Plan) and equipment on the surface shall be removed and Bowman Wind will cover up all pit holes, trenches, or other borings or excavations (but not roads selected by the landowner) and restore the Project area to a clean condition reasonably similar to its original condition and land use.

The following decommissioning BMPs, as outlined in the WEG, will be implemented during the decommissioning process:

- Decommissioning methods will minimize new site disturbance and removal of native vegetation, to the greatest extent practicable.
- Foundations will be removed to a minimum of 1.5 m below surrounding grade (or as otherwise required by state regulation and the approved decommissioning plan) so subsurface structures do not substantially disrupt ground water movements. This depth (1.5 m) is typically adequate for agricultural lands.
- If topsoil is removed during decommissioning, it will be stockpiled and reused when restoring plant communities. Once decommissioning activity is complete, topsoil will be restored to assist in establishing and maintaining pre-construction conditions to the extent possible, consistent with landowner objectives.
- Surface water flows will be restored to pre-disturbance conditions consistent with storm water management objectives and requirements. This will include removal of stream crossings, roads, and pads.
- Overhead power lines no longer needed will be removed.
- After decommissioning, erosion control measures will be installed in all areas of disturbance where potential for erosion exists, consistent with storm water management objectives and requirements.
- Fencing will be removed unless the landowner wishes to utilize the fence.

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Appendix A. Agency Meeting Summaries and Relevant Communication

Jennie Geiger

From: Jennie Geiger
Sent: Monday, July 10, 2017 11:49 AM
To: Kevin_Shelley@fws.gov; John Schumacher (jdschumacher@nd.gov); 'emueller@nd.gov'
Cc: Dave Phillips (dave.phillips@apexcleanenergy.com); Mark Mauersberger (mark.mauersberger@apexcleanenergy.com); Nate Pedder
Subject: BUSINESS CONFIDENTIAL: Follow Up on Bowman Wind Meeting
Attachments: BOW_USFWS NDGF Meeting Summary and PPT_2017-07-10.pdf

Hi Kevin/John/Elisha -

Thank you for taking the time to meet with us last month to discuss our proposed Bowman Wind Project. Attached is a summary of topics discussed during the June 20, 2017 meeting, as well as the Powerpoint presentation (PPT) presented, for your review and consideration. If you could please confirm receipt due to the large file size I would appreciate it.

Also, as discussed during the meeting, we would like to set up a call to discuss lek survey protocols and additional collaboration opportunities. I will send out a doodle poll in the next few days to assist in finding a date/time that is convenient for everyone over the coming weeks.

Thanks,
Jennie

JENNIE GEIGER
Environmental Permitting Manager

Apex Clean Energy, Inc.
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BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees: Kevin Shelley, USFWS
John Schumacher, NDGFD
Elisha Mueller, NDGFD
Jennie Geiger, Apex
Dave Phillips, Apex (by phone)
Mark Mauersberger, Apex (by phone)
Nate Pedder, Apex (by phone)

Notes Prepared by: Apex

Date: July 10, 2017

~~On June 20, 2017, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service (USFWS),~~ and North Dakota Game and Fish Department (NDGFD) to discuss the proposed Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to introduce the Project, discuss and receive input on Apex's Tier 1/Tier 2 and Stage 1 risk reviews completed in accordance with the USFWS Land-based Wind Energy Guidelines (2012) and Eagle Conservation Plan Guidance (ECPG; 2014), and agree on Tier 3 study plans to assess site-specific issues of concern. The following presents a summary of topics discussed and agreed upon next steps.

Apex presented an overview of the company, Project status, risk reviews, and proposed study plans for the Project using the attached Powerpoint (PPT) presentation. There was general agreement that the material presented in the PPT accurately evaluated and characterized the site in accordance with Tiers 1 and 2 and Stage 1 and supported progression to Tier 3/Stage 2 studies[1]. Both agencies expressed their management goals of protecting and minimizing impacts to intact grasslands, and NDGFD noted the importance of considering Level I or Level II species of conservation priority (SCP) in the state Wildlife Action Plan.

Federal/State Listed Species: It was agreed that the Project is located outside the known range of the grey wolf and outside the whooping crane migration corridor, and that species-specific studies were not required to further evaluate risk from Project construction or operation to these species. USFWS confirmed that potential risk to northern long-eared bats could be managed by implementation of the measures presented on slide 19 to minimize risk to this species; however, they indicated few surveys have been conducted on this species to date and additional data would be appreciated.

Eagles: Both agencies agreed that risk to bald eagles is low at the site, but that potential risk to golden eagles warrants ECPG-level studies. It was agreed that the eagle survey plans outlined on slide 21 were appropriate. USFWS indicated that telemetry data from a multiple year tracking study of golden eagles in western ND may be available for review as well and is checking into the availability of the data.

[1] Two revisions were made to slide 14 in response to agency feedback: 1) the bullet indicating "overall low risk of impact to BOCC" was removed, and 2) BOCC species that are also listed as Level I or Level II species of conservation priority in the state Wildlife Action Plan were identified in the table.

Other Avian: It was agreed that sharp-tailed grouse (SCP Level II) and greater sage-grouse (SCP Level I) are likely to occur in or near the Project area and lek surveys are warranted. The scope and details of the surveys will be determined prior to the spring 2018 survey period in coordination with both USFWS and NDGFD in order to most effectively support agency initiatives for grouse conservation in the region.

Tier 3 Survey Plans: The following surveys were recommended and agreed upon for the project:

- Aerial raptor nest surveys out to 1 mile and eagle nest surveys in suitable habitat out to 10 miles, completed no later than leaf-on in spring 2018
- 1-2 yrs of ECPG level surveys (approximately 30% of the area evaluated with 800-m plots, 1x/mo)

Both agencies voiced interest in the Project's studies resulting in useful information for the agencies' regional conservation initiatives; therefore, additional discussions are planned to identify opportunities for collaboration.

Action Items:

- USFWS/NDGFD to look into attaining golden eagle telemetry data.
- Apex to schedule a follow-up call with USFWS and NDGFD regarding lek survey protocols and to discuss additional collaboration opportunities.

Ryan Henning

From: Ryan Henning
Sent: Friday, February 9, 2018 3:09 PM
To: 'sdyke@state.nd.us'; 'Kevin_Shelley@fws.gov'
Cc: Dave Phillips; Jennie Geiger; Mark Mauersberger
Subject: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting
Attachments: BOW_NDGF USFWS Agency Meeting Summary_2018-02-09.pdf

Good afternoon Steve and Kevin,

Thank you for meeting on January 30, 2018 to discuss the Bowman Wind Project. I have attached meeting notes outlining the topics discussed for your review and consideration.

We really appreciate your time and helpful input.

Regards,

-Ryan

RYAN HENNING
Sr. Permitting Manager

Apex Clean Energy, Inc.
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BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees: Kevin Shelley, USFWS
John Schumacher, NDGFD
Elisha Mueller, NDGFD
Josh Montgomery, NDGFD
Steve Dyke, NDGFD
RJ Gross, NDGFD
Ryan Henning, Apex Clean Energy
Jennie Geiger, Apex Clean Energy (by phone)

Notes Prepared by: Apex Clean Energy

Date: February 9, 2018

~~On June 20, 2017, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service (USFW~~S), and North Dakota Game and Fish Department (NDGFD) to discuss the Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to update the agencies on the status of the Project and to agree on specifics for the Tier 3 studies recommended by each agency. The following presents a summary of topics discussed and agreed upon next steps.

Eagles: USFWS confirmed that ECPG-level surveys to evaluate potential eagle use of the Project area and to identify nests within 10 miles were appropriate for the Project. USFWS requested that Apex set up a meeting after nest surveys are complete to discuss findings

Prairie Grouse: NDGFD indicated that they complete lek surveys for greater sage-grouse and sharp-tailed grouse in and around the Project area and are monitoring translocated greater sage-grouse in Bowman County. NDGFD offered to provide the most current historical and active lek location data to inform facility siting. It was agreed that Apex should supplement the annual NDFG lek surveys by surveying known leks (including historic lek sites) in or within 1 mile of the Project area. The lek surveys will occur from 0.5 hours before sunrise to 1 hour after sunrise, with 2 visits to each lek location between April 1 to May 15, where site access is available.

Other: It was agreed that prairie dog colonies should be mapped to inform siting of project features in response to potential prey concentrations. Apex will obtain data on existing prairie dog colonies from NDGFD, confirm boundaries and status of these colonies, and map additional colonies observed within the Project area.

NDFGD recommended that Apex delineate all areas of previously untilled (i.e., native prairie) grassland that are larger than 160 acres, using a combination of available data and field verification. The goal of this work is to inform siting of project facilities to avoid and minimize impacts to these tracts, and to enable quantification of impacts where necessary to inform potential mitigation strategies.

Final Tier 3 Survey Plan: The following surveys were recommended and agreed upon for the project:

- Aerial raptor nest surveys out to 1 mile and eagle nest surveys in suitable habitat out to 10 miles, completed no later than leaf-on in spring 2018
- 1 - 2 years of ECPG-level surveys (approximately 30% of the area evaluated with 800-m plots, 1x/month)
- Check historic and active leks within the Project area and 1-mile buffer. Surveys will occur from 0.5 hours before sunrise to 1 hour after sunrise and from April 1 – May 15.
- Mapping of intact grassland habitats > 160 acres in size

Action Items:

- NDGFD to provide existing lek and prairie dog data for the assessment areas.
- Apex to implement above survey plan and review results with the agencies once complete

From: Ryan Henning
To: "Kevin Shelley"
Subject: BOW - Bat Discussion Follow UP
Date: Thursday, July 5, 2018 3:44:07 PM
Attachments: image001.png

Hi Kevin,

Thanks for your time today discussing bat surveys, and specifically northern long-eared bat (NLEB) risk at the Project and the applicability of the 4d Rule. As discussed/agreed, no acoustic or mist netting work is recommended at this time to assess risk to bats, and the Project will complete an assessment of potentially suitable NLEB summer habitat to evaluate summer risk and identify areas that may warrant further management consideration. We will provide you with the results of the habitat assessment once complete for further discussion.

Talk to you soon.

-Ryan

RYAN HENNING
Sr. Permitting Manager

Apex Clean Energy, Inc.
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BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees: Scott Larson, USFWS
Natalie Gates, USFWS
Ryan Henning, Apex Clean Energy
Dave Phillips, Apex Clean Energy

Notes Prepared by: Apex Clean Energy

Date: October 26, 2018

~~On October 9, 2018, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service~~ (USFWS) to discuss the proposed Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to update the agency on changes to the Project boundary since the June 2017 agency meeting, review Tier 3/Stage 2 survey results, and agree on next steps in accordance with the USFWS 2012 Land-Based Wind Energy Guidelines (WEG) and 2013 Eagle Conservation Plan Guidance (ECPG). The attached PowerPoint presentation was presented, and the following summarizes the meeting.

Federally-Listed Species: It was agreed that there were no new species listings since the last agency Project review in June 2017, that the three-species listed (whooping crane, northern long-eared bat, and gray wolf) are unlikely to occur in or be affected by the Project, and no further studies or management consideration are warranted.

Eagles: Based on the year 1 eagle use data and estimated modeled take, it was agreed that the project presents a fairly low risk to eagles and an Eagle Take Permit may be appropriate for the Project to consider. Therefore, a second year of ECPG-level avian use surveys was initiated in August 2018 to comply with the Eagle Rule requirements for permitting. It was agreed that developing an Eagle Conservation Plan using year 1 data was appropriate, and that updating it and an applicant prepared draft Environmental Assessment (EA) with the Year 2 results in August 2019 may provide the most efficient path forward to obtain incidental take authorization for potential take of bald and golden eagles during operations. USFWS recommended that Apex coordinate with the USFWS Region 6 Migratory Bird Office to develop an Eagle Conservation Plan and EA. The purpose of this approach is to develop an ECP and Draft EA that allows for agency coordination and a comprehensive permit application to be submitted August 2019 that meets the specifications of the Department of Interior August 6, 2018 Secretary of the Interior Memorandum that provided *Additional Direction for Implementing Secretary's Order 3355 Regarding Environmental Assessments*.

Lastly, it was agreed that the Project would avoid siting wind turbines within 500 feet of an active prairie dog colony to minimize risk to foraging raptors, including eagles.

Bats: Apex completed a NLEB suitable habitat assessment for the project. No suitable summer habitat occurs within the project and it was agreed that no further bat studies or impact avoidance measures are warranted.

Prairie Grouse Leks: To minimize impacts to prairie grouse, Apex agreed to repeat the lek survey in spring 2019 (or in the spring preceding construction) using the same methods as used in 2018 and avoid siting turbines within 0.25 mile of active sharp-tailed grouse leks and within 1 mile of active greater sage-grouse leks. In addition, Apex agreed to implement a timing stipulation of no construction activities from 3 hours before until 3 hours after sunrise within 1 mile of an active sharp-tailed grouse lek from April 1 to July 15; and within 2 miles of an active greater sage-grouse leks from March 15 to May 15.

Grasslands: It was acknowledged that minimizing impacts to unbroken (untilled) grasslands is not required by regulation, but that it potentially reduces fragmentation and indirect effects on grassland birds. Apex completed a desktop review of unbroken grasslands within the Project area. Ground verification and mapping is planned for late 2018 or early 2019. The results of the unbroken grassland assessment will be used to inform siting and minimize impacts.

Action Items:

- Apex to provide copies of raptor nest, prairie dog, and lek survey reports completed to date
- Apex to coordinate with USFWS on ECP and draft EA development
- Apex to complete grassland field verification to inform siting.

Ryan Henning

From: Ryan Henning
Sent: Friday, October 26, 2018 1:32 PM
To: 'kevin_kritz@fws.gov'
Cc: 'brian_w_smith@fws.gov'
Subject: Business Confidential: Follow Up on Bowman Wind Project
Attachments: BOW_USFWS Meeting Summary and PPT_2018-10-26.pdf

Hi Kevin,

Thanks for the call back on Wednesday. As we discussed, Apex Clean Energy is developing the Bowman Wind Project in Bowman County, North Dakota. The project is planned to be 200 megawatts (MWs) and would likely use either 62 @ 3.2 MW turbines or 52 @ 3.83 MW turbines. The project initiated agency coordination in June 2017 whereupon Tier 1&2 and Stage 1 assessments were reviewed with FWS and NDGFD and Tier 3 /Stage 2 studies were recommended and initiated. The project has completed a number of these surveys including the spring 2018 raptor and eagle nest survey and year 1 ECPG-level avian/eagle use surveys from Aug 2017 – Jul 2018. A 2nd year of ECPG-level study will be complete by July 2019, at which time we plan to submit our ECP, draft EA, and permit application, ideally for permit issuance on or before February 2020. Therefore, as discussed, we request that the Bowman Wind Project be added to your priority list of wind projects seeking an Eagle Take Permit with the Region 6 Migratory Bird staff so we can achieve this schedule. Please see the attached PPT and meeting summary from our recent FWS meeting, which details our eagle findings to date on slides 12, 14, and 15, and take estimates based on year 1 data on slide 16.

Please let me know if you have any questions or need additional information. I will plan to follow up with you shortly.

Regards,

-Ryan

RYAN HENNING
Sr. Permitting Manager

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GOVERNOR Doug Burgum

DIRECTOR, Terry Steinwand
DEPUTY, Scott A. Peterson

"VARIETY IN HEIN t BING ANC) FISHING"

NORTH DAKOTA GAME AND FISH DEPARTMENT

100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58301-505S PHONE 701-328.6300 FAX 701-328-6332

19 June 2020

Scott Jansen
Senior Development Manager
Apex Clean Energy
8665 Hudson Blvd North, Suite 110
Lake Elmo, MN 55042

Dear Mr. Thomas:

RE: Requesting Comments on an up to 200-megawatt Wind Farm in Bowman County, North Dakota

The North Dakota Game and Fish Department (Department) was first introduced to the Bowman Wind Farm in fall of 2018. In early coordination meetings, the Department expressed concerns on the negative impacts the project may have on native habitats, particularly, unbroken grasslands, as well as species of concern such as the Greater Sage-Grouse. Despite these concerns, there has been virtually no coordination during project development. It wasn't until receiving your letter, dated May 11, 2020, that the Department was solicited for official comments on the project boundary. However, only one week later, the Department received a near-final turbine layout (email correspondence, May 19, 2020). Further, it was not until after our meeting on May 28, 2020 that any pre-construction surveys were shared. In this letter, the Department will provide initial comments based on the project boundary and turbine locations only. Comments, questions, and/or concerns based on the wildlife reports will be provided once the Department has had sufficient time to review all documents. However, with an expectation to submit a permit application to the Public Service Commission in July 2020, these discussions and information-sharing should have taken place long ago.

First and foremost, the project landscape encompasses a significant amount of relatively undisturbed native habitats (Map A). Native prairie is the most endangered ecosystem in North Dakota and, as we are a grassland state, the majority of our native species are linked to, and dependent upon, prairie. Disturbance, fragmentation, and loss of native prairie have adversely impacted a wide variety of species and these negative impacts will only continue to compound as more development takes place on the landscape. The remaining tracts of unbroken prairie, regardless of size, are becoming more and more vital to many declining bird and pollinator species. This habitat supports 30 or more of the 115 Species of Conservation Priority identified in the North Dakota State Wildlife Action Plan (Dyke et. al 2015). For species of conservation priority, such as the Chestnut-collared Longspur with a trend of -4.3 (4.3% of the population is lost annually), Lark Bunting with a trend of -3.4, and Grasshopper Sparrow with a trend of -2.8 (Breeding Bird Survey trend data, U.S. Department of Interior), the loss and fragmentation of native prairie in the project area may further negatively impact these rapidly declining species (Maps B, C, and D).

Wetlands are another productive wildlife habitat in North Dakota, supporting 54 Species of Conservation Priority, as well as a considerable number of waterfowl, shorebirds and cranes throughout the year. Athough wetlands within the project area are minimal, the resources they provide are still of value to many of our native species, especially in a landscape where these resources are so limited.

Finally, although the Department believes the best way to protect our species of conservation priority is by taking a habitat-focused approach, we would also like to reiterate the following species-specific concerns.

- Greater Sage-Grouse have been experiencing sharp declines nationwide, have a highly restricted geographic range in North Dakota, and have been shown to be negatively impacted by energy development, including wind development. For these reasons, the Department's first recommendation is to discontinue permitting energy development within the Priority Conservation Areas. Further, the Department also recommends no surface occupancy within 4 miles of an active sage-grouse lek (active is defined by being attended by >1 male Sage-grouse in the previous 5 years) (Map E).

- Nearly 31% of the global population of Sharp-tailed Grouse falls within North Dakota and declines to the state's population will likely lead to range-wide population declines. Sharp-tailed Grouse are a high-valued upland game bird, and because research indicated that prairie grouse may be adversely affected by energy development, it is important that lek surveys be conducted to understand the risk associated with development. The Department does not survey the entire state for lek activity; however, based on counts conducted in nearby areas, it can be estimated that there are approximately 0.5-1 Sharp-tailed Grouse leks per square mile in areas predominated by grassland habitats (Map F).

- The greatest density of Golden Eagle nests in the state lies along the Little Missouri River, west of the project boundary. Golden Eagles have also been

known to use the project area quite extensively (Map G). Further, as Bald Eagle numbers increase each year in North Dakota, it is possible that Bald Eagle nests may be found anywhere within the project boundary where large trees are present. Therefore, it is highly recommended that Apex work closely with the United States Fish and Wildlife Service to comply with federal law regarding both Golden and Bald Eagles.

- Bats are long-lived, reproduce slowly, and migrate long distances, making them particularly susceptible to wind development. Acoustic surveys should begin at a minimum two years pre-construction to assess the risk the project poses to local bat populations.

- Whooping Cranes are a federally listed endangered species that use a wide variety of shallow wetlands for roosting and foraging. Though risk may be low within this project boundary, the Department recommends Apex contact HAPET in Bismarck to request the Whooping Crane model of predicted use of landscapes.

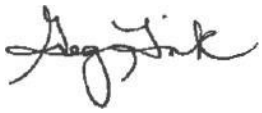
The Department has a number of resources available for the benefit of the developer and consultant, including maps and information on native habitats, priority areas, and sensitive species. Core native habitat layers are available via Esri REST Services https://gf.nd.gov/maps/data then selecting North Dakota Game and Fish Department Species Range and Habitats. In early 2020, the North American Migratory Bird Joint Ventures released a Potentially Undisturbed Lands report and GIS layer. Again, if project proponents had maintained better communication with the Department during project development, you would have been aware of these resources earlier on. Including the Department's stance on avoiding siting wind turbines and associated infrastructure on any size tract of unbroken grassland. It appears more than half of the turbines (from the near-final layout) will be sited on unbroken grassland which is both disappointing and disconcerting considering the efforts other wind proponents have recently made to avoid destroying this irreplaceable habitat. The Department also recommends working with the U.S. Fish and Wildlife Service, as any state guidelines or recommendations do not relieve the developer of its obligations to comply with any applicable federal regulations. It is to our knowledge that the Service provided comment on many of these issues in a 2019 letter.

As we continue to address the challenges of stemming the decline of our state's most sensitive species, we cannot endorse or consent to the disturbance, fragmentation, and loss of the remaining high value habitats essential to Species of Conservation Priority without recommending that suitable replacement or offsets be applied back onto the landscape. Ensuring these habitats remain on the landscape is the only way to stem the decline of these species and prevent further listings through the Endangered Species Act, which could impact both the state and its citizens by placing further restrictions on the development and management of both private and public land. The Department has stressed the importance of following the best available science in determining impacts and voluntary offsets. The best science addressing North Dakota resources are Loesch et al.

2013, Shaffer and Buhl 2016, and Shaffer et al. 2019 and these papers should be used to help guide Apex if it is decided that a voluntary offset package should be created.

As Apex moves forward with this project, the Department requests to remain informed. To accurately analyze the project and provide valuable feedback to the PSC, it is important that the Department receives all documents, including wildlife surveys, spatial data, and any voluntary offsets being proposed 100 days prior to the hearing date.

Sincerely,



Greg Link
Chief, Conservation and Communications Division

Cc: Drew Becker, US Fish and Wildlife Service
ND Public Service Commission
Bowman County Planning and Zoning

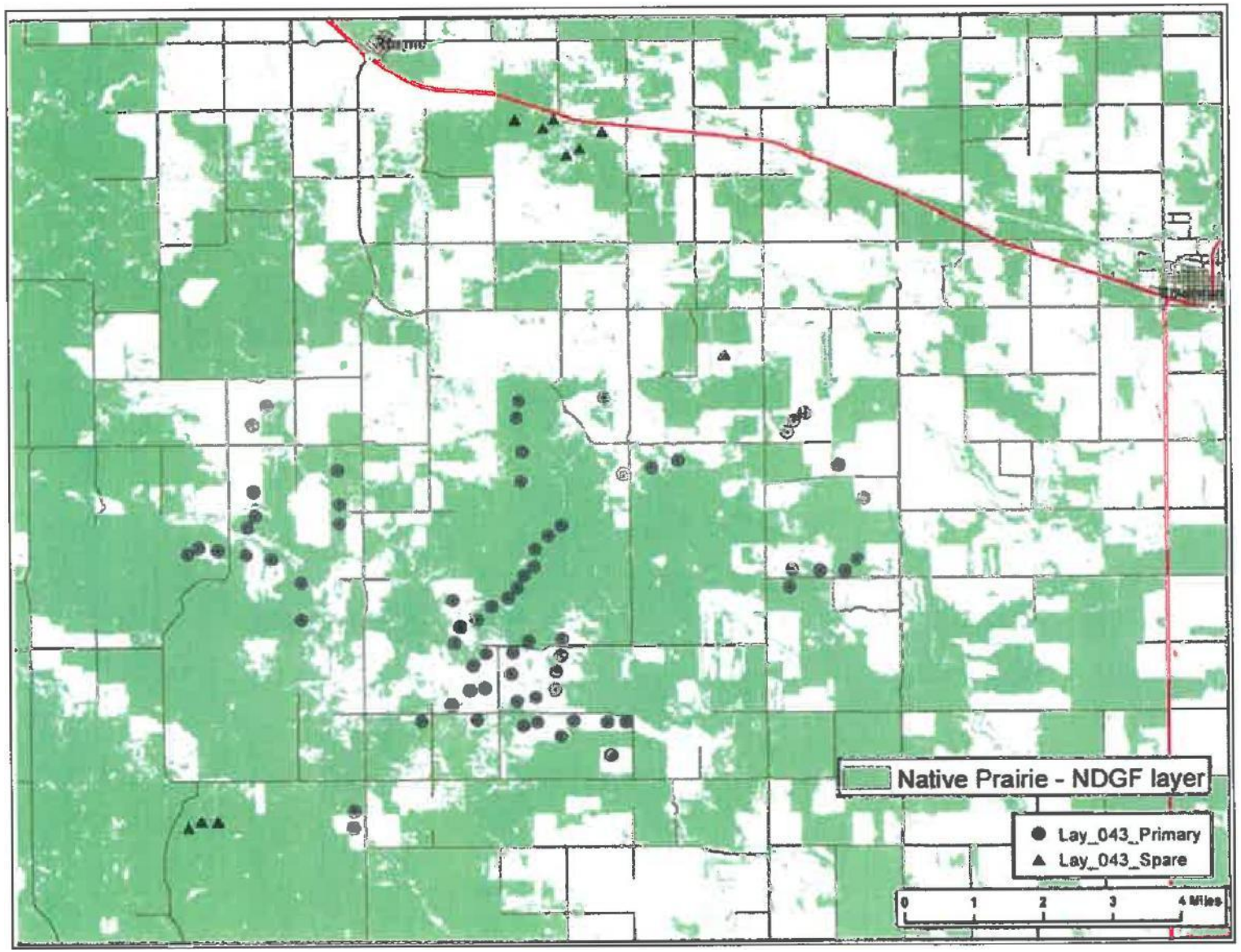
References:

Dyke, S. R., S. K. Johnson, and P. T. 'saloon. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, ND.

Loesch, C. R., J. A. Walker, R. E. Reynolds. J. S. Gleason, N. D. Niemuth, S. E. Stephens, and M.A. Erickson. 2013. Effect of wind energy development on breeding duck densities in the Prairie Pothole Region. Journal of Wildlife Management 77:587-598.

Shaffer, J. A., C. R. Loesch., D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications 29(8): e01983. 10.1002/eap.1983

Shaffer, J. A. and D. A. Buhl. 2016. Effects of wind-energy facilities on grassland bird distributions. Conservation Biology 30:59-71.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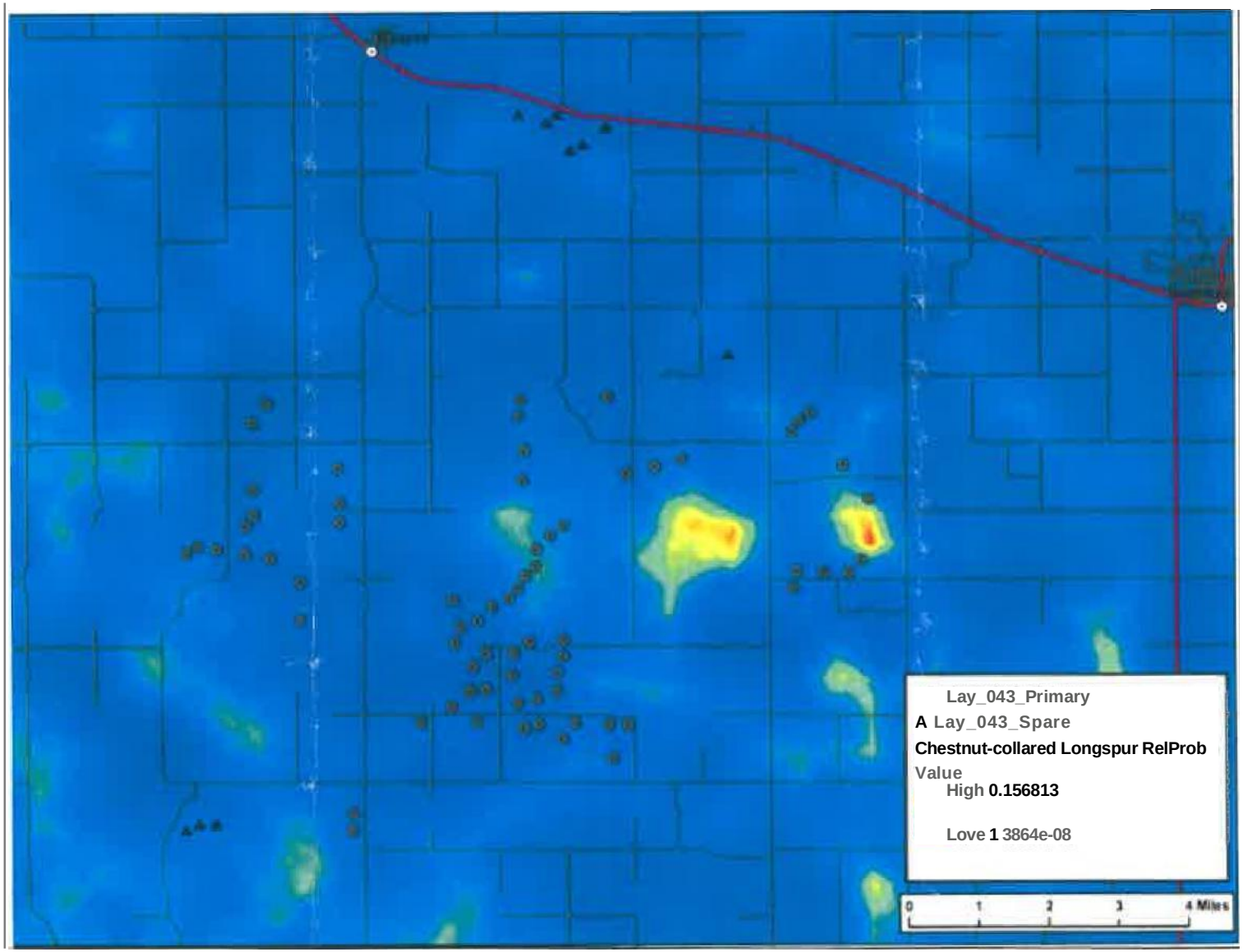
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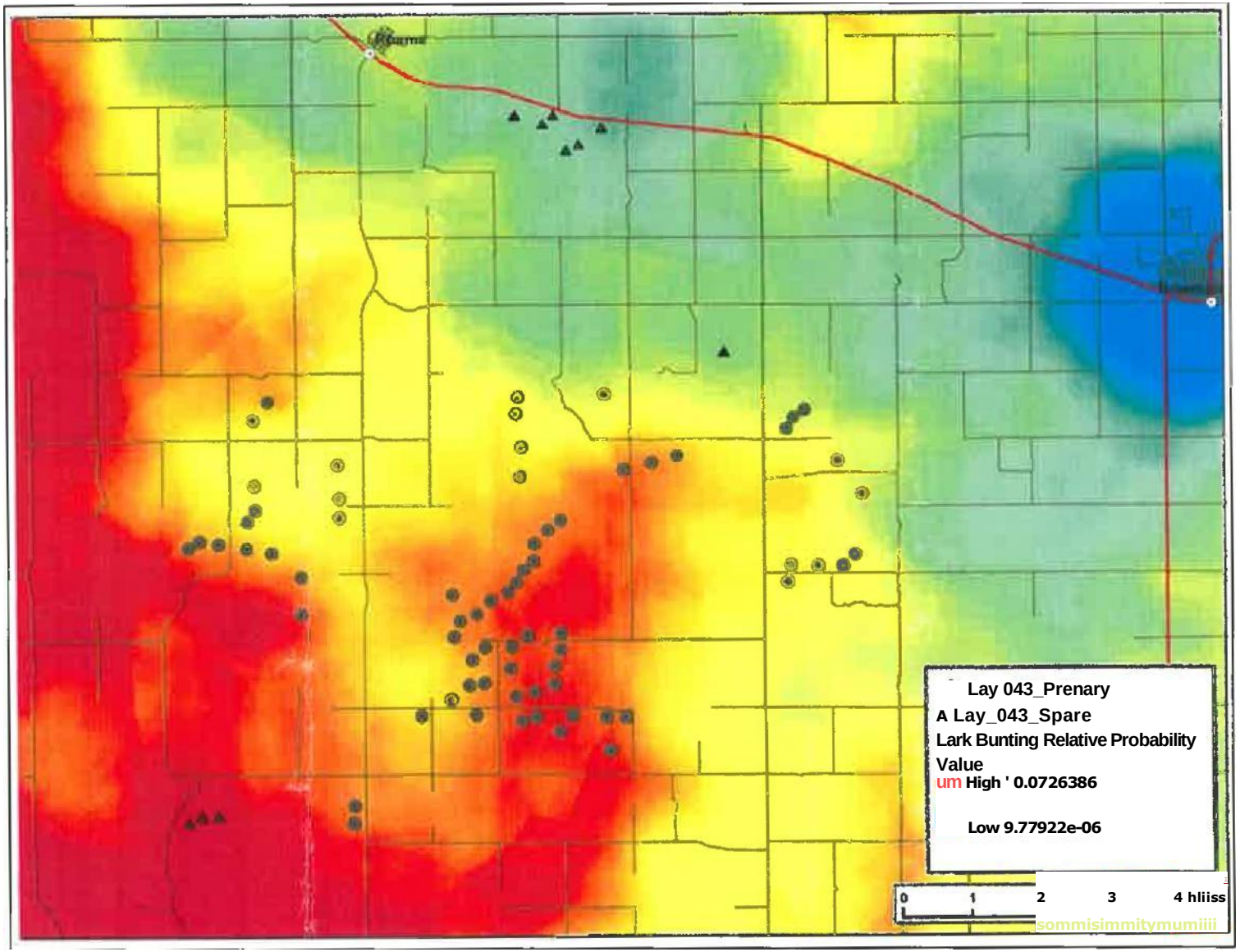
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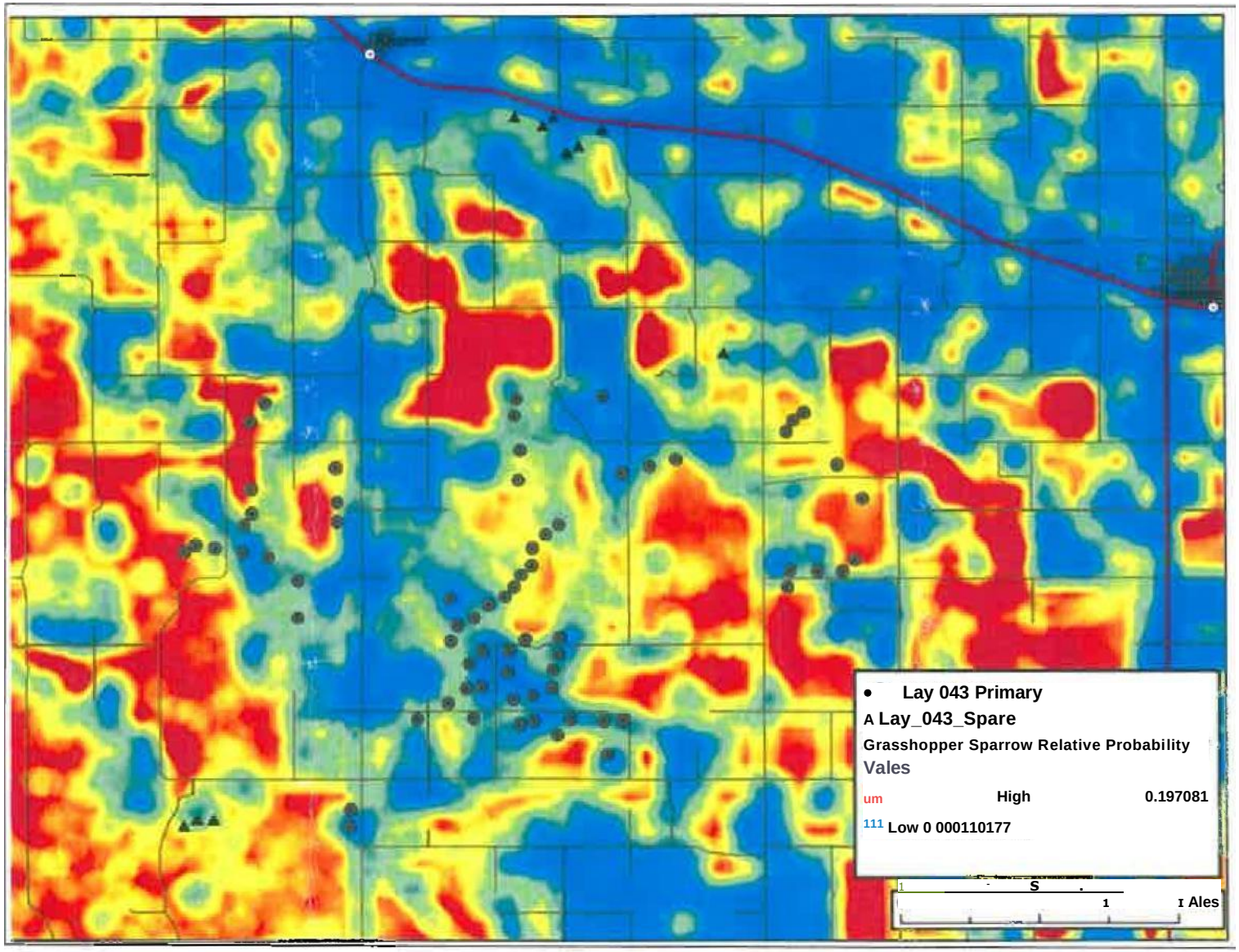
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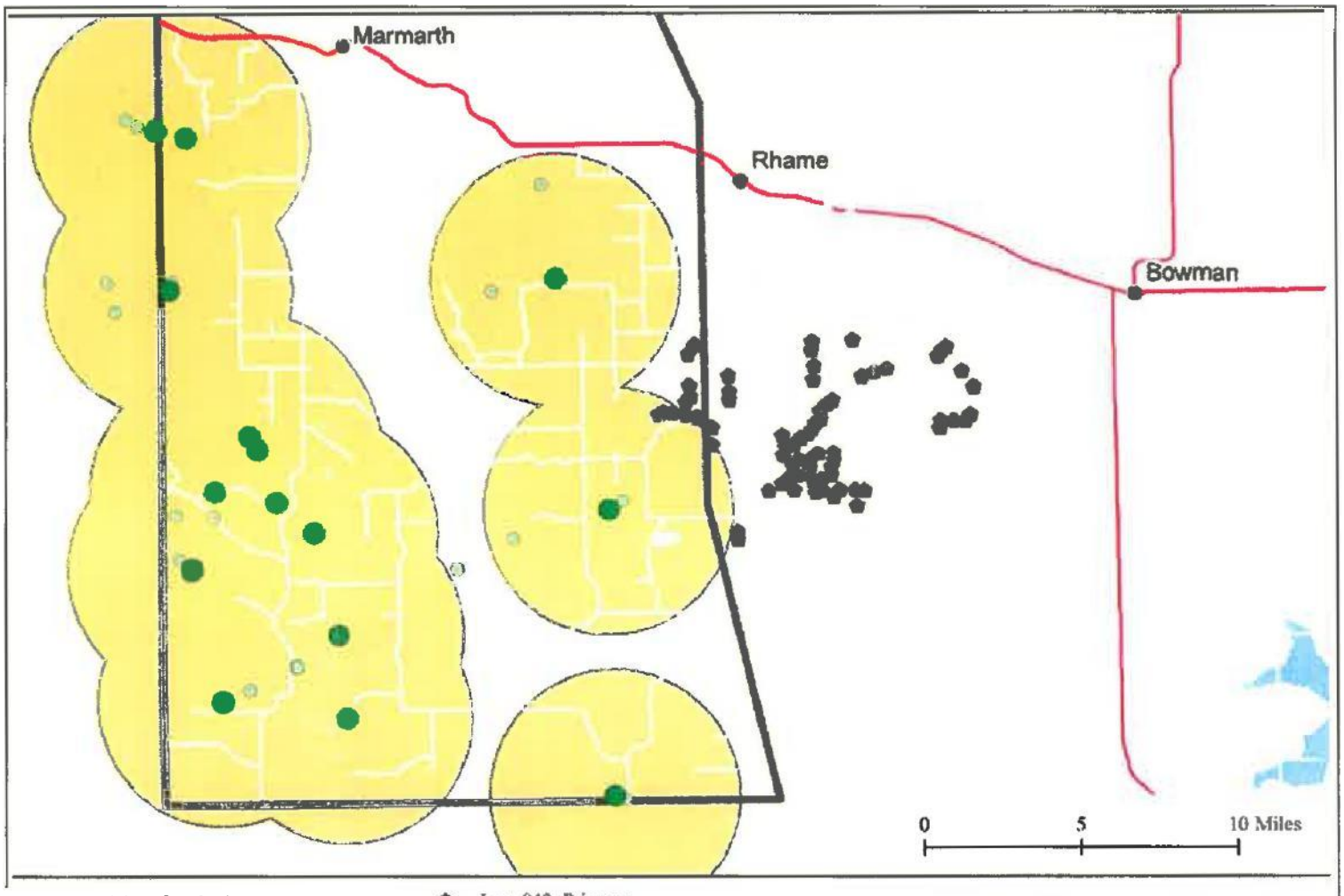

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Sage Grouse Primary Conservation Area

4 Mile Buffer of Occupied I,cks (5yr)

Lay_043_Primary

Lay_043_Spare

Map of proposed wind turbine locations and greater sage-grouse lek locations and primary conservation area. Prepared 6/412020. NDGF.

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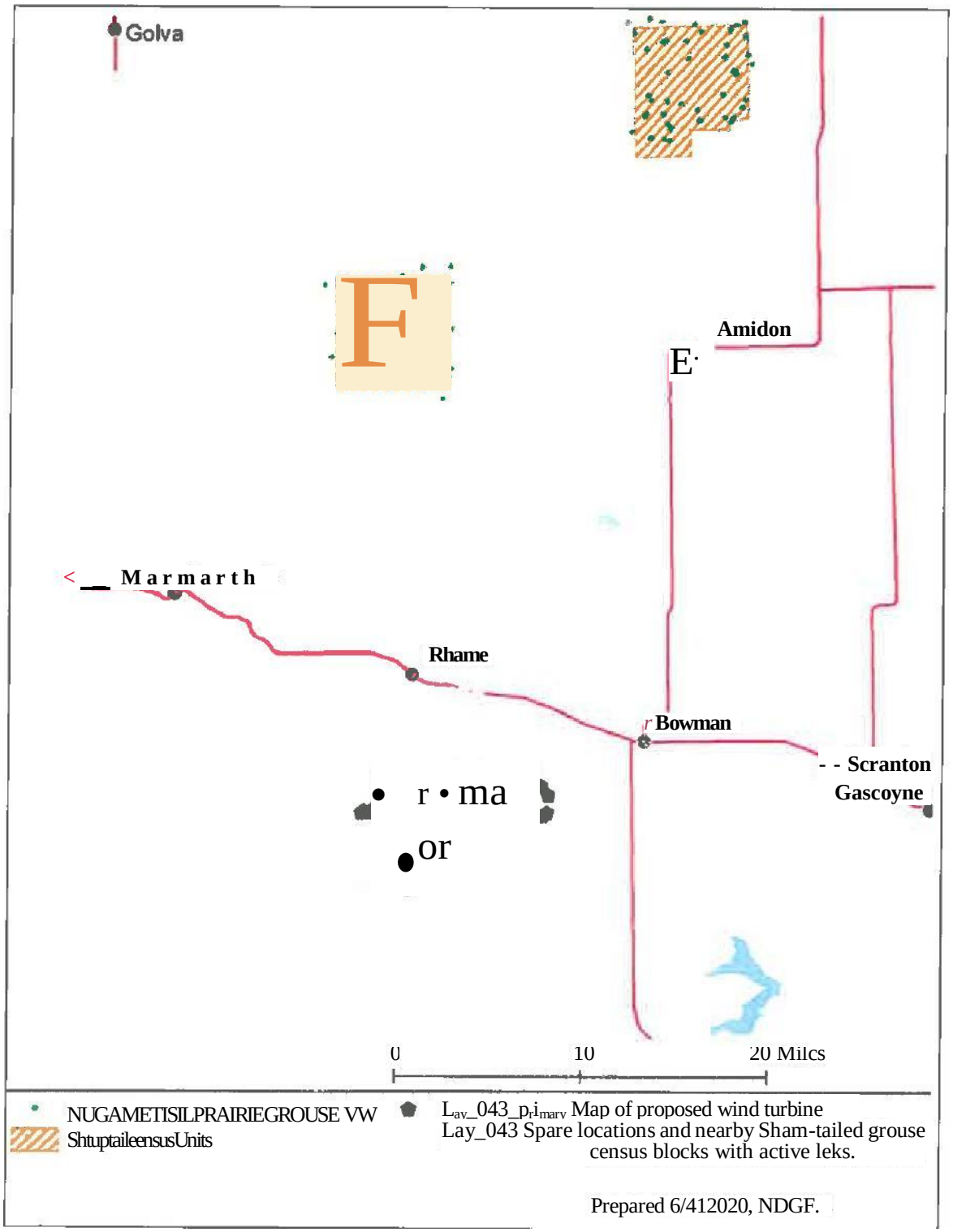
Map F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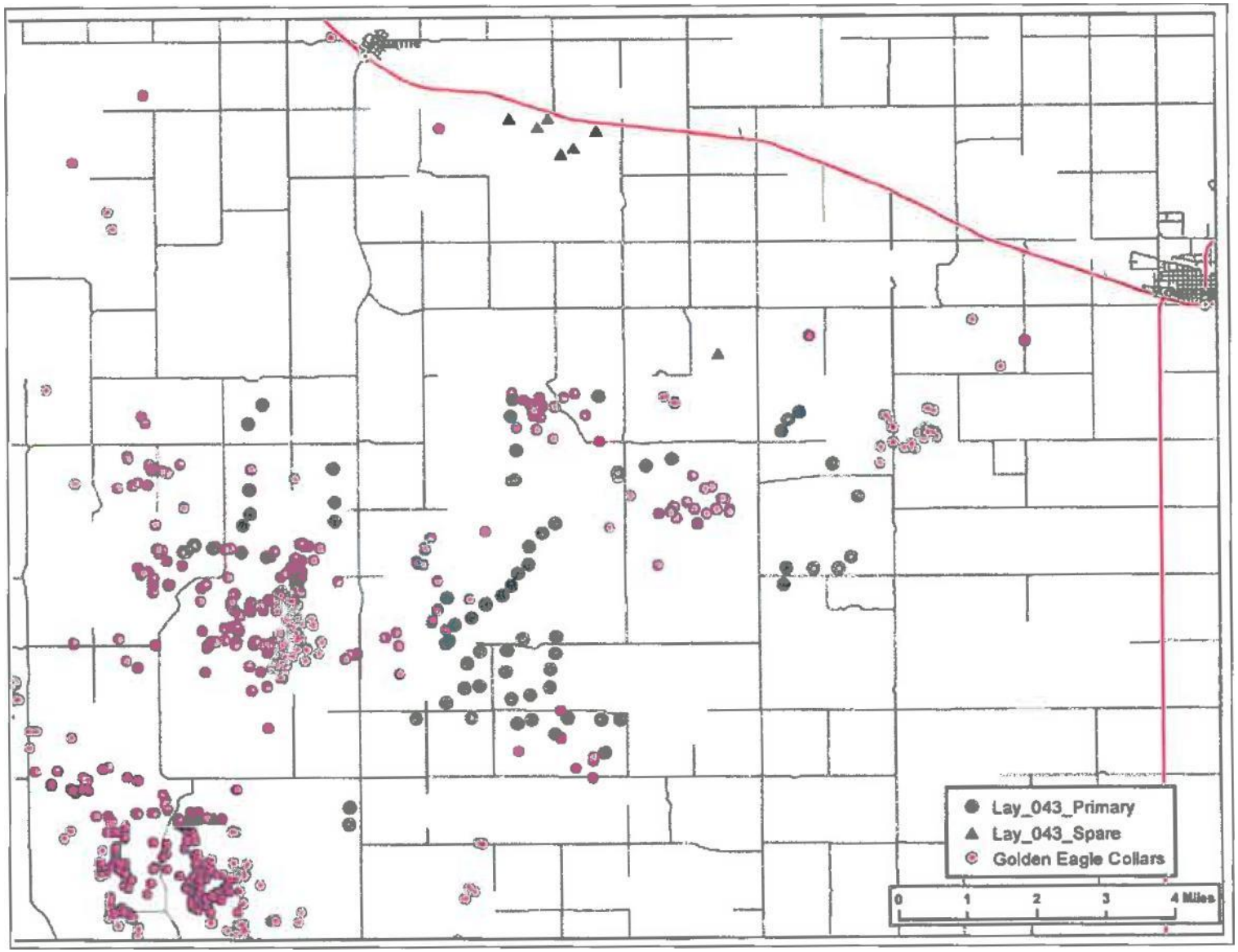
Prepared 6/412020, NDGF.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Golden Eagle Collars
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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
06E15000-2020-B-0024
Bowman Wind Project

North Dakota Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

September 22, 2020

Mr. Ryan Henning
Apex Clean Energy, Inc.
310 4th St. NE, Suite 200
Charlottesville, VA 22902

Dear Mr. Henning:

We received your August 6, 2020, narrative document that discusses the Bowman Wind Project's incorporation of the Shaffer et al (2019) offset model and the corresponding offset area calculation for the current layout. We commend your layout modifications that have reduced the number of turbines on native grasslands to two of 70 total turbines. It is our understanding that a Bird and Bat Conservation Strategy (BBCS) will be prepared which will finalize the application of the model to be included in the NDPSC permit application. We previously provided the FWS Region 6 recommended format for a BBCS and we will provide input on that document when we receive it. The BBCS framework will assist in determining if there is a need to develop other conservation plans such as an Eagle Conservation Plan or Habitat Conservation Plan. At this time, we recommend considering the following for inclusion in the BBCS:

1) Temporary impacts are not necessarily temporary. Native prairie is not easily restored and any acreages considered a temporary impact should be included and detailed in a restoration plan, as part of the BBCS, to be developed in collaboration with NDGF and the Service, and/or other resource managers with experience in prairie restoration. Monitoring should be included as part of this plan for a period of not less than 5 years to ensure that native vegetation becomes established.
2) As stated in the NDGF's June 19, 2020, letter, all intact grasslands, including those less than 160 acres, should be assessed and considered as part of the offset package. In the Grassland Assessment Report, SWCA indicated that only parcels of 160 acres or larger are of primary concern. We would like to reiterate the points made by the NDGF that the developer should avoid all intact grasslands, and not just those of 160 acres or larger.
3) As stated in our April 19, 2019 letter, the presence of prairie dog towns in this area is an indication of raptor use, including eagles. We recommend prairie dog town surveys and maps be included in the BBCS to inform a prey base analysis for eagles and other raptors.

Thank you for the opportunity to comment on this proposal. We look forward to providing input on the BBCS. If you have any additional questions or comments, please contact Heidi Riddle of my staff at (701) 355-8545 or via email at heidi_riddle@fws.gov, or contact me at (701) 355-8512 or drew_becker@fws.gov.

Sincerely,

Drew Becker
ND Ecological Services Supervisor

cc: Greg Link, North Dakota Game and Fish Department

Appendix B. Bird and Bat Studies Completed for the Bowman Wind Project, Bowman County, North Dakota

Avian Use Survey for the Proposed Bowman Wind Project Bowman County, North Dakota

Report

August 7, 2017 - July 22, 2018

Prepared for:

Bowman Wind, LLC

310 4th Street Northeast, Suite 300
Charlottesville, Virginia

Prepared by:

Chad LeBeau, Kristen Chodachek, and Kimberly Bailey

Western EcoSystems Technology, Inc.
1610 Reynolds Street
Laramie, Wyoming 82070

June 25, 2020

Privileged and Confidential – Not For Distribution

• EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. completed an analysis of avian use data collected over a one-year period by SWCA Environmental Consultants (SWCA) for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern. Survey methods were developed to be in accordance with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Final Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines,* and recommendations from USFWS and the North Dakota Game and Fish Department.

SWCA completed monthly surveys from August 7, 2017 to July 22, 2018, at 29 points established throughout the Project. Surveys consisted of 10-minute (min) counts of small birds only within a 100-meter (m; 328-foot [ft]) radius plot, followed by 60 min counts of large birds (including eagles) within 800 m (2,625-ft). The 60 min count was further divided into 20 min surveys of large birds (including eagles) and the remaining 40 min surveys for eagles only.

No federally-listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations and 72 golden eagle observations, both protected under Bald and Golden Eagle Protection Act were recorded during surveys. In addition, five species of concern (ferruginous hawk, Swainson's hawk, chestnut-collared longspur, Brewer's sparrow, and lark bunting) were recorded during surveys.

Thirteen unique large bird species and 29 unique small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (80.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 18.5% of large bird species recorded. Swainson's hawk (26 observations) and northern harrier (28 observations) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (39.7% of observations), western meadowlark (15.3%), and Lapland longspur (10.2%).

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region. Bald eagles were recorded only in winter and spring, suggesting primarily winter and migratory use by non-breeding eagles. Seasonal patterns of activity found during surveys suggest that the Project may receive increased use by golden eagles during the migration periods and winter, with the potential for year-round use.

PARTICIPANTS

Chad LeBeau	Senior Project Manager, Senior Reviewer
Kristen Chodachek	Project Manager, Reviewer
Mandy Kauffman	Lead Client Analyst
Diem Pham	Analyst
Kimberly Bailey	Report Reviewer
Katie Wynne	Technical Editor
Kristen Klaphake	GIS Technician
Michelle Chouinard	QAQC Technician
Carmen Boyd	Project Tracking and Data Manager

REPORT REFERENCE

LeBeau, C., K. Chodachek, and K. Bailey. 2020. Avian Use Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota. Final Report: August 7, 2017 – July 22, 2018. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. June 25, 2020.

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Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018

Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018

• INTRODUCTION

Bowman Wind, LLC (Bowman Wind) is proposing the development of the Bowman Wind Project (Project) located in Bowman County, North Dakota (Figure 1). To support the development of the Project, Bowman Wind contracted Western EcoSystems Technology, Inc. (WEST) to analyze data from a pre-construction avian use surveys completed by SWCA Environmental Consultants (SWCA) within the Project. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern (defined as species afforded protection under the Endangered Species Act, Bald and Golden Eagle Protection Act, defined as Level I Species of Conservation Priority by the state of North Dakota [Dyke et al. 2015] or birds of particular concern identified by the USFWS Information for Planning and Consultation [IPaC] for Bowman County [USFWS 2020]).

• PROJECT AREA

The proposed Project encompasses 58,818 acres (ac; 23,803 hectares [ha]) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns which now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. The Project is approximately 10 miles east of the Little Missouri River (Figure 1). Elevations within the Project range from approximately 896 meters (m; 2,940 feet [ft]) to 1,050 m (3,445 ft; US Geological Survey [USGS] 2019).

According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project is shrub/scrub (43.9%), followed by herbaceous/grassland (32.0%), and cultivated crops (19.7%; Figure 2, Table 1). The remaining land covers account for less than 5% of the Project, individually (Figure 2, Table 1).

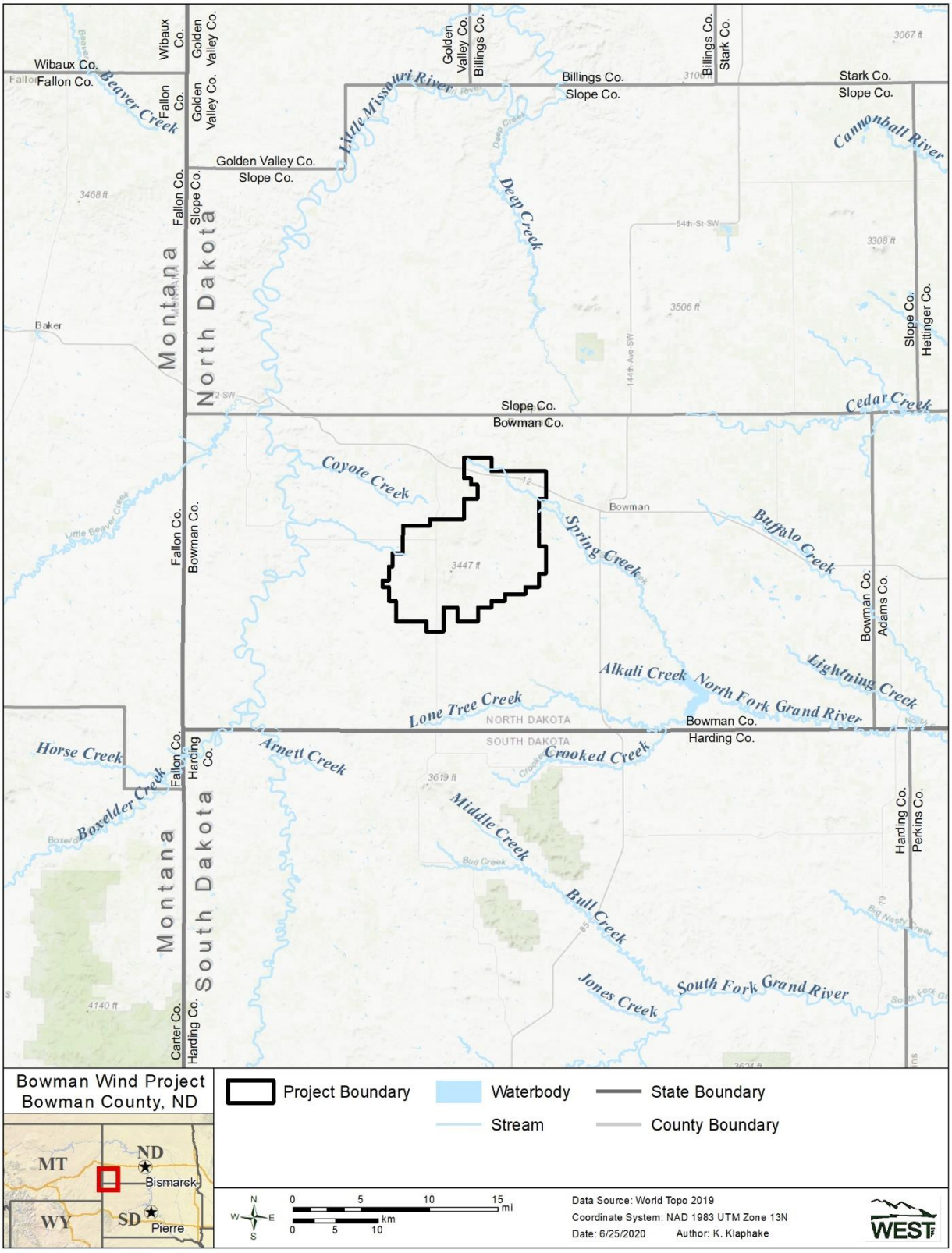

Figure 1. Location of the proposed Bowman Wind Project, Bowman County, North Dakota.

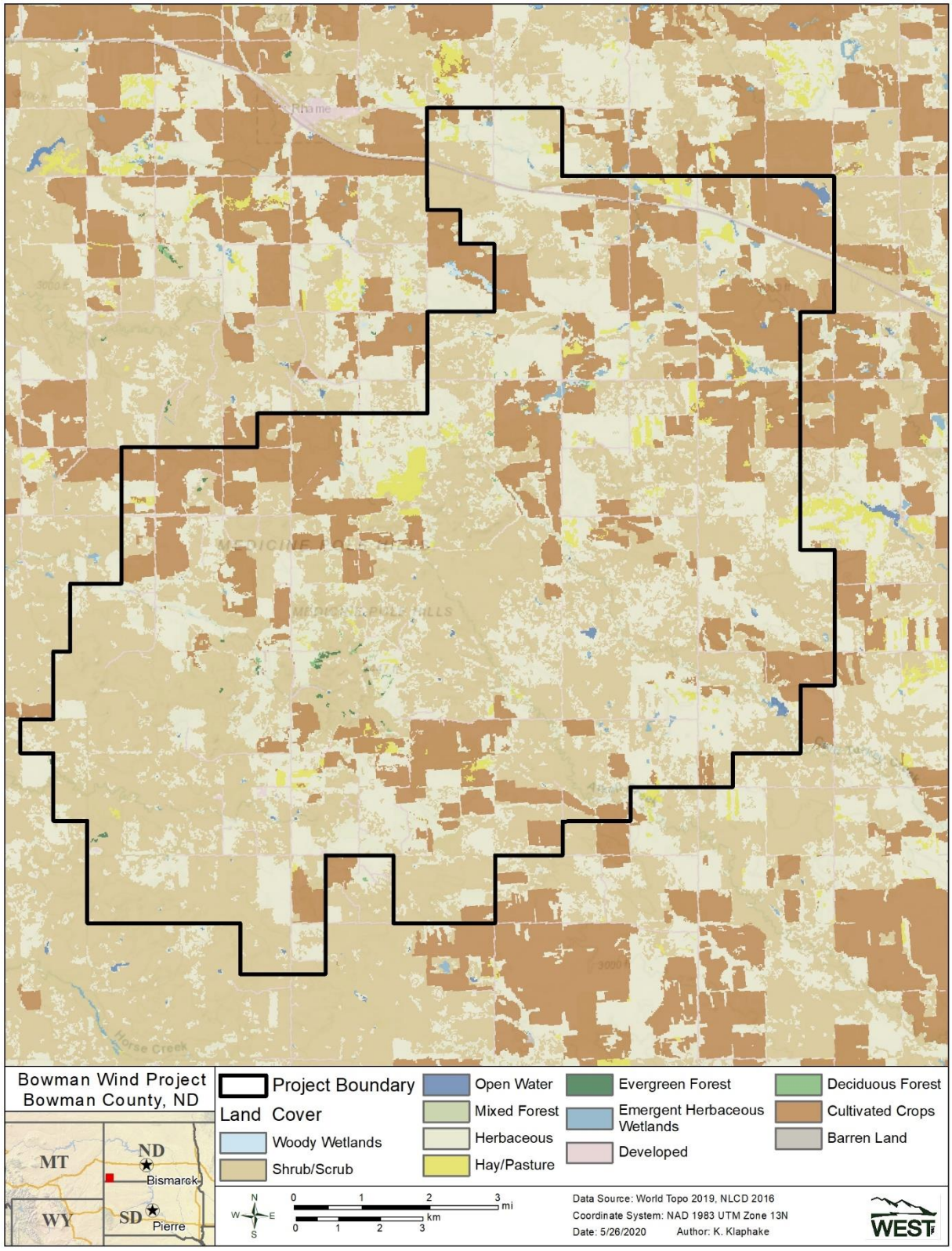

Figure 2. Land cover types and coverage at the proposed Bowman Wind Project, Bowman County, North Dakota (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).

Table 1. Land cover types, area, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota, based on National Land Cover Database.

Land Cover Type	Area (acres)	Area (hectares)	% Composition
Shrub/Scrub	25,835	10,455	43.9
Herbaceous	18,817	7,615	32.0
Cultivated Crops	11,586	4,689	19.7
Developed	1,204	487	2.0
Hay/Pasture	977	396	1.7
Emergent Herbaceous Wetlands	164	66	0.3
Open Water	106	43	0.2
Woody Wetlands	45	18	0.1
Evergreen Forest	45	18	0.1
Deciduous Forest	30	12	0.1
Mixed Forest	7	3	<0.1
Barren Land	2	1	<0.1
Total[1]	**58,818**	**23,803**	**100**

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019

[1.] Sums of values may not add precisely to total value shown, due to rounding.

• METHODS

SWCA completed avian use surveys over a one-year period for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. Survey methods were developed to be in accordance with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Final Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines* (ECPG), USFWS 2016 *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (Final Eagle Rule) and recommendations from USFWS and the North Dakota Game and Fish Department. Methods described below, therefore, are common for all birds (i.e., large and small birds, eagles, and other species of concern) except as noted.

SWCA defined large birds as those of waterfowl size or larger and included waterfowl, herons, pelicans, diurnal raptors (i.e., accipiters, buteos, northern harrier, eagles, falcons, and other raptors), owls, and vultures. Small birds were defined as passerines.

• Survey Design

SWCA established 29 survey points throughout the Project using a spatially balanced sampling design (Figure 3). This sampling methodology captured the variability in habitat and vegetation conditions, topographic features, and potential turbine numbers and densities representing different components of the landscape within the Project. Each point was centered on a circular survey plot with an 800 m (2,625 ft) radius for large birds (including eagles) and 100 m (328 ft) radius for small birds (Reynolds et al. 1980, USFWS 2013, USFWS 2016).

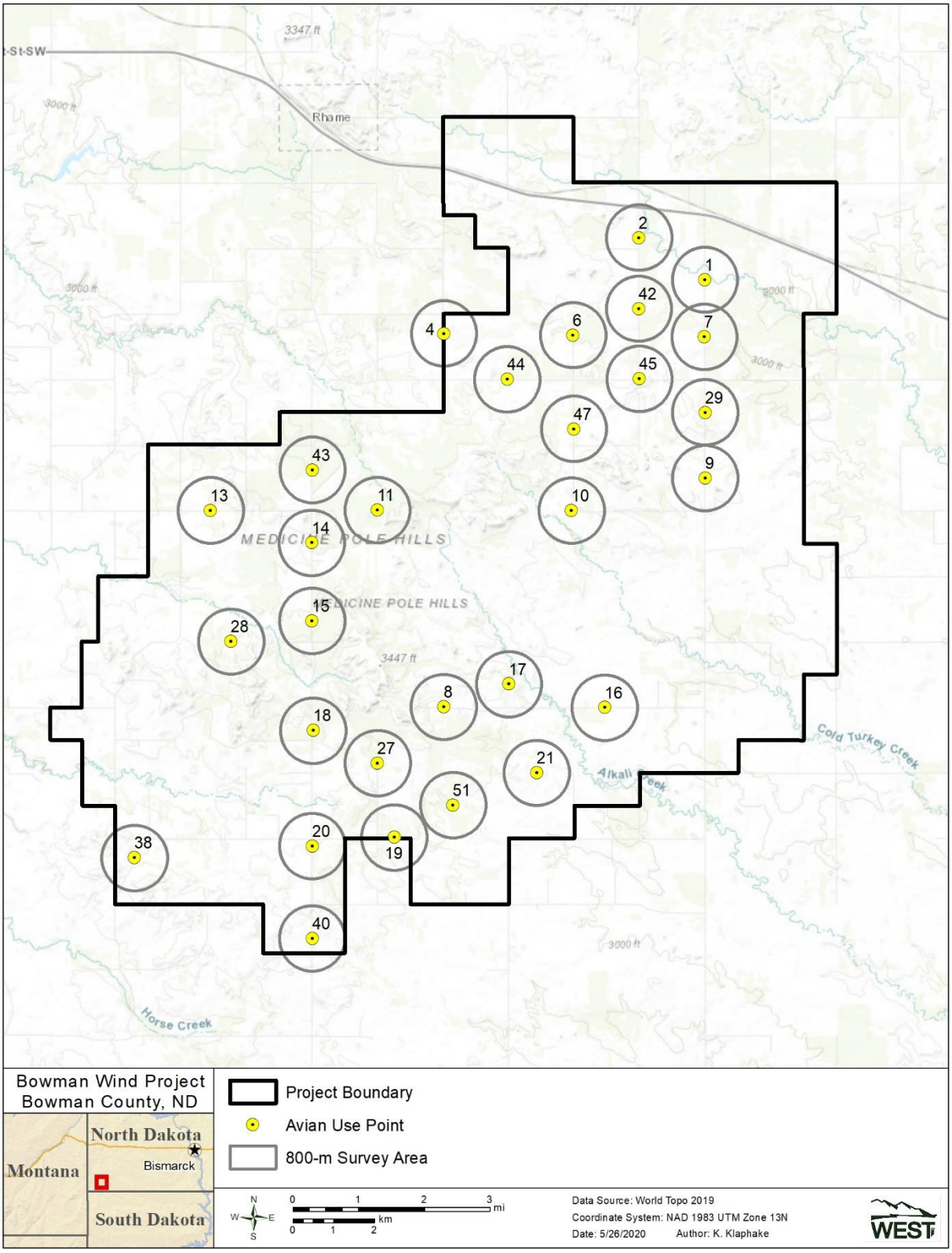

Figure 3. Avian use survey points and plots at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

SWCA conducted surveys once a month from August 7, 2017 to July 22, 2018. Seasons were defined as summer (June 1 – August 31), fall (September 1 − November 15), winter (November 16 − February 28), and spring (March 1 – May 31). Surveys were conducted to provide survey coverage across all daylight hours for each survey plot and the survey schedule was designed for spatial separation of survey plots to increase the likelihood of the independence of any observations.

- **Survey Methods**

- *All Birds*

Surveys at each point were conducted for a period of 70 minutes (min), with only small birds recorded during the first 10 min of the survey period out to a 100-m (328-ft) radius, followed by 60-min counts recording large birds (including eagles) out to an 800-m (2,625-ft) radius. The 60-min count was further divided into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. The 20-min portion of the survey allowed for standardization and comparison of data with other wind energy facilities throughout the region, while the 60-min eagle counts allowed for more robust evaluation of bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) use of the Project in accordance with the ECPG and 2016 Final Eagle Rule.

At each survey point, the date, start and end time of the survey period, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover) were recorded by SWCA. Additionally, SWCA recorded the following data for each individual or group of birds observed:

- Observation number
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if identifiable)
- Estimated distance from observer
- Estimated flight height above ground level (AGL) was recorded using the following ranges: 0-30 m (0-98 ft), 31-200 m (102-656 ft), and greater than 200 m (greater than 656 ft)
- Flight direction (first observed) for large birds only
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Estimated flight path of eagles

- *Eagles*

As stated above, 60-min eagle counts allow for more robust evaluation of bald and golden use of the site in accordance with the ECPG (USFWS 2013). SWCA surveyors recorded the following

metrics to characterize eagle use within the Project: age class (juvenile [first year], immature or sub-adult [second to fourth year], adult [at least fifth year]), eagle minutes, eagle risk minutes, and total minutes. Eagle minutes were defined as the number of minutes an eagle was observed flying within the identified flight height ranges either within or outside of the survey plot. Eagle risk minutes were defined as the number of minutes an eagle was estimated to be flying within the risk cylinder (area within 800 m of the observer and below 200 m AGL during the 60-min survey period). Total minutes were defined as the amount of time eagles were observed inside and outside the risk cylinder.

- **Data Management**

- *Quality Assurance and Quality Control*

WEST implemented quality assurance and quality control (QA/QC) measures during data entry, analysis, and report writing. Multiple reviews of the data were conducted as QA/QC measures.

- *Data Compilation and Storage*

A Microsoft® SQL database was utilized to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis.

- **Statistical Analysis**

A *visit* was defined as the required length of time, in days, to survey all of the plots once within the Project and could occur across multiple dates, but had to be completed in a single season (e.g., spring). If conditions prevented all plots from being surveyed during a visit, then a visit might not have constituted a complete survey of all plots. A *survey* was defined as a single 60 min, 20 min, or 10 min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the 800-m or 100-m survey plot were included in data analysis.

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Mean use was the average number of birds observed per plot per survey for large birds (including eagles) or small birds. Large bird (per 800-m plot per 20-min survey), eagle use (per 800-m plot per 60-min survey) and small bird use (per 100-m plot per 10-min survey) were calculated by 1) summing birds per plot per visit, 2) averaging number of birds over plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of large birds (including eagles) or small bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance, in that mean use is based on the number of birds (i.e., large groups can produce high estimates), whereas frequency of occurrence is based on the number of groups (i.e., it is not influenced by group size). Qualitative comparisons were made with these metrics among bird types, seasons,

and survey points to assist in understanding how birds are using the Project both temporally and spatially.

- *Flight Height*

Bird flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of eagles, large birds, and small birds observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH of 25-200 m AGL was assumed for the purpose of the analysis. The mid-point of each flight height range was used to calculate the percentage of birds flying within the RSH and mean flight height.

- *Spatial Use*

Mean use was calculated by survey point for eagles, large birds, and small birds to make spatial comparisons among the survey points. Additionally, flight paths of eagles were mapped during large bird use surveys to qualitatively show flight path location compared to Project characteristics (e.g., topographic features) to identify if there were areas of concentration or consistent flight patterns within the Project.

- *Eagles*

Eagles observed during surveys were summarized to provide estimated flight heights (see *Flight Height*) and flight path maps (see *Spatial Use*). Data collected during each minute eagles were observed, were examined to count eagle risk minutes and total minutes. Eagle risk minutes per observation hour were reported by survey plot and month to enable spatial and temporal assessments of eagle risk minutes recorded in the Project. Data collected on perched eagles and those outside of survey plots were not considered eagle risk minutes; however, they were considered in the total eagle minutes. The flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Project.

• RESULTS

Overall, 333 eagle, large bird, and small bird surveys were completed resulting in approximately 333.0 hours of 60-min ECPG-level eagle use surveys, 111.0 hours of 20 min large bird surveys, and 55.5 hours of 10-min small bird surveys (Table 2). Thirteen species of large birds (including bald and golden eagles) and 29 species of small birds totaling 42 species of birds were observed or heard during the one-year of surveys (Appendices A1, A2, and A3). Survey results are summarized below, supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys (Appendices A1, A2, and A3), avian use, percent of use, and frequency of occurrence by season (Appendices B1, B2, and B3), and mean use by survey point (Appendices C1, C2, and C3).

Table 2. Summary of survey effort by number (#) of visits, surveys, and hours at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Eagles			Large Birds			Small Birds		
Season[1]	**# Visits[2]**	**# Surveys[3]**	**Hours**	**# Visits[2]**	**# Surveys[3]**	**Hours**	**# Visits[2]**	**# Surveys[3]**	**Hours**
Summer	3	86	86	3	86	28.7	3	86	14.3
Fall	3	83	83	3	83	27.7	3	84	14.0
Winter	3	85	85	3	85	28.3	3	85	14.2
Spring	3	79	79	3	79	26.3	3	78	13.0
Overall	**12**	**333**	**333.0**	**12**	**333**	**111.0**	**12**	**333**	**55.5**

[1] Season dates Summer (June 1 – August 31), Fall (September 1 − November 15), and Winter (November 16 − February 28), and Spring (March 1 – May 31).

[2] A visit was defined as surveying all of the survey plots once within the Project and could occur across multiple dates, but had to be completed in a single season.

[3] A survey was defined as a single 60-minute, 20-minute, or 10-minute count of birds.

- **Species of Concern**

No federally-listed threatened or endangered species were observed during the surveys. Bald eagles (15 observations) and golden eagles (72 observations), both protected under BGEPA were observed during surveys (Table 3; Appendix A1). Four birds of particular concern and Level I Species of Conservatioin Priority (SCP; ferruginous hawk, Swainson's hawk, chestnut-collared longspur, and lark bunting) and one bird of particular concern (Brewer's sparrow) were recorded during surveys (Table 3; Appendices A2 and A3). Ferruginous hawk, Brewer's sparrow, and lark bunting were only recorded during summer, chestnut-colored longspur was observed in the spring and fall, and Swainson's hawk were observed in summer, fall, and spring (Table 3; Appendices A2 and A3).

Table 3. Species of concern by number (#) of groups (grps) and individual observations (obs) observed during the 70-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Species	**Scientific Name**	**Status[a]**	**# of grps**	**# of obs**
Large Birds				
bald eagle	*Haliaeetus leucocephalus*	BGEPA; IPaC	15	15
ferruginous hawk	*Buteo regalis*	LEVEL 1 SCP; IPaC	2	2
golden eagle	*Aquila chrysaetos*	BGEPA; IPaC	72	72
Swainson's hawk	*Buteo swainsoni*	LEVEL 1 SCP	20	26
Small Bird				
Brewer's sparrow	*Spizella breweri*	IPaC	7	26
chestnut-collared longspur	*Calcarius ornatus*	LEVEL 1 SCP; IPaC	15	53
lark bunting	*Calamospiza melanocorys*	LEVEL 1 SCP; IPaC	9	21
Total	**7 species**			

[a] BGEPA = Bald and Golden Eagle Protection Act (1940); IPaC = bird of particular concern identified in the US Fish and Wildlife Service Information for Planning and Consultation report (2020); Level I SCP = Level I North Dakota Species of Conservation Priority (Dyke et al. 2015).

- *Eagles*

- Mean Use

Bald eagles were recorded during winter and spring, with consistent mean use between seasons (0.09 observations/800-m plot/60 min survey and 0.09, respectively; Appendix B1). Overall bald eagle mean use was 0.05 observations/800-m plot/60 min survey.

Golden eagles were recorded in fall, winter, and spring with mean use in spring (0.38), winter (0.33) and fall (0.15); no observations were recorded in summer (Appendix B1). Overall golden eagle use was 0.22 observations/800-m plot/60min survey.

- Activity Minutes

Fifteen bald eagle observations resulted in 38 bald eagle risk minutes out of 170 bald eagle minutes during 333 total survey hours (Table 4). Bald eagle risk minutes per survey hour ranged from 0 to 0.90 across months, with an overall value of 0.11 for the entire survey period (Table 4). Bald eagle risk minutes per survey hour were recorded at points 20 (0.25 minutes/800 m plot/60 min survey), 14 (0.42), 45 (0.58), 9 (0.92), and 1 (1.00; Figure 4). The northeastern corner of the Project where survey points occurred had a relatively slightly higher distribution of bald eagle risk minutes per survey hour (Figure 4).

Table 4. Summary of bald eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Bald Eagle Observations		Bald Eagle Minutes			
Month/Year	Within Estimated Risk Cylinder[a]	Total[b]	Within Estimated Risk Cylinder[a]	Total[b]	Survey Hours	Bald Eagle Risk Minutes/Survey Hour
August 2017	0	0	0	0	28	0
September 2017	0	0	0	0	28	0
October 2017	0	0	0	0	34	0
November 2017	0	0	0	0	34	0
December 2017	0	0	0	0	15	0
January 2018	0	1	0	60	28	0
February 2018	7	7	26	26	29	0.90
March 2018	3	7	12	84	27	0.44
April 2018	0	0	0	0	23	0
May 2018	0	0	0	0	29	0
June 2018	0	0	0	0	29	0
July 2018	0	0	0	0	29	0
Total	10	15	38	170	333	0.11

[a] Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

[b] Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

Seventy-two golden eagle observations resulted in 127 golden eagle risk minutes out of 614 golden eagle minutes during 333 total survey hours (Table 5). Golden eagle risk minutes per survey hour ranged from 0 to 1.78 across months (Table 5). The overall value for the entire survey period was 0.38 golden eagle risk minutes per survey hour (Table 5). Golden eagle risk minutes were recorded at 16 survey points throughout the Project ranging from 0.08 golden eagle risk

minutes per survey hour (point 20) to 1.67 (point 8; Figure 5). Slightly higher levels of golden eagle risk minutes per survey hour were recorded in the southern third of the Project where surveys were conducted (Figure 5).

Table 5. Summary of golden eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Golden Eagle Observations		Golden Eagle Minutes			
Month/Year	Within Estimated Risk Cylinder[a]	Total[b]	Within Estimated Risk Cylinder[a]	Total[b]	Survey Hours	Golden Eagle Risk Minutes/Survey Hour
August 2017	0	0	0	0	28	0
September 2017	1	2	5	14	28	0.18
October 2017	7	11	26	85	34	0.76
November 2017	0	0	0	0	34	0
December 2017	0	0	0	0	15	0
January 2018	0	0	0	0	28	0
February 2018	16	29	46	221	29	1.59
March 2018	16	26	48	183	27	1.78
April 2018	1	4	2	111	23	0.09
May 2018	0	0	0	0	29	0
June 2018	0	0	0	0	29	0
July 2018	0	0	0	0	29	0
Total	**41**	**72**	**127**	**614**	**333**	**0.38**

[a] Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

[b] Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

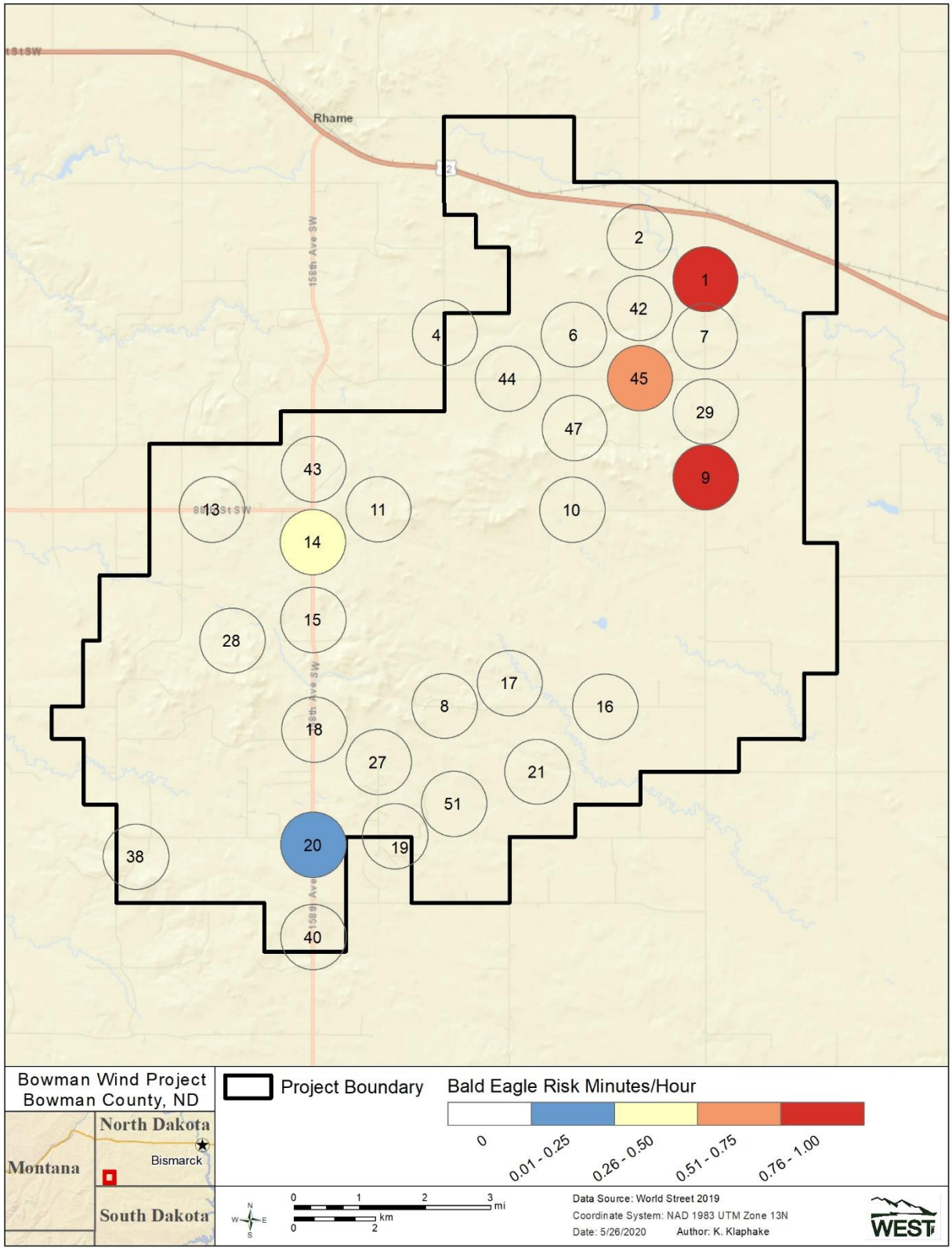

Figure 4. Estimated bald eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

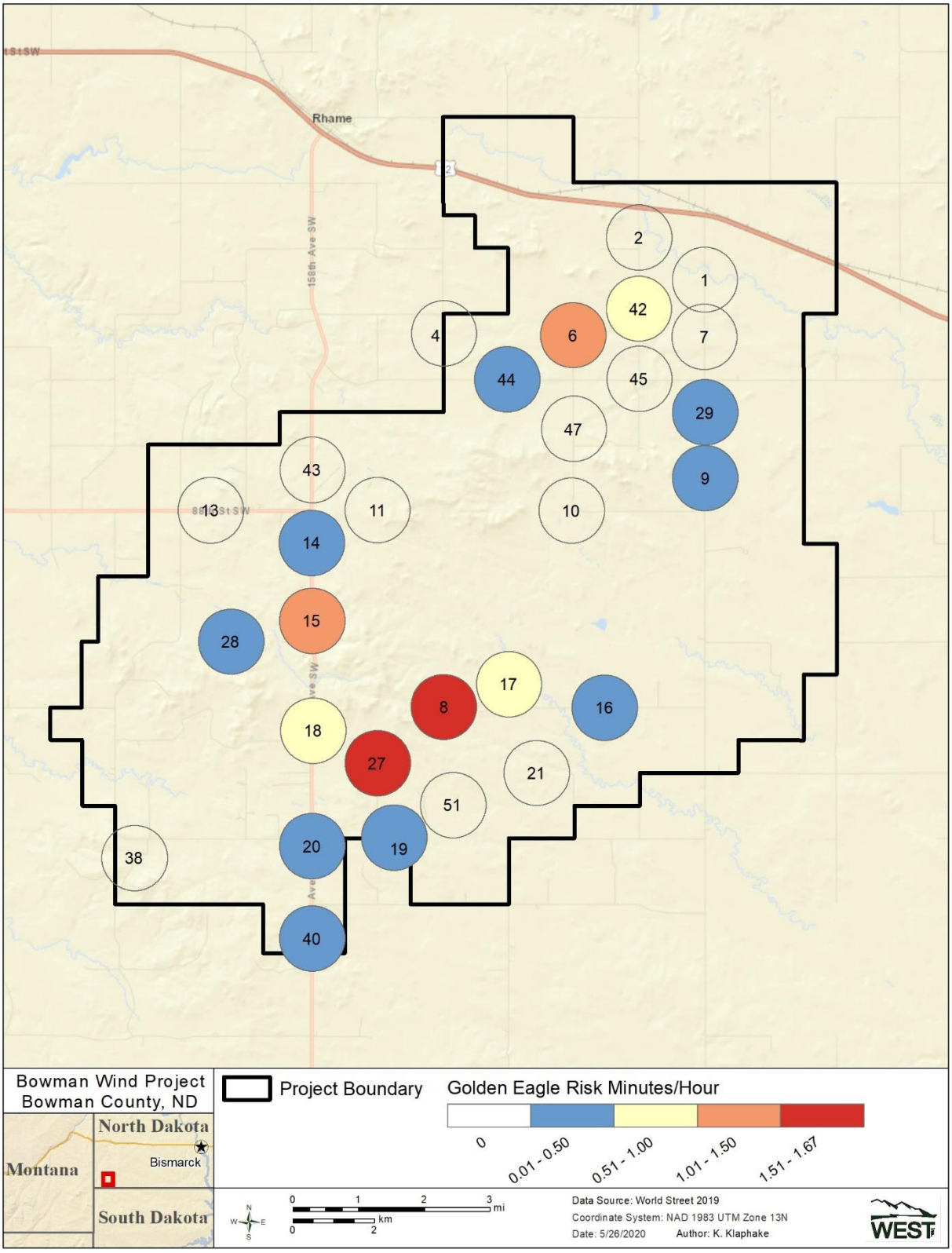

Figure 5. Estimated golden eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

- Spatial Use

Bald eagle observations were recorded at seven of the survey points, with mean use ranging from zero to 0.33 eagles/800-m plot/60-min survey among points (Appendix C1). Bald eagle use was highest at Point 14 (0.33). No clear pattern in bald eagle flight paths was observed (Figure 6).

Golden eagle observations were recorded at 18 of the survey points, with mean use ranging from zero to 1.08 eagles/800-m plot/60-min survey and was highest at Point 8 (1.08; Appendix C1). Golden eagle flight paths were slightly more concentrated in the southern third of the Project where survey points were conducted (Figure 6).

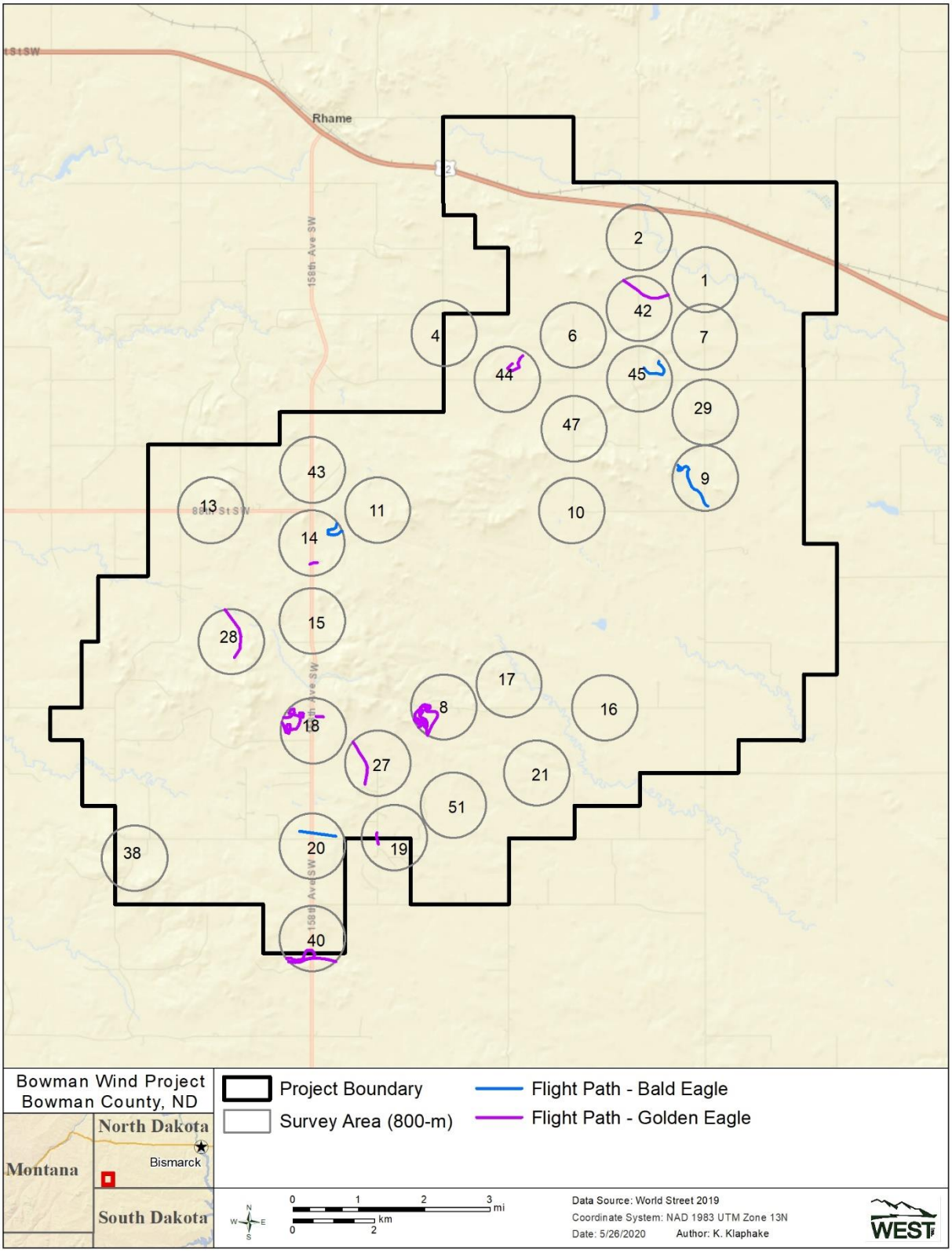

Figure 6. Estimated bald and golden eagle flight paths at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

- **Large Birds**

During 20 min avian use surveys, there were 660 large bird observations within 132 groups. The most commonly observed large bird was Canada goose (80.0% of large bird observations; Appendix A2). Diurnal raptors made up 18.5% of large bird species recorded. The most common non-eagle raptor species observed were the Swainson's hawk (26 observations) and northern harrier (28).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Large bird mean use was highest during spring (7.20; observations/800 m plot/20 min survey), followed by fall (0.50), summer (0.30), and winter (0.22; Appendix B2). Diurnal raptors, including eagles, accounted for 96.0% of use in summer, 100% of use in fall and winter, and 6.8% of use in spring (Appendix B2). Waterfowl (93.0% of use), primarily Canada goose (91.7%) accounted for the majority of use in spring (Appendix B2). Large bird frequency of occurrence varied among seasons with diurnal raptors recorded during all seasons, waterfowl and owls only in spring, and vultures on in summer (Appendix B2). For diurnal raptors, Swainson's hawk and northern harrier were the most frequently observed species in summer (7.1%), red-tailed hawk and Swainson's hawk in fall (9.5% and 8.3%, respectively), golden eagle (4.6%) in winter, and northern harrier in spring (11.0%; Appendix B2).

- *Flight Height*

Mean large bird estimated flight heights ranged from 79.4 m (260.5 ft) for raptors to 116.0 m (380.6 ft) for waterfowl and vultures (Table 6). Waterfowl and vultures were recorded flying within the estimated RSH 100% of the time. Diurnal raptors flew with the RSH 45.6% of the time; including prairie falcons flying within the RSH 66.7% (3 observations) of the time; red-tailed hawk flying 64.3% of the time (14 observations); Swainson's hawk flying 52.4% (21 observations); and eagles flying within the RSH 38.9% of flights (Table 6).

Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys[2] at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Bird Type	# Groups Flying	# Obs Flying	Estimated Mean Flight Height (m)	% Obs Flying	% within Estimated Flight Height Categories		
					<25 m	25–200 m[1]	>200 m
Waterfowl	**14**	**536**	**116.0**	**100**	**0**	**100**	**0**
mallard	3	8	116.0	100	0	100	0
Canada goose	11	528	116.0	100	0	100	0
Diurnal Raptors	**84**	**90**	**79.4**	**73.8**	**43.3**	**45.6**	**11.1**
Buteos	*37*	*43*	*107.5*	*78.2*	*23.3*	*58.1*	*18.6*
red-tailed hawk	14	14	79.92	77.8	35.7	64.3	0
rough-legged hawk	6	6	127.5	66.7	16.7	50.0	33.3
ferruginous hawk	2	2	116.0	100	0	100	0
Swainson's hawk	15	21	124.1	80.8	19.0	52.4	28.6
Northern Harrier	*24*	*24*	*44.5*	*85.7*	*70.8*	*29.2*	*0*
northern harrier	24	24	44.5	85.7	70.8	29.2	0
Eagles	*18*	*18*	*79.9*	*52.9*	*50.0*	*38.9*	*11.1*
golden eagle	18	18	79.9	58.1	50.0	38.9	11.1
Falcons	*5*	*5*	*55.0*	*100*	*60.0*	*40.0*	*0*
prairie falcon	3	3	82.3	100	33.3	66.7	0
American kestrel	2	2	15.0	100	100	0	0
Vultures	**1**	**1**	**116.0**	**100**	**0**	**100**	**0**
turkey vulture	1	1	116.0	100	0	100	0
Large Birds Overall	**99**	**627**	**85.0**	**95.0**	**6.2**	**92.2**	**1.6**

[1]The likely rotor-swept height for potential collision with a turbine blade, or 25 to 200 meters (85 to 656 feet) above ground level

[2] 800-meter radius plot for large birds

- *Spatial Use*

Large birds were observed at 26 of the 29 survey points, with highest use observed at Point 38 with 30.92 birds/800 m plot/20 min survey, followed by Point 13 (9.50), and Point 7 (3.75; Figure 7, Appendix C2). High use at Point 38 was due to high waterfowl use (30.67 waterfowl/800 m plot/20 min survey).

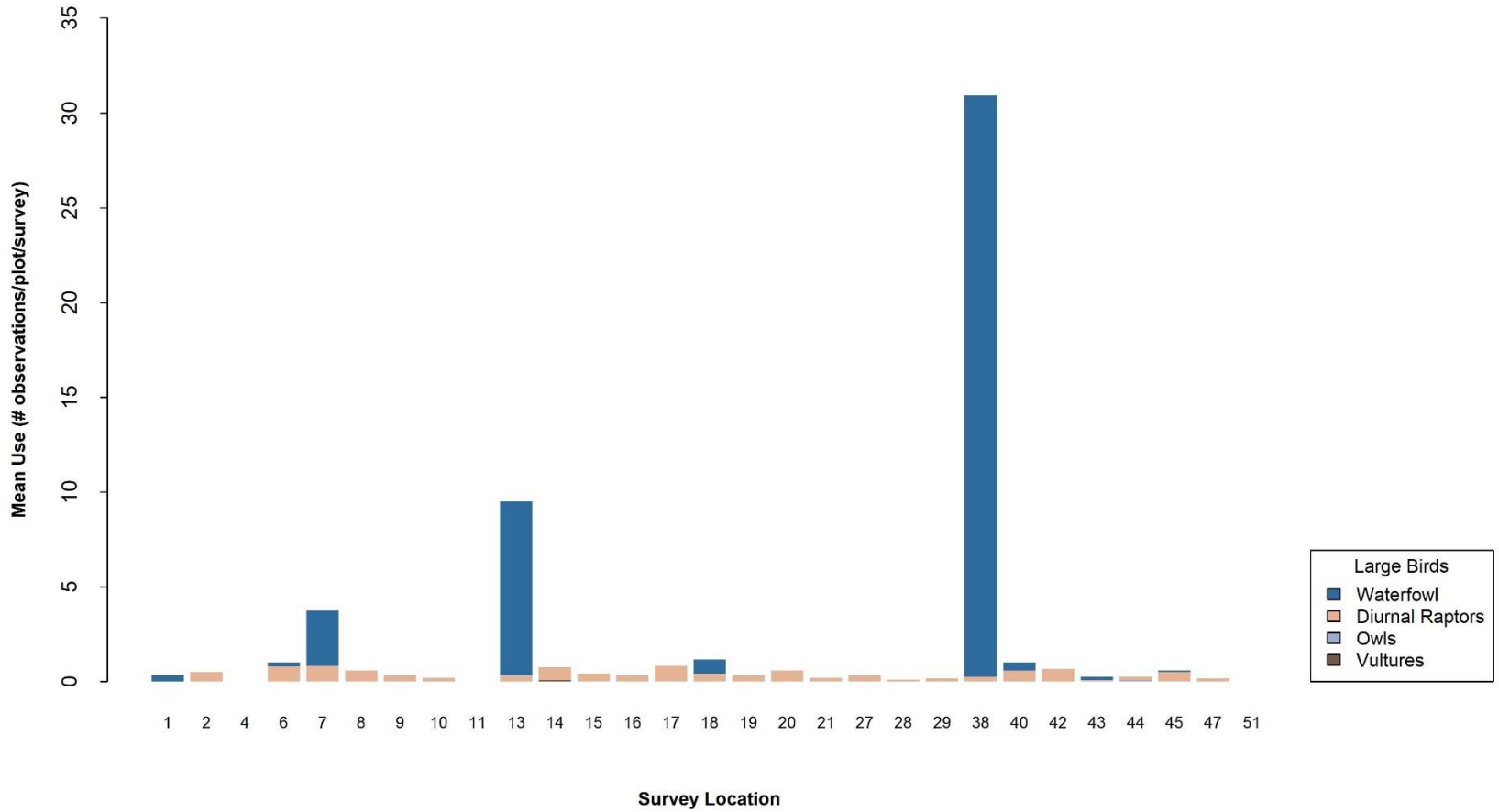

Figure 7. Large bird mean use (number of large birds/800-meter [2,625-foot] plot/20-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

- **Small Bird Use**

During 10 min avian use surveys, 2,420 small birds were observed in 702 groups over 55.5 hours of surveys (Appendix A3). The most commonly observed small birds were horned lark (39.7% of observations), western meadowlark (15.3%), and Lapland longspur (10.2%; Appendix A3). Together these three species accounted for 65.2% of all small bird observations. The remaining 26 passerine species observations make up 34.8% of total observations (Appendix A3).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Small bird mean use ranged from 2.97 observations/100-m plot/10 min survey in the winter to 17.29 during spring (Figure 8, Appendix B3). Passerines accounted for 100% of small bird use in each season. Western meadowlark accounted for 19.8% of use in summer and horned lark accounted for the highest use in fall (45.0%), winter (72.0%) and spring (47.8%; Appendix B3).

- *Spatial Use*

Small birds were observed at all points and ranged from 3.09 observations/100-m plot/10 min survey at Point 10 to 17.00 at Point 7 (Figure 9, Appendix C3). High use at Point 7 was largely due to horned larks (14.3 observations/100-m plot/10-min survey).

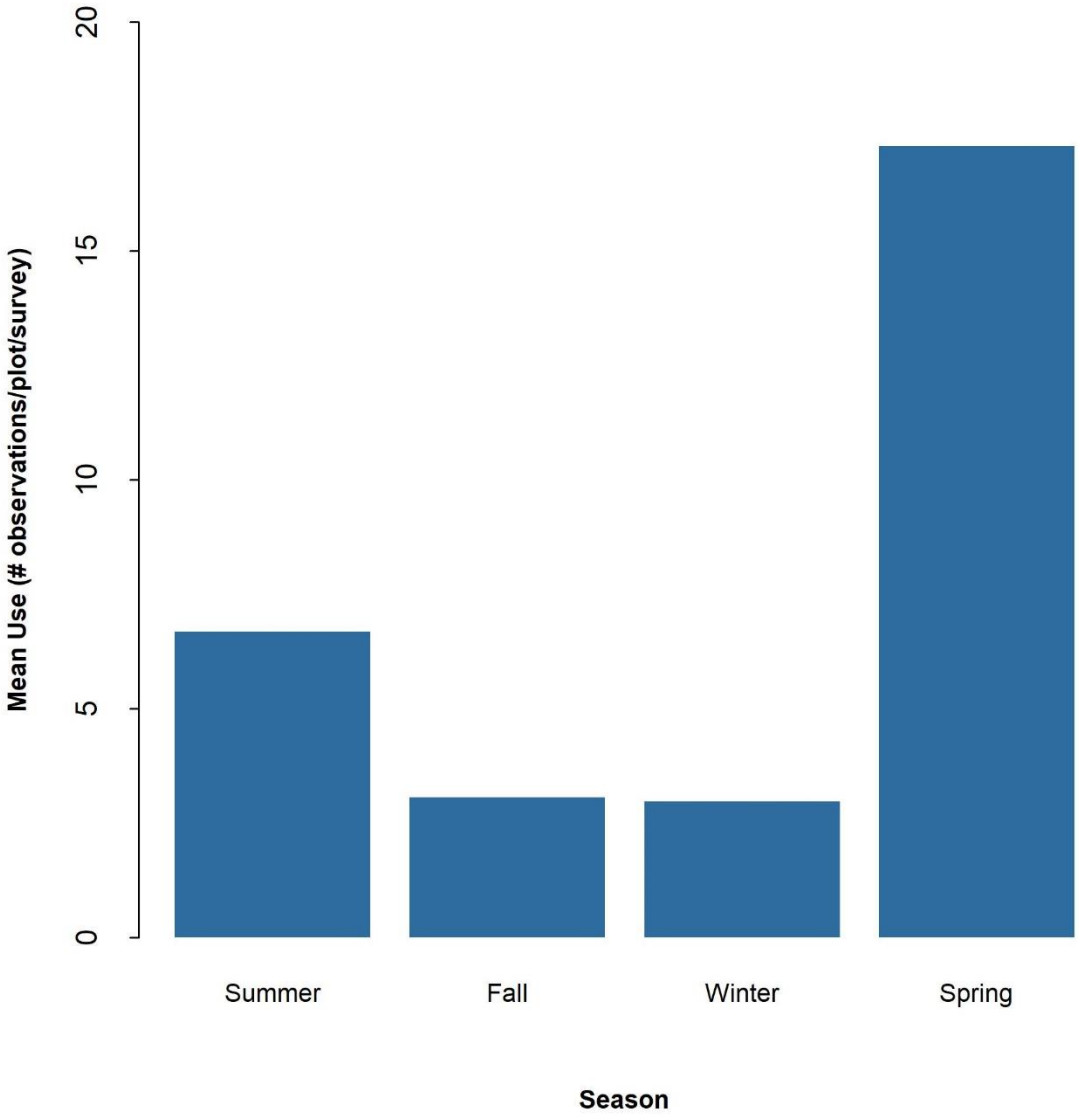

Figure 8. Small bird mean use (number of small birds/100-meter [328-foot] plot/10-minute survey) by season and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

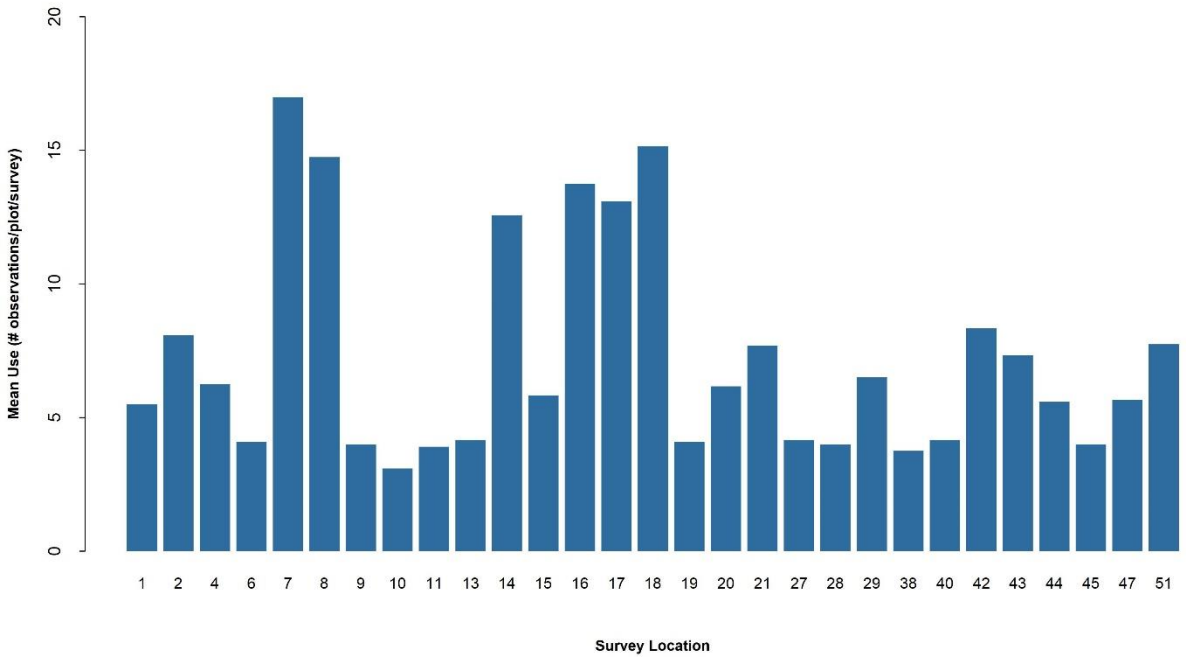

Figure 9. Small bird mean use (number of passerines/100-meter [328-foot] plot/10-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from December 13, 2018 – November 5, 2019.

• DISCUSSION

• Species of Concern

No federally threatened or endangered species were recorded at the Project during surveys. Four raptor species of concern (bald eagle, golden eagle, ferruginous hawk, and Swainson's hawk) and three passerine species of concern (Brewer's sparrow, chestnut-collared longspur, and lark bunting) were recorded during surveys.

Two ferruginous hawks were observed during summer. Southwestern North Dakota is the primary range of the hawk in North Dakota and thought to have some of the highest densities of the species in the state (Dyke et al. 2015). The Project contains preferred habitat (shrub/scrub and grasslands); however, is lacking nesting habitat. Twenty-six Swainson's hawks were observed in all seasons other than winter. Bowman County is considered primary range for the hawk (Dyke et al. 2015) and they are considered common in the state. Swainson's hawk utilize a wide variety of habitats, including those found within the Project. In general, impacts to these raptor species is likely to be low based on the relatively low number of observations and typical flight behavior. Fifty-three chestnut-collared longspurs were observed in summer and fall, suggesting they are potentially nesting in the Project. Chestnut-collared longspurs prefer native prairie habitat and avoid areas of dense shrub. This species of longspur is considered common and are abundant in North Dakota, with Bowman County included within their primary range (Dyke et al. 2015).

Twenty-one lark buntings were observed in summer and spring during surveys. Bowman County is with their primary range in North Dakota and contains some preferred habitat (shorter grasslands mixed with shrubs; Dyke et al. 2015). Brewer's sparrow was only observed in summer when 26 birds were recorded. This sparrow is a sagebrush-obligate (Dyke et al. 2015) with a North Dakota range in only the far southwest portion of the state. Brewer's sparrow is considered uncommon in North Dakota and is experiencing an overall population decline. The project is approximately 44% shrub/scrub and 32% herbaceous with the majority of sagebrush and grasslands located in the central and southwestern portions of the Project. Impacts to chestnut-collared longspurs, lark buntings, and Brewer's sparrows may be minimized by limiting surface disturbance in these areas.

- *Eagles*

Based on data collected during surveys, the Project may receive increased use by bald eagles during the winter and spring migration, suggesting eagles are foraging opportunistically and not breeding in the Project. Bald eagles prefer habitat combining large trees, such as cottonwood trees (*Populus spp.*), and larger bodies of water or rivers, which are lacking in the Project. Furthermore, no occupied bald eagle nests were observed within the Project during raptor nest surveys in 2018 (SWCA 2018). Bald eagle use was not concentrated in a particular portion of the Project; which is reflective of the potential prey base and the lack of major water features in the Project.

Seasonal patterns of activity found during surveys suggest that the Project may receive increased use by golden eagles during the migration periods and winter, with the potential for year-round use. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat. No occupied golden eagle nests were observed within the Project during raptor nest surveys, with the nearest occupied active golden eagle nest 14.3 km (8.9 mi) west of the Project (SWCA 2018). Although nesting habitat is limited within the Project, primary prey resources, including greater sage-grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Tympanuchus phasianellus*), black-tailed prairie dogs (*Cynomys ludovicianus*), lagomorphs, and livestock (including sheep and cattle) are located adjacent to or within the Project. Golden eagle use was concentrated in the central and southern third of the Project; which is likely attributed to the greater topographic relief of the Medicine Pole hills. Based on the results of this survey, presence of preferred habitat, and availability of prey resources, golden eagle use within the Project is likely to occur year-round which is typical for this region.

- **Large Birds**

During spring, migratory waterfowl was most often observed during large bird surveys, with Canada goose composing the most observations and the cause of high waterfowl use at point 38. While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project.

Swainson's hawk and northern harrier were the mostly frequently observed non-eagle raptor species observed within the Project. Both species were observed in relatively small numbers in all seasons except winter. Northern harriers may fly within the RSH during aerial courtship displays that occur at nesting sites during the breeding season, but otherwise, northern harriers are known to hunt, eat, and perch low to the ground (MacWhirter and Bildstein 1996, Smith et al. 2011). Whitfield and Madders (2006) reported up to 97.0% of northern harrier flights were below 20 m (66 ft); therefore, risk of collision with turbine blades is considered low for this species. Swainson's hawk are considered to be common species within the region with stable populations (Dyke et al. 2015; All About Birds 2020). The operation of a wind energy facility within the Project is not likely to incur population-level impacts to these species.

- **Small Birds**

The most commonly observed small birds were horned lark, western meadowlark, and Lapland longspur. These species are typical of this region and are widespread and abundant. Overall, 96.6% of small bird species were recorded below the estimated RSH, suggesting the Project is not likely to cause significant impacts to local small-bird populations. Limiting surface disturbance to previously undisturbed shrub/scrub and herbaceous habitats may minimize impacts to small birds that rely on these habitats for breeding.

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Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018

Appendix A1. Summary of number (#) of groups (grps) and individual observations (obs)[1] for eagles observed during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Eagles		*0*	*0*	*13*	*13*	*37*	*37*	*37*	*37*	*87*	*87*
golden eagle	*Aquila chrysaetos*	0	0	13	13	29	29	30	30	72	72
bald eagle	*Haliaeetus leucocephalus*	0	0	0	0	8	8	7	7	15	15
Overall		**0**	**0**	**13**	**13**	**37**	**37**	**37**	**37**	**87**	**87**

[1] within an 800-meter (2,625-foot) radius of the survey point.

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)[1] by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterfowl		**0**	**0**	**0**	**0**	**0**	**0**	**14**	**536**	**14**	**536**
mallard	*Anas platyrhynchos*	0	0	0	0	0	0	3	8	3	8
Canada goose	*Branta canadensis*	0	0	0	0	0	0	11	528	11	528
Diurnal Raptors		**23**	**24**	**37**	**42**	**19**	**19**	**37**	**37**	**116**	**122**
Buteos		*15*	*16*	*19*	*24*	*4*	*4*	*11*	*11*	*49*	*55*
red-tailed hawk	*Buteo jamaicensis*	5	5	9	9	0	0	4	4	18	18
rough-legged hawk	*Buteo lagopus*	0	0	2	2	4	4	3	3	9	9
ferruginous hawk	*Buteo regalis*	2	2	0	0	0	0	0	0	2	2
Swainson's hawk	*Buteo swainsoni*	8	9	8	13	0	0	4	4	20	26
Northern Harrier		*6*	*6*	*7*	*7*	*0*	*0*	*15*	*15*	*28*	*28*
northern harrier	*Circus hudsonius*	6	6	7	7	0	0	15	15	28	28
Eagles		*0*	*0*	*8*	*8*	*15*	*15*	*11*	*11*	*34*	*34*
golden eagle	*Aquila chrysaetos*	0	0	8	8	14	14	9	9	31	31
bald eagle	*Haliaeetus leucocephalus*	0	0	0	0	1	1	2	2	3	3
Falcons		*2*	*2*	*3*	*3*	*0*	*0*	*0*	*0*	*5*	*5*
prairie falcon	*Falco mexicanus*	0	0	3	3	0	0	0	0	3	3
American kestrel	*Falco sparverius*	2	2	0	0	0	0	0	0	2	2
Owls		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**
snowy owl	*Bubo scandiacus*	0	0	0	0	0	0	1	1	1	1
Vultures		**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
turkey vulture	*Cathartes aura*	1	1	0	0	0	0	0	0	1	1
Overall		**24**	**25**	**37**	**42**	**19**	**19**	**52**	**574**	**132**	**660**

[1] within an 800-meter (2,625-foot) radius of the survey point.

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)[1] by small bird type, passerine subtype, and species observed during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**303**	**576**	**67**	**258**	**28**	**252**	**304**	**1,334**	**702**	**2,420**
Blackbirds/Orioles		*152*	*266*	*22*	*63*	*0*	*0*	*142*	*367*	*316*	*696*
red-winged blackbird	*Agelaius phoeniceus*	35	60	0	0	0	0	24	99	59	159
bobolink	*Dolichonyx oryzivorus*	16	21	0	0	0	0	0	0	16	21
Brewer's blackbird	*Euphagus cyanocephalus*	4	10	1	17	0	0	10	40	15	67
brown-headed cowbird	*Molothrus ater*	5	17	0	0	0	0	0	0	5	17
common grackle	*Quiscalus quiscula*	16	43	0	0	0	0	0	0	16	43
western meadowlark	*Sturnella neglecta*	75	114	19	32	0	0	105	224	199	370
European starling	*Sturnus vulgaris*	0	0	2	14	0	0	3	4	5	18
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	1	1	0	0	0	0	0	0	1	1
Finches/Crossbills		*4*	*8*	*1*	*2*	*0*	*0*	*0*	*0*	*5*	*10*
American goldfinch	*Spinus tristis*	4	8	1	2	0	0	0	0	5	10
Flycatchers		*22*	*42*	*0*	*0*	*0*	*0*	*1*	*4*	*23*	*46*
eastern kingbird	*Tyrannus tyrannus*	15	29	0	0	0	0	0	0	15	29
western kingbird	*Tyrannus verticalis*	7	13	0	0	0	0	1	4	8	17
Grassland/Sparrows		*87*	*198*	*40*	*188*	*28*	*252*	*151*	*931*	*306*	*1,569*
grasshopper sparrow	*Ammodramus savannarum*	32	42	0	0	0	0	5	23	37	65
lark bunting	*Calamospiza melanocorys*	8	19	0	0	0	0	1	2	9	21
Lapland longspur	*Calcarius lapponicus*	0	0	2	30	5	51	18	167	25	248
chestnut-collared longspur	*Calcarius ornatus*	4	23	11	30	0	0	0	0	15	53
horned lark	*Eremophila alpestris*	17	38	20	116	21	182	99	624	157	960
dark-eyed junco	*Junco hyemalis*	0	0	0	0	0	0	1	3	1	3
song sparrow	*Melospiza melodia*	0	0	0	0	0	0	4	11	4	11
house sparrow	*Passer domesticus*	0	0	0	0	0	0	5	21	5	21
savannah sparrow	*Passerculus sandwichensis*	10	17	5	10	0	0	4	20	19	47
snow bunting	*Plectrophenax nivalis*	0	0	0	0	2	19	4	11	6	30
vesper sparrow	*Pooecetes gramineus*	5	28	1	1	0	0	8	43	14	72
Brewer's sparrow	*Spizella breweri*	7	26	0	0	0	0	0	0	7	26
clay-colored sparrow	*Spizella pallida*	4	5	1	1	0	0	2	6	7	12
Swallows		*15*	*24*	*1*	*1*	*0*	*0*	*0*	*0*	*16*	*25*
barn swallow	*Hirundo rustica*	12	17	1	1	0	0	0	0	13	18
bank swallow	*Riparia riparia*	1	2	0	0	0	0	0	0	1	2
tree swallow	*Tachycineta bicolor*	2	5	0	0	0	0	0	0	2	5
Shrikes		*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*1*

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)[1] by small bird type, passerine subtype, and species observed during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
loggerhead shrike	*Lanius ludovicianus*	0	0	0	0	0	0	1	1	1	1
Thrushes		*23*	*38*	*3*	*4*	*0*	*0*	*9*	*31*	*35*	*73*
American robin	*Turdus migratorius*	23	38	3	4	0	0	9	31	35	73
Overall		**303**	**576**	**67**	**258**	**28**	**252**	**304**	**1,334**	**702**	**2,420**

[1] within a 100-meter (328-foot) radius of the survey point.

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018

Appendix B1. Mean eagle use[1], percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Eagles	*0*	*0.15*	*0.43*	*0.47*	*0*	*100*	*100*	*100*	*0*	*10.7*	*11.5*	*16.5*
golden eagle	0	0.15	0.33	0.38	0	100	78.3	81.4	0	10.7	9.2	11.5
bald eagle	0	0	0.09	0.09	0	0	21.7	18.6	0	0	4.6	4.9
Overall	**0**	**0.15**	**0.43**	**0.47**	**0**	**100**	**100**	**100**				

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix B2. Mean large birds use[1], percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Waterfowl	**0**	**0**	**0**	**6.70**	**0**	**0**	**0**	**93.0**	**0**	**0**	**0**	**11.6**
mallard	0	0	0	0.10	0	0	0	1.4	0	0	0	3.7
Canada goose	0	0	0	6.60	0	0	0	91.7	0	0	0	9.3
Diurnal Raptors	**0.28**	**0.50**	**0.22**	**0.49**	**96.0**	**100**	**100**	**6.8**	**18.8**	**34.6**	**9.3**	**28.8**
Buteos	*0.19*	*0.29*	*0.05*	*0.14*	*63.9*	*57.2*	*21.3*	*2.0*	*11.7*	*20.3*	*3.5*	*8.9*
red-tailed hawk	0.06	0.11	0	0.05	19.9	21.4	0	0.7	5.9	9.5	0	4.0
rough-legged hawk	0	0.02	0.05	0.04	0	4.9	21.3	0.6	0	2.5	3.5	1.4
ferruginous hawk	0.02	0	0	0	8.1	0	0	0	2.4	0	0	0
Swainson's hawk	0.11	0.15	0	0.05	36.0	30.9	0	0.6	7.1	8.3	0	3.4
Northern Harrier	*0.07*	*0.08*	*0*	*0.21*	*24.0*	*16.6*	*0*	*2.9*	*7.1*	*7.1*	*0*	*11.0*
northern harrier	*0.07*	*0.08*	*0*	*0.21*	*24.0*	*16.6*	*0*	*2.9*	*7.1*	*7.1*	*0*	*11.0*
Eagles	*0*	*0.10*	*0.17*	*0.14*	*0*	*19.0*	*78.7*	*1.9*	*0*	*7.1*	*5.8*	*10.3*
golden eagle	0	0.10	0.16	0.12	0	19.0	73.3	1.6	0	7.1	4.6	7.8
bald eagle	0	0	0.01	0.02	0	0	5.4	0.3	0	0	1.2	2.5
Falcons	*0.02*	*0.04*	*0*	*0*	*8.1*	*7.1*	*0*	*0*	*1.2*	*3.6*	*0*	*0*
prairie falcon	0	0.04	0	0	0	7.1	0	0	0	3.6	0	0
American kestrel	0.02	0	0	0	8.1	0	0	0	1.2	0	0	0
Owls	**0**	**0**	**0**	**0.01**	**0**	**0**	**0**	**0.2**	**0**	**0**	**0**	**1.2**
snowy owl	0	0	0	0.01	0	0	0	0.2	0	0	0	1.2
Vultures	**0.01**	**0**	**0**	**0**	**4.0**	**0**	**0**	**0**	**1.2**	**0**	**0**	**0**
turkey vulture	0.01	0	0	0	4.0	0	0	0	1.2	0	0	0
Overall	**0.30**	**0.50**	**0.22**	**7.20**	**100**	**100**	**100**	**100**				

[1.] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix B3. Mean small birds use[1], percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Passerines	**6.68**	**3.07**	**2.97**	**17.29**	**100**	**100**	**100**	**100**	**88.2**	**48.8**	**30.8**	**97.4**
Blackbirds/Orioles	*3.07*	*0.75*	*0*	*4.67*	*46.0*	*24.4*	*0*	*27.0*	*70.6*	*21.4*	*0*	*65.5*
red-winged blackbird	0.69	0	0	1.16	10.3	0	0	6.7	28.8	0	0	27.6
bobolink	0.24	0	0	0	3.6	0	0	0	11.5	0	0	0
Brewer's blackbird	0.11	0.20	0	0.47	1.7	6.6	0	2.7	4.6	1.2	0	11.8
brown-headed cowbird	0.20	0	0	0	2.9	0	0	0	4.6	0	0	0
common grackle	0.50	0	0	0	7.4	0	0	0	15.0	0	0	0
western meadowlark	1.32	0.38	0	2.98	19.8	12.4	0	17.2	47.5	17.9	0	63.2
European starling	0	0.17	0	0.06	0	5.4	0	0.3	0	2.4	0	2.9
yellow-headed blackbird	0.01	0	0	0	0.2	0	0	0	1.1	0	0	0
Finches/Crossbills	*0.10*	*0.02*	*0*	*0*	*1.4*	*0.8*	*0*	*0*	*4.8*	*1.2*	*0*	*0*
American goldfinch	0.10	0.02	0	0	1.4	0.8	0	0	4.8	1.2	0	0
Flycatchers	*0.49*	*0*	*0*	*0.05*	*7.3*	*0*	*0*	*0.3*	*18.6*	*0*	*0*	*1.1*
eastern kingbird	0.34	0	0	0	5.1	0	0	0	14.0	0	0	0
western kingbird	0.15	0	0	0.05	2.3	0	0	0.3	7.0	0	0	1.1
Grassland/Sparrows	*2.30*	*2.24*	*2.97*	*12.15*	*34.5*	*72.9*	*100*	*70.3*	*54.4*	*32.1*	*30.8*	*83.9*
grasshopper sparrow	0.48	0	0	0.26	7.2	0	0	1.5	27.6	0	0	5.7
lark bunting	0.22	0	0	0.02	3.3	0	0	0.1	5.7	0	0	1.1
Lapland longspur	0	0.36	0.61	2.19	0	11.6	20.4	12.6	0	2.4	5.9	18.5
chestnut-collared longspur	0.27	0.36	0	0	4.1	11.6	0	0	1.2	10.7	0	0
horned lark	0.44	1.38	2.14	8.27	6.6	45.0	72.0	47.8	15.1	19.0	23.7	57.6
dark-eyed junco	0	0	0	0.04	0	0	0	0.3	0	0	0	1.4
song sparrow	0	0	0	0.13	0	0	0	0.7	0	0	0	4.6
house sparrow	0	0	0	0.30	0	0	0	1.8	0	0	0	2.9
savannah sparrow	0.20	0.12	0	0.23	3.0	3.9	0	1.3	10.5	6.0	0	4.6
snow bunting	0	0	0.23	0.14	0	0	7.6	0.8	0	0	2.4	2.6
vesper sparrow	0.33	0.01	0	0.49	5.0	0.4	0	2.9	4.8	1.2	0	9.2
Brewer's sparrow	0.30	0	0	0	4.5	0	0	0	6.9	0	0	0
clay-colored sparrow	0.06	0.01	0	0.07	0.9	0.4	0	0.4	4.6	1.2	0	2.3
Swallows	*0.28*	*0.01*	*0*	*0*	*4.2*	*0.4*	*0*	*0*	*15.1*	*1.2*	*0*	*0*
barn swallow	0.20	0.01	0	0	3.0	0.4	0	0	12.8	1.2	0	0
bank swallow	0.02	0	0	0	0.3	0	0	0	1.1	0	0	0
tree swallow	0.06	0	0	0	0.9	0	0	0	2.3	0	0	0
Shrikes	*0*	*0*	*0*	*0.01*	*0*	*0*	*0*	*0.1*	*0*	*0*	*0*	*1.1*

Appendix B3. Mean small birds use[1], percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
loggerhead shrike	0	0	0	0.01	0	0	0	0.1	0	0	0	1.1
Thrushes	*0.44*	*0.05*	*0*	*0.42*	*6.6*	*1.6*	*0*	*2.4*	*20.8*	*3.6*	*0*	*7.5*
American robin	0.44	0.05	0	0.42	6.6	1.6	0	2.4	20.8	3.6	0	7.5
Overall	**6.68**	**3.07**	**2.97**	**17.29**	**100**	**100**	**100**	**100**				

[1.] Number of small birds/100-meter (328-foot) plot/10-minute survey.

Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018

Appendix C1. Mean use by point for eagles[1] observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Bird Type	**1**	**2**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**13**
Eagles	*0.25*	*0*	*0*	*0.70*	*0.25*	*1.08*	*0.33*	*0.09*	*0*	*0*
golden eagle	0	0	0	0.60	0.25	1.08	0.08	0.09	0	0
bald eagle	0.25	0	0	0.10	0	0	0.25	0	0	0
All Large Birds	**0.25**	**0**	**0**	**0.70**	**0.25**	**1.08**	**0.33**	**0.09**	**0**	**0**

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (*continued*). Mean use by point for eagles[1] observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point								
Bird Type	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**27**
Eagles	*0.42*	*0.25*	*0.33*	*0.50*	*0.42*	*0.17*	*0.33*	*0*	*0.92*
golden eagle	0.08	0.17	0.33	0.50	0.42	0.17	0.25	0	0.92
bald eagle	0.33	0.08	0	0	0	0	0.08	0	0
All Large Birds	**0.42**	**0.25**	**0.33**	**0.50**	**0.42**	**0.17**	**0.33**	**0**	**0.92**

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (*continued*). Mean use by point for eagles[1] observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Bird Type	**28**	**29**	**38**	**40**	**42**	**43**	**44**	**45**	**47**	**51**
Eagles	*0.27*	*0.08*	*0*	*0.17*	*0.50*	*0*	*0.17*	*0.17*	*0*	*0*
golden eagle	0.27	0.08	0	0.17	0.50	0	0.17	0	0	0
bald eagle	0	0	0	0	0	0	0	0.17	0	0
All Large Birds	**0.27**	**0.08**	**0**	**0.17**	**0.50**	**0**	**0.17**	**0.17**	**0**	**0**

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C2. Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Type/Species	**1**	**2**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**13**
Waterfowl	**0.33**	**0**	**0**	**0.20**	**2.92**	**0**	**0**	**0**	**0**	**9.17**
mallard	0.33	0	0	0.20	0	0	0	0	0	0
Canada goose	0	0	0	0	2.92	0	0	0	0	9.17
Diurnal Raptors	**0**	**0.50**	**0**	**0.80**	**0.83**	**0.58**	**0.33**	**0.18**	**0**	**0.33**
Buteos	*0*	*0.42*	*0*	*0*	*0.08*	*0*	*0.25*	*0*	*0*	*0.17*
red-tailed hawk	0	0.08	0	0	0.08	0	0.08	0	0	0
rough-legged hawk	0	0	0	0	0	0	0.08	0	0	0
ferruginous hawk	0	0	0	0	0	0	0	0	0	0
Swainson's hawk	0	0.33	0	0	0	0	0.08	0	0	0.17
Northern Harrier	*0*	*0.08*	*0*	*0.30*	*0.42*	*0.17*	*0.08*	*0.09*	*0*	*0.17*
northern harrier	0	0.08	0	0.30	0.42	0.17	0.08	0.09	0	0.17
Eagles	*0*	*0*	*0*	*0.50*	*0.17*	*0.42*	*0*	*0.09*	*0*	*0*
golden eagle	0	0	0	0.40	0.17	0.42	0	0.09	0	0
bald eagle	0	0	0	0.10	0	0	0	0	0	0
Falcons	*0*	*0*	*0*	*0*	*0.17*	*0*	*0*	*0*	*0*	*0*
prairie falcon	0	0	0	0	0	0	0	0	0	0
American kestrel	0	0	0	0	0.17	0	0	0	0	0
Owls	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
snowy owl	0	0	0	0	0	0	0	0	0	0
Vultures	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
turkey vulture	0	0	0	0	0	0	0	0	0	0
All Large Birds	**0.33**	**0.50**	**0**	**1.00**	**3.75**	**0.58**	**0.33**	**0.18**	**0**	**9.50**

[1] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point								
Type/Species	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**27**
Waterfowl	**0**	**0**	**0**	**0**	**0.75**	**0**	**0**	**0**	**0**
mallard	0	0	0	0	0	0	0	0	0
Canada goose	0	0	0	0	0.75	0	0	0	0
Diurnal Raptors	**0.67**	**0.42**	**0.33**	**0.83**	**0.42**	**0.33**	**0.58**	**0.20**	**0.33**
Buteos	*0.25*	*0.25*	*0.08*	*0.58*	*0.17*	*0.08*	*0.33*	*0.10*	*0*
red-tailed hawk	0.17	0.08	0	0	0	0	0.08	0	0
rough-legged hawk	0	0	0	0.17	0.17	0	0.08	0	0
ferruginous hawk	0.08	0	0	0	0	0.08	0	0	0
Swainson's hawk	0	0.17	0.08	0.42	0	0	0.17	0.10	0
Northern Harrier	*0.25*	*0*	*0.08*	*0.08*	*0.17*	*0.08*	*0*	*0*	*0*
northern harrier	0.25	0	0.08	0.08	0.17	0.08	0	0	0
Eagles	*0.17*	*0.17*	*0.17*	*0.08*	*0.08*	*0.17*	*0.25*	*0*	*0.33*
golden eagle	0	0.17	0.17	0.08	0.08	0.17	0.25	0	0.33
bald eagle	0.17	0	0	0	0	0	0	0	0
Falcons	*0*	*0*	*0*	*0.08*	*0*	*0*	*0*	*0.10*	*0*
prairie falcon	0	0	0	0.08	0	0	0	0.10	0

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point								
Type/Species	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**27**
American kestrel	0	0	0	0	0	0	0	0	0
Owls	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
snowy owl	0	0	0	0	0	0	0	0	0
Vultures	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
turkey vulture	0.08	0	0	0	0	0	0	0	0
All Large Birds	**0.75**	**0.42**	**0.33**	**0.83**	**1.17**	**0.33**	**0.58**	**0.20**	**0.33**

[1] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Type/Species	**28**	**29**	**38**	**40**	**42**	**43**	**44**	**45**	**47**	**51**
Waterfowl	**0**	**0**	**30.67**	**0.42**	**0**	**0.17**	**0**	**0.08**	**0**	**0**
mallard	0	0	0	0.17	0	0	0	0	0	0
Canada goose	0	0	30.67	0.25	0	0.17	0	0.08	0	0
Diurnal Raptors	**0.09**	**0.17**	**0.25**	**0.58**	**0.67**	**0.08**	**0.17**	**0.50**	**0.17**	**0**
Buteos	*0.09*	*0.08*	*0.17*	*0.42*	*0.50*	*0*	*0.08*	*0.42*	*0.08*	*0*
red-tailed hawk	0	0	0.17	0.17	0.42	0	0.08	0	0.08	0
rough-legged hawk	0	0	0	0.25	0	0	0	0	0	0
ferruginous hawk	0	0	0	0	0	0	0	0	0	0
Swainson's hawk	0.09	0.08	0	0	0.08	0	0	0.42	0	0
Northern Harrier	*0*	*0*	*0.08*	*0.08*	*0*	*0.08*	*0*	*0.08*	*0.08*	*0*
northern harrier	0	0	0.08	0.08	0	0.08	0	0.08	0.08	0
Eagles	*0*	*0*	*0*	*0.08*	*0.17*	*0*	*0.08*	*0*	*0*	*0*
golden eagle	0	0	0	0.08	0.17	0	0.08	0	0	0
bald eagle	0	0	0	0	0	0	0	0	0	0
Falcons	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
prairie falcon	0	0.08	0	0	0	0	0	0	0	0
American kestrel	0	0	0	0	0	0	0	0	0	0
Owls	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**
snowy owl	0	0	0	0	0	0	0.08	0	0	0
Vultures	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
turkey vulture	0	0	0	0	0	0	0	0	0	0
All Large Birds	**0.09**	**0.17**	**30.92**	**1.00**	**0.67**	**0.25**	**0.25**	**0.58**	**0.17**	**0**

[1] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C3. Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Type/Species	**1**	**2**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**13**
Passerines	**5.50**	**8.08**	**6.25**	**4.09**	**17.00**	**14.75**	**4.00**	**3.09**	**3.91**	**4.17**
red-winged blackbird	0.42	0.83	0.92	0	0.58	0.50	0	0.27	0	0.75
bobolink	0.08	0.17	0	0	0	0.17	0.25	0	0.27	0
Brewer's blackbird	0	0.42	0	1.73	0	0	0	0.27	0	0.25
brown-headed cowbird	0	0	0	0	0.33	0	0	0	0	0
common grackle	0	0	0	0	0.08	0	0	0	0	0
western meadowlark	1.08	1.17	1.08	0.27	1.00	2.50	1.33	0.36	0.73	0.83
European starling	0	0	0	0	0	0.25	0	0	0	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0.25	0	0.17	0	0	0	0	0
eastern kingbird	0.42	0	0	0	0	0	0	0	0	0
western kingbird	0	0.08	0	0.55	0	0	0	0	0	0
grasshopper sparrow	0	0.42	0.25	0.27	0.33	0.17	0.25	0.27	0.27	0.08
lark bunting	0	0	0	0	0	0.33	0	0	0	0
Lapland longspur	0	0	0.33	0.27	0	0	0.42	0	0	0.25
chestnut-collared longspur	0.08	0	0	0	0	0.33	0	0	0	0
horned lark	2.67	2.75	2.83	0.91	14.25	8.17	1.67	0.82	1.73	1.17
dark-eyed junco	0	0	0	0	0	0	0	0	0	0
song sparrow	0	0	0	0	0	0	0	0	0	0.25
house sparrow	0	0	0	0	0	1.17	0	0	0	0
savannah sparrow	0.50	0.17	0.42	0	0	0	0	0	0	0.08
snow bunting	0	1.00	0	0	0	0	0	0	0	0
vesper sparrow	0	0.67	0	0.09	0	0	0	0.55	0.55	0
Brewer's sparrow	0	0.17	0	0	0	0	0	0.36	0	0
clay-colored sparrow	0	0.08	0	0	0	0	0	0.09	0	0.17
barn swallow	0.08	0	0.17	0	0	0	0	0.09	0	0
bank swallow	0	0	0	0	0	0.17	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0.36	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0
American robin	0.17	0.17	0	0	0.25	1.00	0.08	0	0	0.33
All Small Birds	**5.50**	**8.08**	**6.25**	**4.09**	**17.00**	**14.75**	**4.00**	**3.09**	**3.91**	**4.17**

[1] Number of small birds/100-meter (328-foot) plot/10-minute survey.

Appendix C3 (*continued*). Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point								
Type/Species	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**27**
Passerines	**12.58**	**5.83**	**13.75**	**13.09**	**15.17**	**4.08**	**6.17**	**7.70**	**4.17**
red-winged blackbird	0.75	0.83	0.42	1.27	0.58	0.17	0.58	0.30	0.42
bobolink	0	0.08	0.17	0	0	0	0	0.40	0
Brewer's blackbird	0.58	0	0.33	0.27	0	0	0	0.20	0.50
brown-headed cowbird	0	0	0	0	0	0	0.17	0	0
common grackle	0.33	0.08	0.17	0	0.42	0.17	0.17	0	0
western meadowlark	1.58	1.42	2.33	1.55	1.17	1.25	1.33	1.30	0.75

Appendix C3 (*continued*). Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point								
Type/Species	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**27**
European starling	0	0.08	0	0	0	0	0	0.90	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0.17	0	0	0	0.17	0	0
eastern kingbird	0.25	0	0	0.09	0	0.33	0.42	0	0.08
western kingbird	0	0	0.08	0	0	0	0	0	0.08
grasshopper sparrow	0	0	0.25	1.27	0.08	0	0.08	0.20	0
lark bunting	0	0	0	0	0	0	0	0.20	0
Lapland longspur	2.67	1.50	1.25	2.45	4.08	0.58	1.92	0	0
chestnut-collared longspur	0	0	0.25	2.55	0.08	0	0	0.20	0
horned lark	6.42	0.50	7.83	2.09	5.75	0.75	0.67	2.90	2.08
dark-eyed junco	0	0	0	0	0	0	0.25	0	0
song sparrow	0	0	0.17	0	0	0	0	0	0
house sparrow	0	0	0	0	0	0	0	0	0
savannah sparrow	0	0	0	1.00	0.17	0.17	0	0.10	0
snow bunting	0	0	0	0	0	0	0	0	0
vesper sparrow	0	0.50	0.33	0.36	1.33	0	0	1.00	0.25
Brewer's sparrow	0	0	0	0	1.42	0	0	0	0
clay-colored sparrow	0	0	0	0	0	0.08	0	0	0
barn swallow	0	0	0	0	0.08	0.42	0.08	0	0
bank swallow	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0.08	0	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0
American robin	0	0.83	0	0.18	0	0.08	0.33	0	0
All Small Birds	**12.58**	**5.83**	**13.75**	**13.09**	**15.17**	**4.08**	**6.17**	**7.70**	**4.17**

[1] Number of small birds/100-meter (328-foot) plot/10-minute survey.

Appendix C3 (*continued*). Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Type/Species	**28**	**29**	**38**	**40**	**42**	**43**	**44**	**45**	**47**	**51**
Passerines	**4.00**	**6.50**	**3.75**	**4.17**	**8.33**	**7.33**	**5.58**	**4.00**	**5.67**	**7.75**
red-winged blackbird	0.27	1.08	0	0	0.67	0.25	0.42	0.58	0.25	1.00
bobolink	0.09	0	0	0	0	0	0	0	0	0.50
Brewer's blackbird	0.18	0.83	0	0	0.25	0	0	0	0	0
brown-headed cowbird	0	0.58	0	0	0	0	0.33	0	0	0
common grackle	0	0.08	0	0	1.50	0.17	0	0.17	0	0.75
western meadowlark	0.45	0.83	1.50	1.17	0.50	0.17	1.00	0.83	1.25	1.75
European starling	0	0	0	0	0.42	0	0	0	0	0
yellow-headed blackbird	0	0	0	0	0.08	0	0	0	0	0

Appendix C3 (*continued*). Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

	Survey Point									
Type/Species	**28**	**29**	**38**	**40**	**42**	**43**	**44**	**45**	**47**	**51**
American goldfinch	0	0	0	0	0	0	0	0.08	0	0
eastern kingbird	0	0	0.25	0.17	0	0	0.25	0.17	0	0
western kingbird	0	0	0	0	0.33	0	0	0.08	0	0.75
grasshopper sparrow	0.09	0	0	0	0.17	0	0.25	0.42	0.42	0.25
lark bunting	1.18	0	0	0	0	0.17	0	0	0	0
Lapland longspur	0	0.75	0	0	0.75	0.25	1.25	0	1.92	0.75
chestnut-collared longspur	0	0	0	0.42	0.50	0	0.25	0	0	0
horned lark	1.09	0	1.25	1.92	2.83	4.17	1.00	0.83	1.42	1.75
dark-eyed junco	0	0	0	0	0	0	0	0	0	0
song sparrow	0.27	0	0	0	0	0	0	0	0.25	0
house sparrow	0	0.58	0	0	0	0	0	0	0	0
savannah sparrow	0	0	0.17	0	0	0.17	0.58	0.50	0	0
snow bunting	0	0	0	0	0	1.33	0	0	0.17	0
vesper sparrow	0	0	0.42	0	0	0.25	0	0	0	0
Brewer's sparrow	0	0	0	0.08	0.17	0	0	0	0	0
clay-colored sparrow	0	0	0.17	0	0.08	0.33	0	0	0	0
barn swallow	0	0	0	0.33	0.08	0.08	0	0.08	0	0
bank swallow	0	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0	0
loggerhead shrike	0	0	0	0.08	0	0	0	0	0	0
American robin	0.36	1.75	0	0	0	0	0.25	0.25	0	0.25
All Small Birds	**4.00**	**6.50**	**3.75**	**4.17**	**8.33**	**7.33**	**5.58**	**4.00**	**5.67**	**7.75**

[1] Number of small birds/100-meter (328-foot) plot/10-minute survey.

Avian Use Survey for the Proposed Bowman Wind Project Bowman County, North Dakota

Final Report

August 23, 2018 – July 23, 2019

Prepared for:

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June 25, 2020

Privileged and Confidential – Not For Distribution

• EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. completed a year of avian use surveys for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern. The survey methods were consistent with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines,* USFWS *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (2016) and recommendations from USFWS and the North Dakota Game and Fish Department.

Surveys were completed monthly from August 23, 2018 to July 23, 2019, at 33 points established throughout the Project. Surveys consisted of 5-minute (min) counts of small birds only within a 100-meter (m; 328-foot [ft]) radius plot, followed by 60 min counts recording large birds (including eagles) within 800 m (2,625 ft). The 60-min count was further divided into 20 min surveys of large birds (including eagles) and the remaining 40 min surveys for eagles only.

No federally listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations, 47 golden eagle observations, and two unidentified eagle observations, protected under the Bald and Golden Eagle Protection Act, were recorded during use surveys and incidentally. In addition, eight bird species of concern (ferruginous hawk, marbled godwit, Swainson's hawk, Wilson's phalarope, Baird's sparrow, chestnut-collared longspur, grasshopper sparrow, and lark bunting) were recorded during use surveys or incidentally.

Thirty-seven large bird species and 38 small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (45.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 10% of large bird observations recorded. Northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (25.0% of observations), western meadowlark (19.9%), and red-winged blackbird (14.2%).

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region. Bald eagles were recorded in fall, winter, and spring, suggesting primarily winter and migratory use by non-breeding eagles. Seasonal patterns of activity found during surveys suggest the Project may receive increased use by golden eagles during the migration periods and winter, with the potential for year-round use.

PARTICIPANTS

Chad LeBeau	Senior Project Manager, Senior Reviewer
Kristen Chodachek	Project Manager, Reviewer
Mandy Kauffman	Lead Client Analyst
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Kimberly Bailey	Report Reviewer
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Carmen Boyd	Project Tracking and Data Manager

REPORT REFERENCE

LeBeau, C., K. Chodachek, and K. Bailey. 2020. Avian Use Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota. Draft Report: August 23, 2018 – August 23, 2019. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. June 25, 2020.

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• INTRODUCTION

Bowman Wind, LLC (Bowman Wind) is proposing the development of the Bowman Wind Project (Project) located in Bowman County, North Dakota (Figure 1). To support the development of the Project, Bowman Wind contracted Western EcoSystems Technology, Inc. (WEST) to complete a year of avian use surveys from August 2018 through July 2019 within the Project. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern (defined as species afforded protection under the Endangered Species Act of 1973, Bald and Golden Eagle Protection Act [BGEPA] of 1940, and defined as Level I Species of Conservation Priority by the state of North Dakota [Dyke et al. 2015]).

• PROJECT AREA

The proposed Project encompasses 23,803 hectares (58,818 acres) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. Elevations within the Project range from approximately 896 meters (m; 2,940 feet [ft]) to 1,051 m (3,448 ft; US Geological Survey 2019), with the greater topographic relief associated with the Medicine Pole hills in the center of the Project (Figure 1).

According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project is shrub/scrub (43.9%), followed by herbaceous/grassland (32.0%), and cultivated crops (19.7%; Figure 2, Table 1). The remaining land covers account for less than 3.0% of the Project, individually (Figure 2, Table 1).

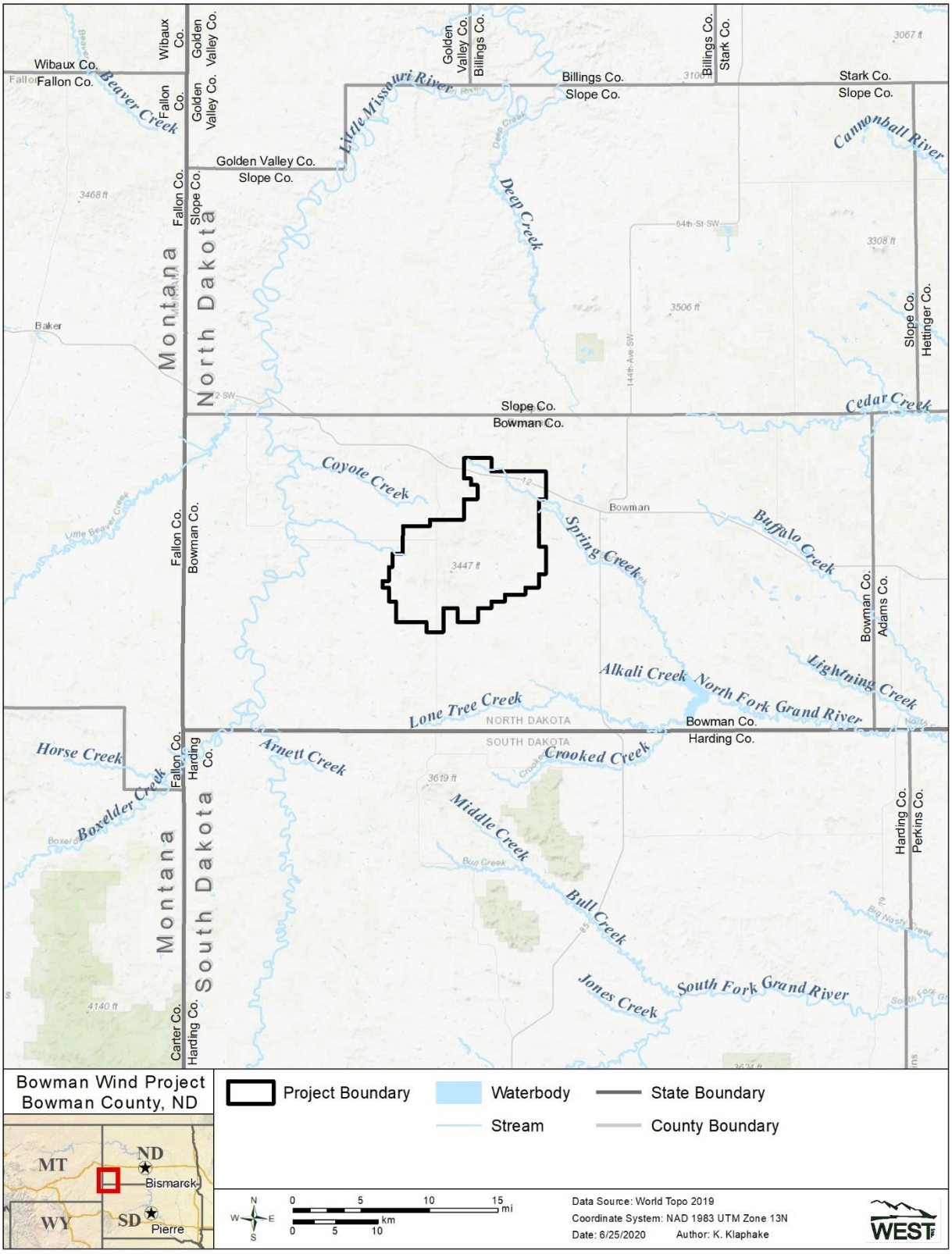

Figure 1. Location of the proposed Bowman Wind Project, Bowman County, North Dakota.

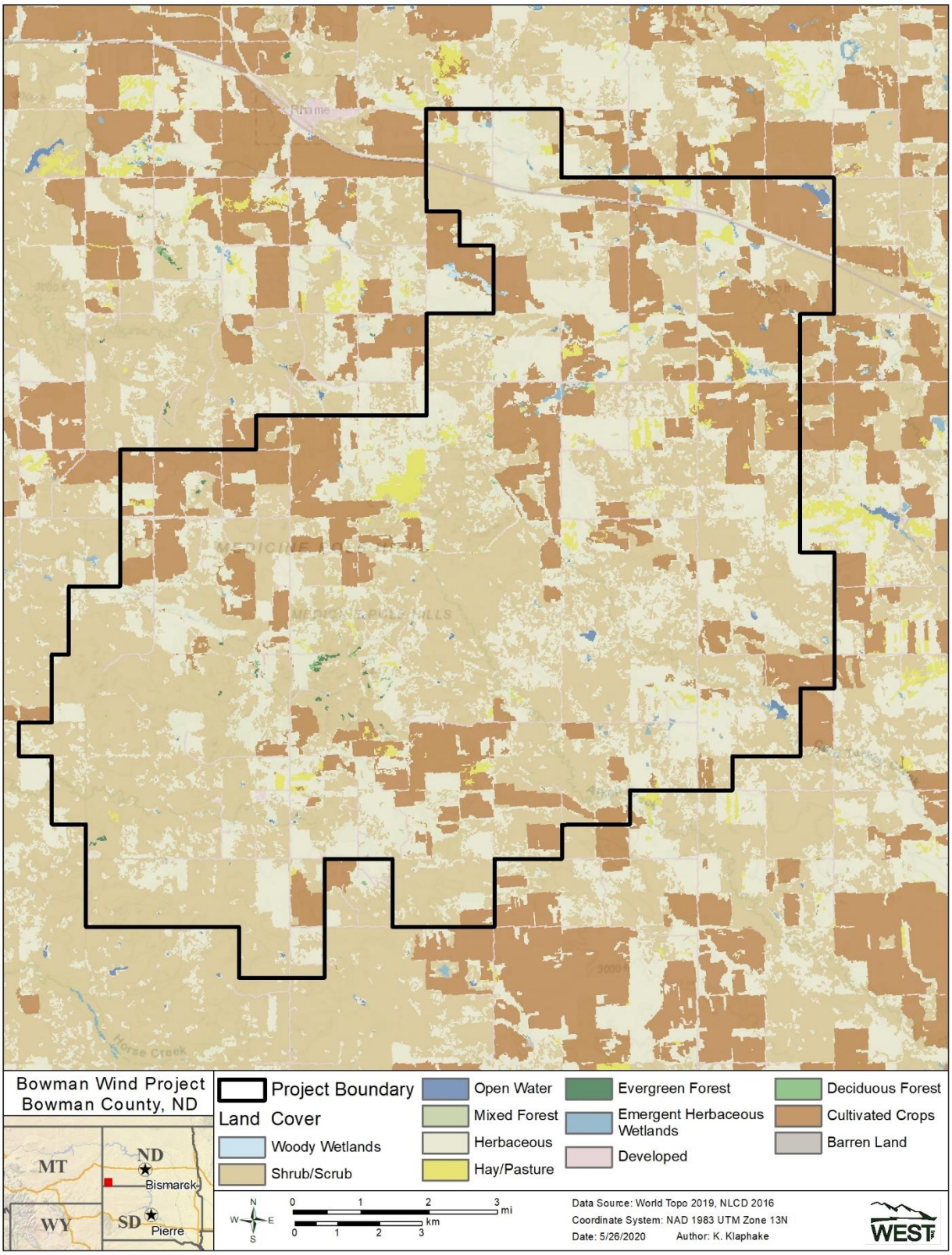

Figure 2. Land cover types and coverage at the proposed Bowman Wind Project, Bowman County, North Dakota (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).

Table 1. Land cover types, area, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota, based on National Land Cover Database.

Land Cover Type	Area (acres)	Area (hectares)	% Composition
Shrub/Scrub	25,835	10,455	43.9
Herbaceous	18,817	7,615	32.0
Cultivated Crops	11,586	4,689	19.7
Developed	1,204	487	2.0
Hay/Pasture	977	396	1.7
Emergent Herbaceous Wetlands	164	66	0.3
Open Water	106	43	0.2
Woody Wetlands	45	18	0.1
Evergreen Forest	45	18	0.1
Deciduous Forest	30	12	0.1
Mixed Forest	7	3	<0.1
Barren Land	2	1	<0.1
Total[1]	**58,818**	**23,803**	**100**

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019

[1.] Sums of values may not add precisely to total value shown, due to rounding.

• METHODS

Survey methods were developed to be in accordance with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines* (ECPG), and recommendations from USFWS and the North Dakota Game and Fish Department. Methods described below, therefore, are common for all birds (i.e., large and small birds, eagles, and other species of concern) except as noted.

Large birds were defined as waterbirds, waterfowl, shorebirds, gulls and terns, diurnal raptors (accipiters, buteos, northern harrier, eagles, and falcons), vultures, upland game birds, doves and pigeons, and large corvids. Small birds were defined as passerines, cuckoos, swifts and hummingbirds, and woodpeckers.

• Survey Design

Thirty-three survey points located on accessible roads were surveyed within the Project boundary (Figure 3). Twenty-eight of the 29 survey plots from Year 1 and an additional five survey plots were selected for the second year of surveys to increase survey coverage within the Project. Each survey point consisted of an 800-m (2,625 ft) radius survey plot for large birds (including eagles) and 100-m (328 ft) radius survey plot for small birds, centered on the survey point. Per the ECPG, each survey point was located to maximize viewshed for the observer and to enable evaluation of representative habitats within the Project.

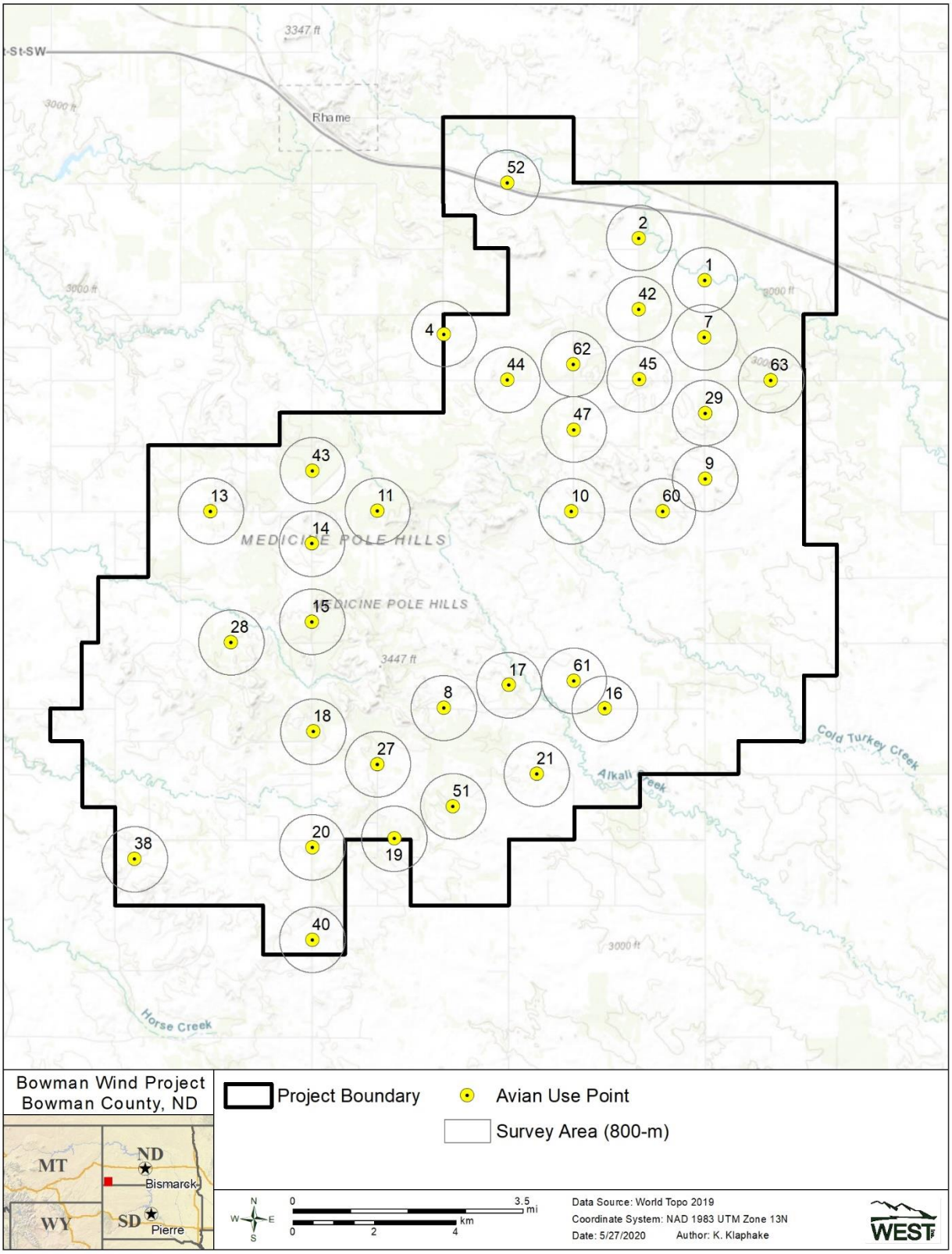

Figure 3. Avian use survey points and plots at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Surveys were completed once a month from August 23, 2018 to July 23, 2019. Seasons were defined as summer (May 9 – August 31), fall (September 1 − November 30), winter (December 1 − February 28), and spring (March 1 – May 8). Surveys were conducted during daylight hours, and survey times at survey points were varied to cover all daylight hours during a season. Surveys were conducted under all weather conditions except when visibility was less than 800 m horizontally and 200 m (656 ft) vertically.

- **Survey Methods**

- *All Birds*

Surveys at each point were conducted for a period of 65 minutes (min), with only small birds recorded during the first five min of the survey period out to a 100-m radius, followed by 60-min counts recording large birds (including eagles) out to an 800-m radius. The 60-min count was divided further into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. The 20-min portion of the survey allowed for standardization and comparison of data with other wind energy facilities throughout the region, while the 60-min eagle counts allowed for a more robust evaluation of bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) use of the Project in accordance with the ECPG and USFWS Revision to Regulations for Eagle Incidental Take and Take of Eagle Nests; Final Rule (USFWS 2016).

At each survey point, the date, start and end time of the survey period, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover) were recorded. Additionally, the following data for each individual or group of birds observed was recorded:

- Observation number
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if identifiable)
- Distance from plot center when first observed (to the nearest 1-m [3-ft] interval)
- Closest distance
- Estimated flight height above ground level (AGL; to the nearest 1-m interval)
- Flight direction (first observed) for large birds only
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Estimated flight path of eagles

- *Eagles*

Surveyors recorded the following metrics to characterize eagle use within the Project: age class (juvenile [first year], immature or sub-adult [second to fourth year], adult [at least fifth year]), eagle minutes, eagle risk minutes, and total minutes. Eagle minutes were defined as the number of minutes in which an eagle was observed flying within the identified flight height ranges either within or outside of the survey plot during each minute of survey. Eagle risk minutes were defined as the number of minutes an eagle was estimated to be flying within the risk cylinder (area within 800 m of the observer and 25-200 m AGL) during the 60-min survey period. Total minutes were defined as the amount of time eagles were observed inside and outside the risk cylinder.

- *Incidental Observations*

Species of concern observed outside the 800-m radius plot during surveys were recorded as incidental but were not included in statistical analysis. In addition, incidental wildlife observations made outside of standardized surveys (i.e., driving to and from avian use survey points) were recorded, but were limited to species of concern, rare species not documented in general avian use surveys, and unique events such as large flocks. These data do not represent a systematic sampling of the Project, but are useful to document rare or potentially localized birds that were not documented in the avian use study. Incidental observations were included in lists of species observed, but were not included in quantitative analyses.

- **Data Management**

- *Quality Assurance and Quality Control*

WEST implemented quality assurance and quality control (QA/QC) measures during data collection, data entry, analysis, and report writing. Multiple reviews of the data were conducted as QA/QC measures.

- *Data Compilation and Storage*

A Microsoft® SQL database was utilized to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis.

- **Statistical Analysis**

A *visit* was defined as the required length of time, in days, to survey all of the plots once within the Project and could occur across multiple dates, but had to be completed in a single season (e.g., spring). If conditions prevented all plots from being surveyed during a visit, then a visit might not have constituted a complete survey of all plots. A *survey* was defined as a single 60-min, 20-min, or 5-min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the 800-m or 100-m survey plot were included in data analysis.

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Mean use was the average number of birds observed per plot per survey for large birds (including eagles) or small birds. Large bird (per 800-m plot per 20-min survey), eagle use (per 800-m plot per 60-min survey) and small bird use (per 100-m plot per 5-min survey) were calculated by 1) summing birds per plot per visit, 2) averaging number of birds over plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of large birds (including eagles) or small bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance, in that mean use is based on the number of birds (i.e., large groups can produce high estimates), whereas frequency of occurrence is based on the number of groups (i.e., it is not influenced by group size). Qualitative comparisons were made with these metrics among bird types, seasons, and survey points to assist in understanding how birds are using the Project both temporally and spatially.

- *Flight Height*

Bird flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of eagles, large birds, and small birds observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH estimated between 25 m (82 ft) and 200 m AGL was assumed for the purpose of the analysis. The percentage of birds flying within the RSH was calculated using the lowest and highest flight heights recorded. Auditory-only observations were excluded from flight height calculations.

- *Spatial Use*

Mean use was calculated by survey point for eagles, large birds, and small birds to make spatial comparisons among the survey points. Additionally, flight paths of eagles were mapped during large bird use surveys to qualitatively show flight path location compared to Project characteristics (e.g., topographic features) to identify if there were areas of concentration or consistent flight patterns within the Project.

- *Eagles*

Eagles observed during surveys were summarized to provide estimated flight heights (see *Flight Height*) and flight path maps (see *Spatial Use*). Data collected during each minute eagles were observed, were examined to count eagle risk minutes and total minutes. Eagle risk minutes per observation hour were reported by survey plot and month to enable spatial and temporal assessments of eagle risk minutes recorded in the Project. Data collected on perched eagles and those outside of survey plots were not considered eagle risk minutes; however, they were considered in the total eagle minutes. The flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Project.

• RESULTS

Overall, 389 eagle, large bird, and small bird surveys were completed resulting in approximately 389 hours of 60-min ECPG-level eagle use surveys, 129.7 hours of 20-min large bird surveys, and 32.5 hours of 5-min small bird surveys (Table 2). Thirty-seven species of large birds (including bald and golden eagles) and 38 species of small birds, totaling 75 species of birds were observed or heard during the surveys (Appendices A1, A2, and A3). Survey results are summarized below, supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys (Appendices A1, A2, and A3), avian use, percent of use, and frequency of occurrence by season (Appendices B1, B2, and B3), and mean use by survey point (Appendices C1, C2, and C3).

Table 2. Summary of survey effort by number (#) of visits, surveys, and hours at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Eagles			Large Birds			Small Birds		
Season[1]	# Visits[2]	# Surveys[3]	Hours	# Visits[2]	# Surveys[3]	Hours	# Visits[2]	# Surveys[3]	Hours
Summer	4	126	126.0	4	126	42.0	4	126	10.5
Fall	3	98	98.0	3	98	32.7	3	98	8.2
Winter	3	99	99.0	3	99	33.0	3	99	8.3
Spring	2	66	66.0	2	66	22.0	2	66	5.5
Overall	**12**	**389**	**389.0**	**12**	**389**	**129.7**	**12**	**389**	**32.5**

[1] Season dates: summer (May 9 – August 31), fall (September 1 − November 30), winter (December 1 – February 28), and spring (March 1 – May 8).

[2] A visit was defined as surveying all of the survey plots once within the Project and could occur across multiple dates, but had to be completed in a single season.

[3] A survey was defined as a single 60-minute, 20-minute, or 5-minute count of birds.

• Species of Concern

No federally listed threatened or endangered species were observed during the surveys. Bald eagles (15 observations), golden eagles (47), and unidentified eagles (two), protected under BGEPA were observed during use surveys and incidentally (Table 3, Appendix A1). Eight additional birds classified as Level I Species of Conservation Priority were recorded during avian use surveys and incidentally (Table 3, Appendices A2 and A3). Ferruginous hawk, marbled godwit, Wilson's phalarope, Baird's sparrow, chestnut-colored longspur, grasshopper sparrow, and lark bunting were only recorded during summer and Swainson's hawk were observed in summer, fall, and spring (Appendices A2 and A3).

- *Eagles*

- Mean Use

Bald eagles were recorded during fall, winter and spring, with approximate consistent mean use observed between the three seasons (0.02, 0.07, and 0.02 observations/800-m plot/60-min survey, respectively; Appendix B1). Overall bald eagle mean use was 0.03 observations/800-m plot/60-min survey.

Golden eagles were recorded in all seasons with mean use in winter (0.14 observations/800-m plot/60-min survey), fall (0.12), summer (0.06), and spring (0.03; Appendix B1). Overall golden eagle use was 0.09 observations/800-m plot/60-min survey. Unidentified eagles were only recorded during the winter (0.02 observations/800-m plot/60-min survey; Appendix B1) and overall use was less than 0.01.

Table 3. Species of concern by number (#) of groups (grps) and individual observations (obs) observed during the 65-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

			Surveys		Incidental		Total	
Species	**Scientific Name**	**Status[a]**	**# of grps**	**# of obs**	**# of grps**	**# of obs**	**# of grps**	**# of obs**
Large Birds								
bald eagle	*Haliaeetus leucocephalus*	BGEPA	10	10	3	5	13	15
ferruginous hawk	*Buteo regalis*	LEVEL 1 SCP	6	6	11	11	17	17
golden eagle	*Aquila chrysaetos*	BGEPA	35	35	11	12	46	47
Marbled godwit	*Limosa fedoa*	LEVEL 1 SCP	2	3	0	0	2	3
Swainson's hawk	*Buteo swainsoni*	LEVEL 1 SCP	25	28	29	29	54	57
unidentified eagle		BGEPA	2	2	0	0	2	2
Wilson’s phalarope	*Phalaropus tricolor*	LEVEL 1 SCP	3	12	0	0	3	12
Small Bird								
Baird’s sparrow	*Ammodramus bairdii*	LEVEL 1 SCP	13	14	0	0	13	14
chestnut-collared longspur	*Calcarius ornatus*	LEVEL 1 SCP	8	8	0	0	8	8
Grasshopper sparrow	*Ammodramus savannarum*	LEVEL 1 SCP	37	42	0	0	37	42
lark bunting	*Calamospiza melanocorys*	LEVEL 1 SCP	7	8	0	0	7	8
Total	**10 species**		**148**	**168**	**54**	**57**	**202**	**225**

[a] BGEPA = Bald and Golden Eagle Protection Act (1940); Level I SCP = Level I North Dakota Species of Conservation Priority (Dyke et al. 2015).

- Activity Minutes

Ten bald eagle observations resulted in 22 bald eagle risk minutes out of 154 bald eagle minutes during 389 total survey hours (Table 4). Bald eagle risk minutes per survey hour ranged from zero to 0.48 across months, with an overall value of 0.06 for the entire survey period (Table 4). Bald eagle risk minutes per survey hour were recorded at points 18 (0.08 risk min/800-m plot/60-min survey), 60 (0.25), 21 (0.27), 40 (0.33), 29 (0.42), and 43 (0.50; Figure 4). The distribution of bald eagle risk minutes per survey hour was similar throughout the Project where survey points occurred (Figure 4).

Table 4. Summary of bald eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Bald Eagle Observations		Bald Eagle Minutes			
Month/Year	Within Estimated Risk Cylinder[a]	Total[b]	Within Estimated Risk Cylinder[a]	Total[b]	Survey Hours	Bald Eagle Risk Minutes/Survey Hour
August 2018	0	0	0	0	30	0
September 2018	2	2	3	59	32	0.09
October 2018	0	0	0	0	33	0
November 2018	0	0	0	0	33	0
December 2018	1	1	3	3	33	0.09
January 2019	6	6	16	32	33	0.48
February 2019	0	0	0	0	33	0
March 2019	0	1	0	60	42	0
April 2019	0	0	0	0	24	0
May 2019	0	0	0	0	32	0
June 2019	0	0	0	0	32	0
July 2019	0	0	0	0	32	0
Total	**9**	**10**	**22**	**154**	**389**	**0.06**

[a] Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

[b] Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

Forty-three golden eagle observations resulted in 100 golden eagle risk minutes out of 570 golden eagle minutes during 389 total survey hours (Table 5). Golden eagle risk minutes per survey hour ranged from zero to 0.77 across months (Table 5). Golden eagle risk minutes were recorded at 20 survey points throughout the Project ranging from 0.08 golden eagle risk minutes per hour (points 18, 27, 28, 42, and 60) to 1.42 (Point 1; Figure 5). The northern half of the Project, where survey points occurred, had slightly higher levels of golden eagle risk minutes per survey hour (Figure 5).

Two unidentified eagle observations resulted in three unidentified eagle risk minutes out of 18 unidentified eagle minutes during 389 total survey hours. Unidentified eagle risk minutes per survey hour were recorded in December (0.06) and January (0.03), with an overall value of 0.01 for the entire survey period. Unidentified eagle risk minutes per survey hour were recorded at points 43 (0.08 observations/800-m plot/60-min survey) and 21 (0.18; Appendix C1).

Table 5. Summary of golden eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Golden Eagle Observations		Golden Eagle Minutes			
Month/Year	Within Estimated Risk Cylinder[a]	Total[b]	Within Estimated Risk Cylinder[a]	Total[b]	Survey Hours	Golden Eagle Risk Minutes/Survey Hour
August 2018	6	6	23	49	30	0.77
September 2018	5	7	5	18	32	0.16
October 2018	1	1	4	4	33	0.12
November 2018	6	8	25	62	33	0.76
December 2018	3	5	7	49	33	0.21
January 2019	4	5	9	95	33	0.27
February 2019	4	5	19	80	33	0.58
March 2019	2	5	2	207	42	0.05
April 2019	0	0	0	0	24	0
May 2019	0	0	0	0	32	0
June 2019	1	1	6	6	32	0.19
July 2019	0	0	0	0	32	0
Total	**32**	**43**	**100**	**570**	**389**	**0.26**

[a] Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

[b] Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

- Spatial Use

Bald eagle observations were recorded at six of the survey points, with mean use ranging from zero to 0.33 eagles/800-m plot/60-min survey among points (Appendix C1). Bald eagle use was highest at Point 43 (0.33). No clear pattern in bald eagle flight paths was observed (Figure 6).

Golden eagle observations were recorded at 21 of the survey points, with mean use ranging from zero to 0.42 and was highest at Point 10 (0.42; Appendix C1). Golden eagle flight paths were slightly more concentrated in the northern half and central regions of the Project where survey points were conducted (Figure 6).

Unidentified eagle observations were recorded at two of the survey points, with mean use ranging from zero to 0.09 eagles/800-m plot/60-min survey among points (Appendix C1). Unidentified eagle use was highest at Point 21 (0.09 eagles/800-m plot/60-min survey). No clear pattern in unidentified eagle flight paths was observed (Figure 6).

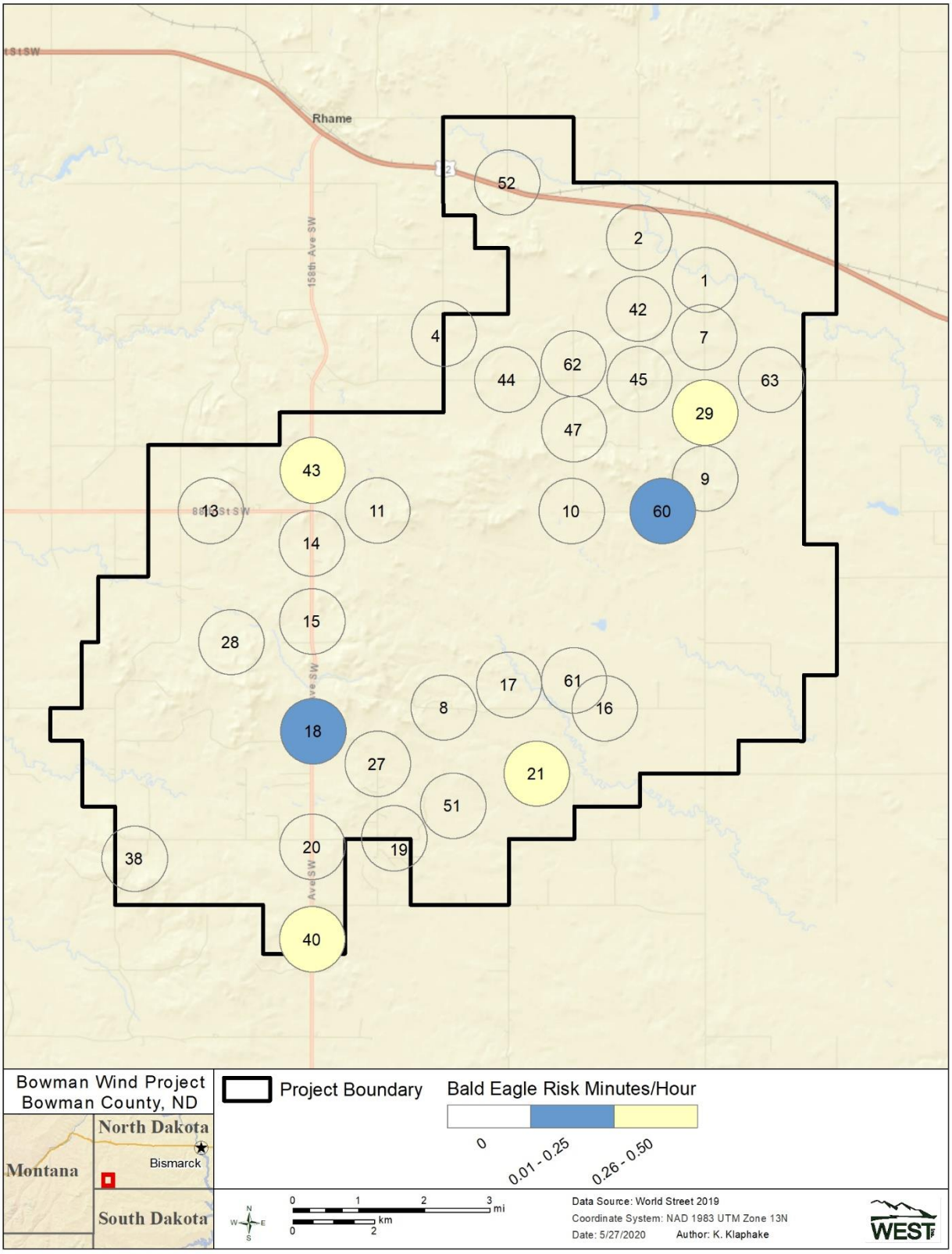

Figure 4. Estimated bald eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

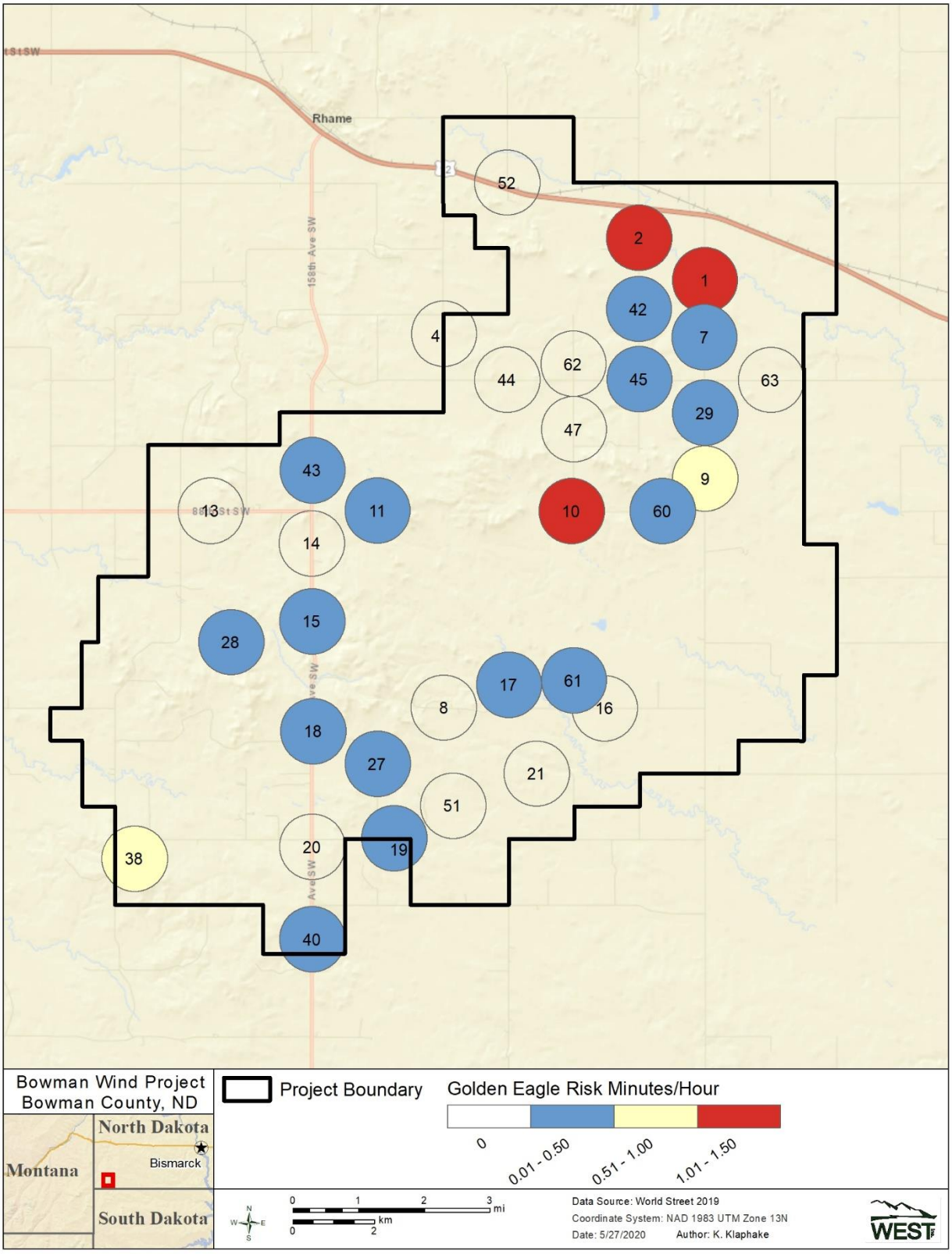

Figure 5. Estimated golden eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

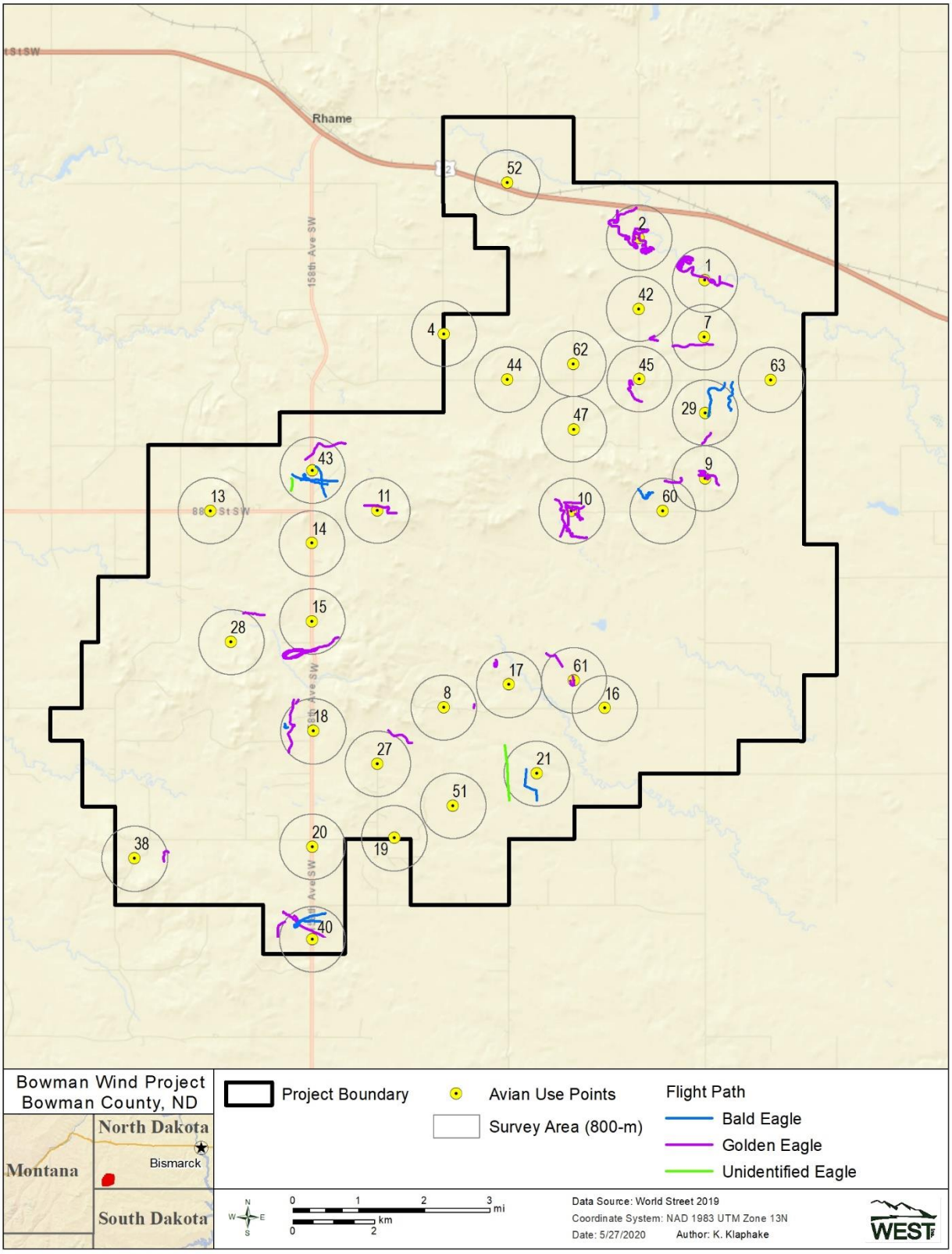

Figure 6. Estimated bald, golden, and unidentified eagle flight paths at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

- **Large Birds**

During the 20-min avian use surveys, there were 1,858 large bird observations within 403 groups. The most commonly observed large bird was Canada goose (45.0% of large bird observations; Appendix A2). Diurnal raptors made up 10.0% of large bird species recorded. The most common non-eagle raptor species observed were northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Large bird mean use was highest during fall (9.73 observations/800-m plot/20-min survey), followed by spring (5.09), summer (4.18), and winter (0.32; Appendix B2). Diurnal raptors, including eagles, accounted for 68.8% of use in winter, 12.7% of use in summer, 8.2% in fall, and 5.7% of use in spring (Appendix B2). Waterfowl accounted for the majority of use in fall and spring (75.8% and 50.62%, respectively) from Canada goose (72.0% in fall and 33.0% in spring; Appendix B2). Large bird frequency of occurrence varied among seasons with diurnal raptors recorded during all seasons and waterfowl only in summer, fall, and spring (Appendix B2). For diurnal raptors, northern harrier was the most frequently observed species in fall, summer, and spring (25.7%, 15.0%, and 9.1%, respectively), while red-tailed hawk and rough-legged hawk were in fall (13.3% and 10.1%, respectively), and golden eagle (8.1%) in winter (Appendix B2).

- *Flight Height*

Mean large bird estimated flight heights ranged from 3.0 m (9.8 ft) for large corvids to 95.0 m (311.7 ft) for waterbirds (Table 6). Waterbirds and vultures were recorded flying within the estimated RSH 100% of the time. Diurnal raptors flew within the estimated RSH 38.5% of the time, including unidentified accipiters within the estimated RSH 100% (one observation) of the time, golden eagle flying 92.9% (14), bald eagle flying 75.0% (four), rough-legged hawk flying 68.8% (16), and red-tailed hawk flying 56.3% (16; Table 6) of the time within the estimated RSH.

- *Spatial Use*

Large birds were observed at all 33 survey points, with highest use observed at Point 14 with 39.92 birds/800-m plot/20 min survey, followed by Point 17 (16.45), Point 20 (10.17), Point 4 (10.08), and Point 13 (9.91; Figure 7, Appendix C2). High use at Point 14 was due to high waterfowl use (33.33 waterfowl/800-m plot/20-min survey).

Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys[2] at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23,2019.

Bird Type	# Groups Flying	# Obs Flying	Estimated Mean Flight Height (m)	% Obs Flying	% within Estimated Flight Height Categories		
					<25 m	25–200 m[1]	>200 m
Waterbirds	**3**	**71**	**95.00**	**100**	**0**	**100**	**0**
sandhill crane	1	30	200.00	100	0	100	0
great blue heron	1	1	35.00	100	0	100	0
American white pelican	1	40	50.00	100	0	100	0
Waterfowl	**50**	**892**	**35.36**	**81.2**	**9.8**	**90.2**	**0**
northern pintail	7	20	18.86	71.4	40.0	60.0	0
American wigeon	2	3	8.00	42.9	100	0	0
green-winged teal	1	16	1.00	100	100	0	0
mallard	14	25	25.36	48.1	44.0	56.0	0
snow goose	1	25	75.00	100	0	100	0
canvasback	1	7	1.00	100	100	0	0
Canada goose	17	779	58.88	93.1	4.4	95.6	0
tundra swan	1	2	80.00	100	0	100	0
gadwall	3	4	8.67	100	100	0	0
blue-winged teal	2	7	15.50	33.3	57.1	42.9	0
unidentified waterfowl	1	4	50.00	5.2	0	100	0
Shorebirds	**12**	**15**	**11.58**	**34.1**	**100**	**0**	**0**
upland sandpiper	1	1	20.00	50.0	100	0	0
killdeer	7	8	11.86	34.8	100	0	0
marbled godwit	2	3	8.00	100	100	0	0
Wilson's phalarope	1	2	5.00	16.7	100	0	0
American avocet	1	1	15.00	25.0	100	0	0
Diurnal Raptors	**136**	**143**	**26.77**	**77.3**	**61.5**	**38.5**	**0**
Accipiters	*1*	*1*	*40.00*	*100*	*0*	*100*	*0*
unidentified accipiter	1	1	40.00	100	0	100	0
Buteos	*49*	*56*	*38.94*	*66.7*	*42.9*	*57.1*	*0*
red-tailed hawk	15	16	44.00	53.3	43.8	56.3	0
rough-legged hawk	13	16	33.85	80.0	31.3	68.8	0
ferruginous hawk	3	3	21.00	50.0	66.7	33.3	0
Swainson's hawk	18	21	41.39	75.0	47.6	52.4	0
Northern Harrier	*58*	*58*	*8.59*	*95.1*	*93.1*	*6.9*	*0*
northern harrier	58	58	8.59	95.1	93.1	6.9	0
Eagles	*18*	*18*	*59.44*	*69.2*	*11.1*	*88.9*	*0*
golden eagle	14	14	59.29	70.0	7.1	92.9	0
bald eagle	4	4	60.00	66.7	25.0	75.0	0
Falcons	*4*	*4*	*9.75*	*80.0*	*75.0*	*25.0*	*0*
prairie falcon	2	2	14.00	66.7	50.0	50.0	0
American kestrel	2	2	5.50	100	100	0	0
Other Raptors	*6*	*6*	*14.33*	*75.0*	*83.3*	*16.7*	*0*
unidentified raptor	6	6	14.33	75.0	83.3	16.7	0
Vultures	**4**	**4**	**40.00**	**100**	**0**	**100**	**0**
turkey vulture	4	4	40.00	100	0	100	0
Upland Game Birds	**6**	**26**	**3.83**	**25.2**	**100**	**0**	**0**
ring-necked pheasant	2	3	2.50	4.0	100	0	0
sharp-tailed grouse	4	23	4.50	82.1	100	0	0
Doves/Pigeons	**65**	**139**	**12.78**	**61.5**	**89.2**	**10.8**	**0**
rock pigeon	9	34	31.67	61.8	64.7	35.3	0
mourning dove	56	105	9.75	61.4	97.1	2.9	0

Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys[2] at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23,2019.

Bird Type	# Groups Flying	# Obs Flying	Estimated Mean Flight Height (m)	% Obs Flying	% within Estimated Flight Height Categories		
					<25 m	25–200 m[1]	>200 m
Large Corvids	**2**	**14**	**3.00**	**11.5**	**100**	**0**	**0**
American crow	2	14	3.00	11.5	100	0	0
Goatsuckers	**3**	**3**	**10.00**	**100**	**100**	**0**	**0**
common nighthawk	3	3	10.00	100	100	0	0
Large Birds Overall	**281**	**1,307**	**24.49**	**70.3**	**27.3**	**72.7**	**0**

[1] The likely rotor-swept height for potential collision with a turbine blade, or 25 to 200 m (82 to 656 feet [ft]) above ground level.

[2] 800-m (2,625-ft) radius plot for large birds.

- **Small Bird Use**

During the 5-min avian use surveys, 1,154 small birds were observed in 610 groups over 32.5 hours of surveys (Appendix A3). The most commonly observed small birds were horned lark (25.0% of observations), western meadowlark (19.9%), and red-winged blackbird (14.2%; Appendix A3). Together these three species accounted for approximately 59.1% of all small bird observations (Appendix A3).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Small bird mean use ranged from 0.59 observations/100-m plot/5-min survey in the winter to 4.87 during summer (Figure 8, Appendix B3). Passerines accounted for 100% of small bird use in fall, winter, and spring and 99.8% of use in summer. Horned larks accounted for 100% of use in winter, 65.4% in spring, and 31.3% of use in fall and western meadowlark accounted for the highest use in summer (25.5%; Appendix B3).

- *Spatial Use*

Small birds were observed at all but one point (Point 38) and ranged from 0.75 observations/100-m plot/5-min survey at points 9 and 47 to 7.08 at Point 10 (Figure 9, Appendix C3). High use at Point 10 was largely due to horned larks (5.08).

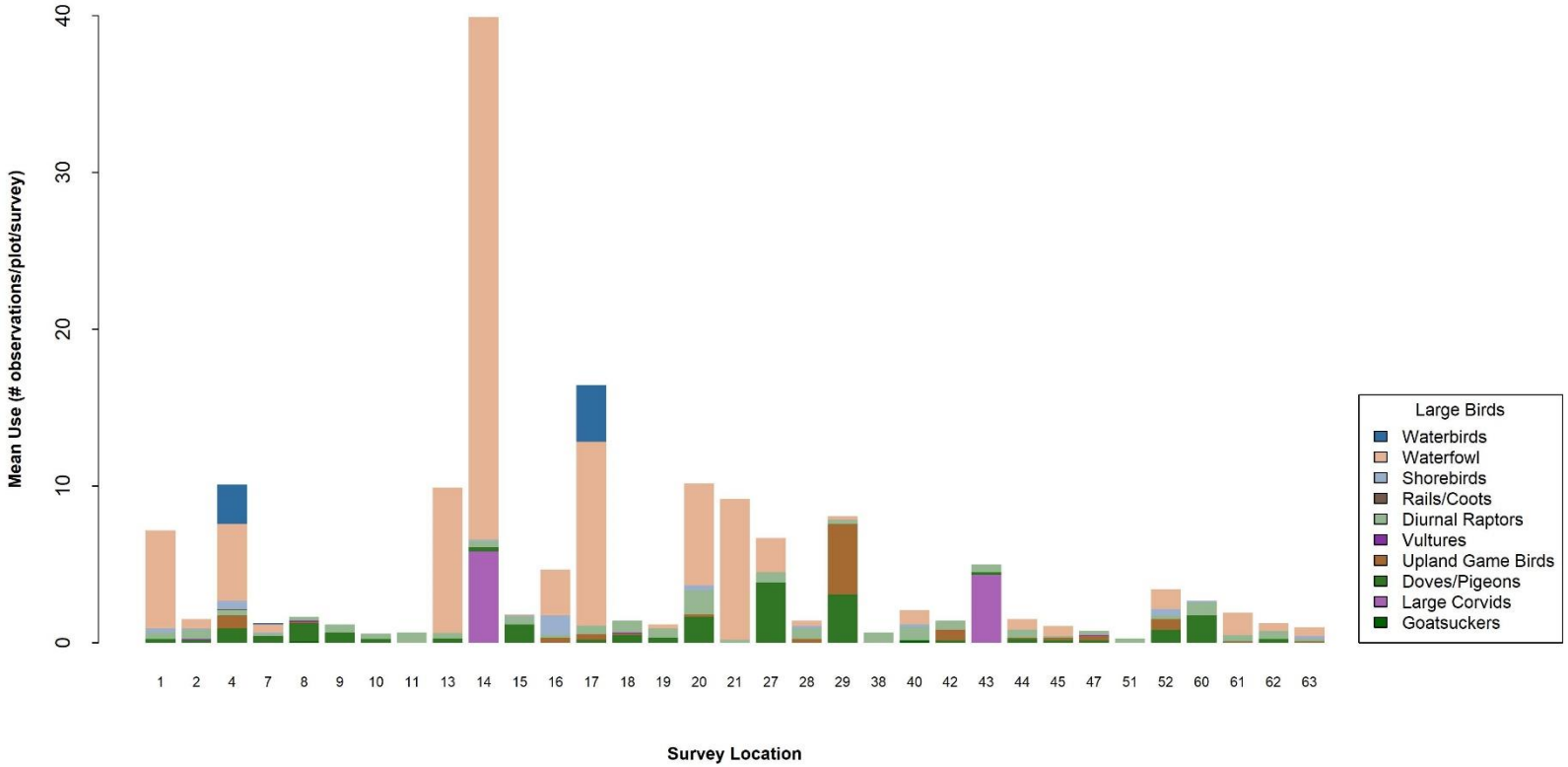

Figure 7. Large bird mean use (number of large birds/800-meter [2,625-foot] plot/20-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

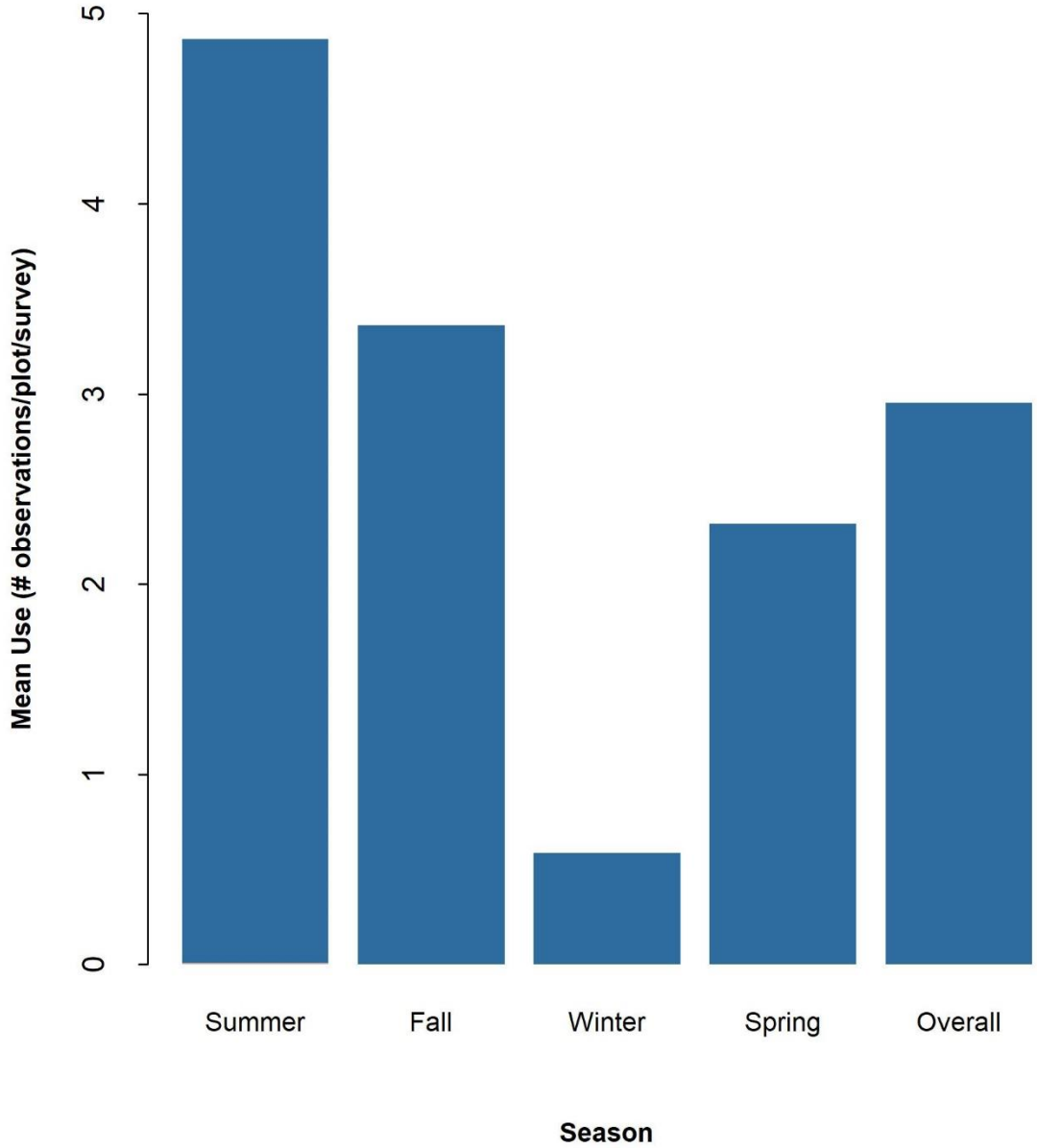

Figure 8. Small bird mean use (number of small birds/100-meter [328-foot] plot/5-minute survey) by season and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

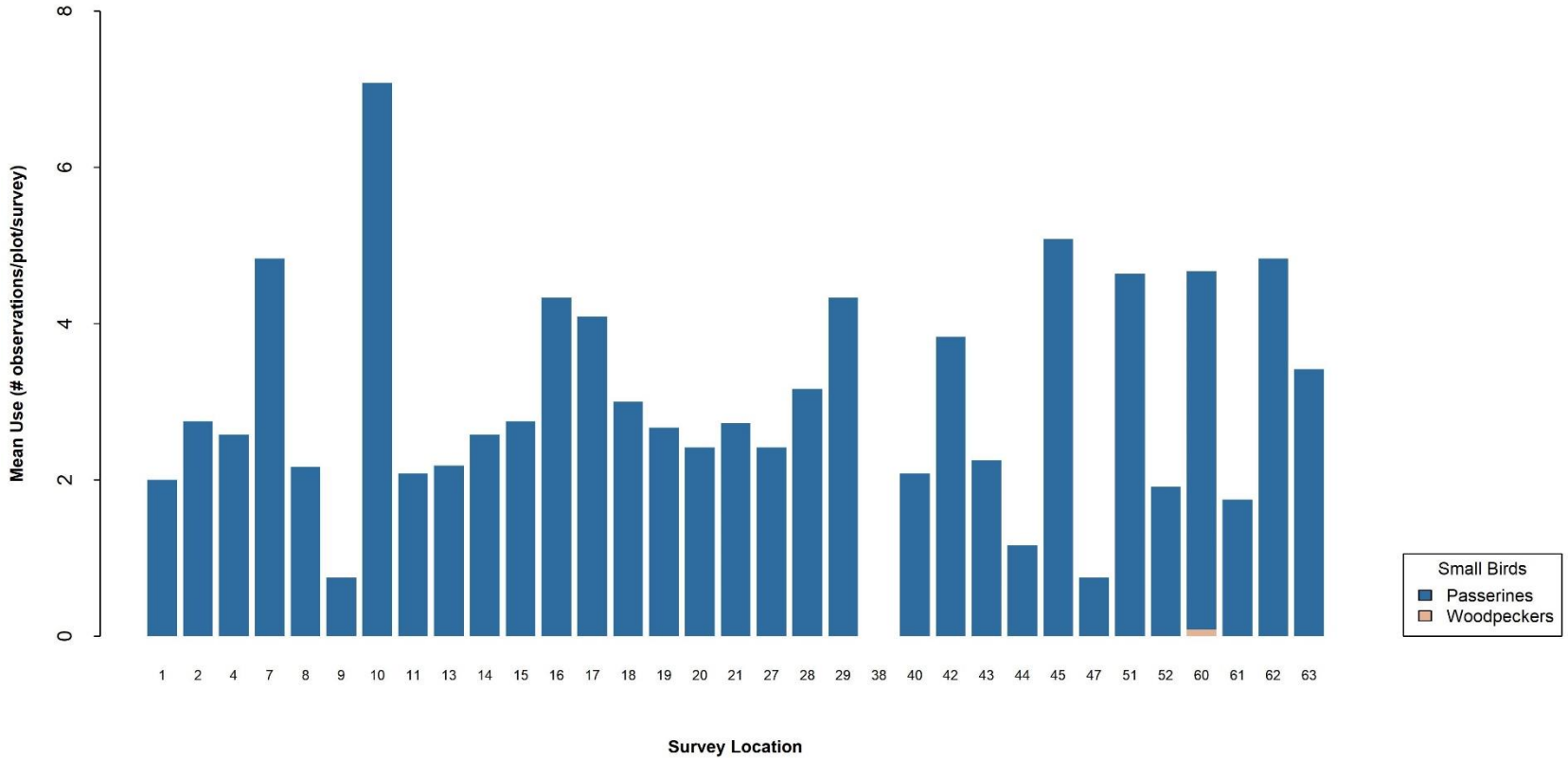

Figure 9. Small bird mean use (number of small birds/100-meter [328-foot] plot/5-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

• DISCUSSION

• Species of Concern

No federally threatened or endangered species were recorded at the Project during surveys. Ten bird species of concern, including four raptors (bald eagle, golden eagle, ferruginous hawk, and Swainson's hawk), four passerines (Baird's sparrow, chestnut-collared longspur, grasshopper sparrow, and lark bunting) and two shorebirds (marbled godwit and Wilson's phalarope) were recorded during surveys.

Six ferruginous hawks were observed during the summer use surveys. Southwestern North Dakota is the primary range of the ferruginous hawk in North Dakota and thought to have some of the highest densities of the species in the state (Dyke et al. 2015). The Project contains preferred habitat (shrub/scrub and grasslands); however, it lacks nesting habitat. Twenty-eight Swainson's hawks were observed during spring, summer, and fall use surveys. Bowman County is considered primary range for the hawk (Dyke et al. 2015) and they are considered common in the state. Swainson's hawk utilize a wide variety of habitats, including those found within the Project. In general, impacts to these raptor species is likely to be low based on the relatively low number of observations and typical flight behavior.

Eight chestnut-collared longspurs were observed during the summer use surveys, suggesting they are potentially nesting in the Project. Chestnut-collared longspurs prefer native prairie habitat and avoid areas of dense shrub. This species of longspur is considered common and are abundant in North Dakota, with Bowman County included within their primary range (Dyke et al. 2015). Eight lark buntings were observed in summer. Bowman County is located within their primary range in North Dakota and contains some preferred habitat (shorter grasslands mixed with shrubs; Dyke et al. 2015). The grasshopper sparrow was only observed in summer when 42 birds were recorded. This sparrow is present statewide in North Dakota, occurring in grass-dominated habitats with some bare ground and minimal scrub cover (Dyke et al. 2015). Fourteen Baird's sparrow were recorded during the summer use surveys. This sparrow breeds mostly in native prairie; however, it has been documented using non-native grasslands, including pasture within North Dakota, with the highest densities found in northwestern North Dakota (Dyke et al. 2015). Based on NLCD data (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the Project is approximately 44% shrub/scrub and 32% herbaceous with the majority of sagebrush and grasslands located in the central and southwestern portions of the Project. Impacts to chestnut-collared longspurs, lark buntings, grasshopper sparrows, and Baird's sparrows may be minimized by limiting surface disturbance to any existing, intact shrub/scrub and herbaceous habitats.

Three marbled godwits and 12 Wilson's phalarope were only recorded during use surveys in the summer, indicating they were potentially nesting in the area. In North Dakota, marbled godwits and Wilson's phalarope are considered common summer residents. Marbled godwit nest within grazed native prairie, pastureland, and idle grasslands and haylands (Dyke et al. 2015). Wilson's

phalarope prefer shallow wetlands with open areas, nesting on the margins of wetlands. In general, impacts to these shorebird species are likely to be low based on the relatively low number of observations and very limited amount of open water (0.2%) within the Project.

- *Eagles*

Based on data collected during Year 2 surveys, the Project may receive increased use by bald eagles during spring, fall migration and winter. This corresponds with higher bald eagle use seen during winter and spring migration in Year 1, suggesting bald eagles are foraging opportunistically and not breeding in the Project. For breeding, bald eagles prefer habitat with large trees, such as cottonwood trees (*Populus* spp.), coupled with larger bodies of water or rivers, both of which are lacking in the Project. Furthermore, no occupied bald eagle nests were observed within the Project during raptor nest surveys in 2018 or 2019. The closest occupied active bald eagle nest occurred approximately 15 kilometers (km; nine miles) west of the Project along the Missouri River. Bald eagle prey resources such as waterfowl can be found within the Project and bald eagles will likely scavenge on wildlife carrion and livestock carcasses. Bald eagle use was not concentrated in a particular portion of the Project. Spatial use by bald eagles in Year 2 resembled their use in Year 1 and reflects the potential presence of a prey base but the lack of major water features in the Project.

Similar to the results from the Year 1 surveys, golden eagles were recorded during all seasons, with the highest use during winter and fall, suggesting increased use of the Project during the migration periods and winter. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat for golden eagles. No occupied golden eagle nests were observed within the Project during raptor nest surveys in 2018 or 2019. The nearest occupied active golden eagle nest occurs 15 km (nine miles) west of the Project. Although nesting habitat is limited within the Project, primary prey resources, including greater sage-grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Tympanuchus phasianellus*), black-tailed prairie dogs (*Cynomys ludovicianus*), lagomorphs, and livestock (including sheep and cattle) are located adjacent to or within the Project. Golden eagle use was slightly more concentrated in the northern and central regions of the Project, which is likely due to the presence of prey (prairie dog colonies in northern region) and greater topographic relief of the Medicine Pole hills in the central region providing foraging opportunities. Based on the results of this survey, the presence of foraging habitat and availability of potential prey resources, golden eagle use within the Project is likely to occur year-round, which is typical for this region.

- **Large Birds**

During spring, migratory waterfowl were the most often observed large bird group, with Canada goose observed more frequently than any other waterfowl species. While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project.

Northern harrier and Swainson's hawk were the mostly frequently observed non-eagle raptor species observed within the Project. Both species were observed in relatively small numbers in all seasons. Northern harriers may fly within the RSH during aerial courtship displays that occur at nesting sites during the breeding season, but otherwise, northern harriers are known to hunt, eat, and perch low to the ground (MacWhirter and Bildstein 1996, Smith et al. 2011). Whitfield and Madders (2006) reported up to 97.0% of northern harrier flights were below 20 m (66 ft); therefore, risk of collision with turbine blades is considered low for this species. Swainson's hawk are considered a common species within the region with stable populations (Dyke et al. 2015, All About Birds 2020) and the operation of a wind energy facility within the Project is not likely to incur population-level impacts to these species.

- **Small Birds**

The most commonly observed small birds were horned lark, western meadowlark, and red-winged blackbird. These species are typical of this region and are widespread and abundant. Overall, 99.5% of small bird species were recorded below the estimated RSH, suggesting the Project is not likely to cause significant impacts to local small-bird populations. Limiting surface disturbance to previously undisturbed shrub/scrub and herbaceous habitats may minimize impacts to small birds that rely on these habitats for breeding.

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Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019

Appendix A1. Summary of number (#) of groups (grps) and individual observations (obs)[1] for eagles observed during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Eagles		*7*	*7*	*14*	*14*	*32*	*23*	*3*	*3*	*47*	*47*
bald eagle	*Haliaeetus leucocephalus*	0	0	2	2	7	7	1	1	10	10
golden eagle	*Aquila chrysaetos*	7	7	12	12	14	14	2	2	35	35
unidentified eagle		0	0	0	0	2	2	0	0	2	2
Overall		**7**	**7**	**14**	**14**	**23**	**23**	**3**	**3**	**47**	**47**

[1] within an 800-meter (2,625-foot) radius of the survey point.

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)[1] by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**2**	**41**	**1**	**30**	**0**	**0**	**0**	**0**	**3**	**71**
sandhill crane	*Antigone canadensis*	0	0	1	30	0	0	0	0	1	30
great blue heron	*Ardea herodias*	1	1	0	0	0	0	0	0	1	1
American white pelican	*Pelecanus erythrorhynchos*	1	40	0	0	0	0	0	0	1	40
Waterfowl		**48**	**199**	**8**	**730**	**0**	**0**	**22**	**170**	**78**	**1,099**
northern pintail	*Anas acuta*	3	3	0	0	0	0	7	25	10	28
American wigeon	*Anas americana*	4	7	0	0	0	0	0	0	4	7
green-winged teal	*Anas crecca*	0	0	0	0	0	0	1	16	1	16
mallard	*Anas platyrhynchos*	12	24	1	10	0	0	6	18	19	52
snow goose	*Anser caerulescens*	0	0	1	25	0	0	0	0	1	25
canvasback	*Aythya valisineria*	1	7	0	0	0	0	0	0	1	7
Canada goose	*Branta canadensis*	8	33	5	693	0	0	8	111	21	837
tundra swan	*Cygnus columbianus*	0	0	1	2	0	0	0	0	1	2
gadwall	*Mareca strepera*	3	4	0	0	0	0	0	0	3	4
northern shoveler	*Spatula clypeata*	7	23	0	0	0	0	0	0	7	23
blue-winged teal	*Spatula discors*	6	21	0	0	0	0	0	0	6	21
unidentified waterfowl		4	77	0	0	0	0	0	0	4	77

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)[1] by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Shorebirds		**18**	**33**	**0**	**0**	**0**	**0**	**6**	**11**	**24**	**44**
upland sandpiper	*Bartramia longicauda*	2	2	0	0	0	0	0	0	2	2
killdeer	*Charadrius vociferus*	9	12	0	0	0	0	6	11	15	23
marbled godwit	*Limosa fedoa*	2	3	0	0	0	0	0	0	2	3
Wilson's phalarope	*Phalaropus tricolor*	3	12	0	0	0	0	0	0	3	12
American avocet	*Recurvirostra americana*	2	4	0	0	0	0	0	0	2	4
Rails/Coots		**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
American coot	*Fulica americana*	1	1	0	0	0	0	0	0	1	1
Diurnal Raptors		**65**	**66**	**72**	**78**	**22**	**22**	**19**	**19**	**178**	**185**
Accipiters		*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*1*
unidentified accipiter		0	0	0	0	1	1	0	0	1	1
Buteos		*34*	*35*	*34*	*40*	*5*	*5*	*4*	*4*	*77*	*84*
red-tailed hawk	*Buteo jamaicensis*	11	11	15	16	0	0	3	3	29	30
rough-legged hawk	*Buteo lagopus*	0	0	12	15	5	5	0	0	17	20
ferruginous hawk	*Buteo regalis*	6	6	0	0	0	0	0	0	6	6
Swainson's hawk	*Buteo swainsoni*	17	18	7	9	0	0	1	1	25	28
Northern Harrier		*21*	*21*	*27*	*27*	*3*	*3*	*10*	*10*	*61*	*61*
northern harrier	*Circus hudsonius*	21	21	27	27	3	3	10	10	61	61
Eagles		*3*	*3*	*7*	*7*	*13*	*13*	*3*	*3*	*26*	*26*
golden eagle	*Aquila chrysaetos*	3	3	5	5	10	10	2	2	20	20
bald eagle	*Haliaeetus leucocephalus*	0	0	2	2	3	3	1	1	6	6
Falcons		*0*	*0*	*3*	*3*	*0*	*0*	*2*	*2*	*5*	*5*
prairie falcon	*Falco mexicanus*	0	0	2	2	0	0	1	1	3	3
American kestrel	*Falco sparverius*	0	0	1	1	0	0	1	1	2	2
Other Raptors		*7*	*7*	*1*	*1*	*0*	*0*	*0*	*0*	*8*	*8*
unidentified raptor		7	7	1	1	0	0	0	0	8	8
Vultures		**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**4**	**4**
turkey vulture	*Cathartes aura*	3	3	1	1	0	0	0	0	4	4
Upland Game Birds		**19**	**19**	**2**	**12**	**4**	**6**	**4**	**66**	**29**	**103**
ring-necked pheasant	*Phasianus colchicus*	18	18	0	0	2	3	2	54	22	75
sharp-tailed grouse	*Tympanuchus phasianellus*	1	1	2	12	2	3	2	12	7	28
Doves/Pigeons		**63**	**164**	**10**	**40**	**2**	**4**	**4**	**18**	**79**	**226**
rock pigeon	*Columba livia*	2	11	3	22	2	4	4	18	11	55
mourning dove	*Zenaida macroura*	61	153	7	18	0	0	0	0	68	171

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)[1] by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Large Corvids		**0**	**0**	**1**	**70**	**0**	**0**	**3**	**52**	**4**	**122**
American crow	*Corvus brachyrhynchos*	0	0	1	70	0	0	3	52	4	122
Goatsuckers		**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**
common nighthawk	*Chordeiles minor*	3	3	0	0	0	0	0	0	3	3
Overall		**222**	**529**	**95**	**961**	**28**	**32**	**58**	**336**	**403**	**1,858**

[1] within an 800-meter (2,625-foot) radius of the survey point.

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)[1] by small bird type, passerine subtype, and species observed during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**453**	**615**	**74**	**327**	**19**	**58**	**63**	**153**	**609**	**1,153**
Blackbirds/Orioles		*305*	*404*	*33*	*167*	*0*	*0*	*47*	*50*	*385*	*621*
red-winged blackbird	*Agelaius phoeniceus*	70	96	4	61	0	0	6	7	80	164
bobolink	*Dolichonyx oryzivorus*	5	5	0	0	0	0	0	0	5	5
Brewer's blackbird	*Euphagus cyanocephalus*	1	3	0	0	0	0	0	0	1	3
orchard oriole	*Icterus spurius*	1	1	0	0	0	0	0	0	1	1
brown-headed cowbird	*Molothrus ater*	62	102	1	7	0	0	0	0	63	109
common grackle	*Quiscalus quiscula*	15	39	1	15	0	0	0	0	16	54
western meadowlark	*Sturnella neglecta*	150	157	25	30	0	0	41	43	216	230
European starling	*Sturnus vulgaris*	0	0	2	54	0	0	0	0	2	54
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	1	1	0	0	0	0	0	0	1	1
Finches/Crossbills		*1*	*2*	*2*	*5*	*0*	*0*	*2*	*3*	*5*	*10*
house finch	*Haemorhous mexicanus*	0	0	0	0	0	0	1	1	1	1
American goldfinch	*Spinus tristis*	1	2	2	5	0	0	1	2	4	9
Flycatchers		*10*	*11*	*1*	*1*	*0*	*0*	*0*	*0*	*11*	*12*
eastern kingbird	*Tyrannus tyrannus*	6	7	0	0	0	0	0	0	6	7
western kingbird	*Tyrannus verticalis*	4	4	1	1	0	0	0	0	5	5

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)[1] by small bird type, passerine subtype, and species observed during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

		Summer		Fall		Winter		Spring		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Grassland/Sparrows		*99*	*130*	*35*	*151*	*19*	*58*	*14*	*100*	*167*	*439*
Baird's sparrow	*Ammodramus bairdii*	13	14	0	0	0	0	0	0	13	14
grasshopper sparrow	*Ammodramus savannarum*	37	42	0	0	0	0	0	0	37	42
lark bunting	*Calamospiza melanocorys*	7	8	0	0	0	0	0	0	7	8
Lapland longspur	*Calcarius lapponicus*	0	0	1	1	0	0	0	0	1	1
chestnut-collared longspur	*Calcarius ornatus*	8	8	0	0	0	0	0	0	8	8
lark sparrow	*Chondestes grammacus*	3	5	4	7	0	0	0	0	7	12
horned lark	*Eremophila alpestris*	15	26	11	104	19	58	14	100	59	288
dark-eyed junco	*Junco hyemalis*	0	0	2	3	0	0	0	0	2	3
house sparrow	*Passer domesticus*	1	10	0	0	0	0	0	0	1	10
savannah sparrow	*Passerculus sandwichensis*	8	8	0	0	0	0	0	0	8	8
spotted towhee	*Pipilo maculatus*	1	1	0	0	0	0	0	0	1	1
clay-colored sparrow	*Spizella pallida*	1	1	2	2	0	0	0	0	3	3
chipping sparrow	*Spizella passerina*	0	0	4	11	0	0	0	0	4	11
field sparrow	*Spizella pusilla*	1	1	1	1	0	0	0	0	2	2
American tree sparrow	*Spizelloides arborea*	0	0	1	1	0	0	0	0	1	1
white-crowned sparrow	*Zonotrichia leucophrys*	2	4	0	0	0	0	0	0	2	4
unidentified sparrow		2	2	9	21	0	0	0	0	11	23
Swallows		*20*	*43*	*2*	*2*	*0*	*0*	*0*	*0*	*22*	*45*
barn swallow	*Hirundo rustica*	14	36	2	2	0	0	0	0	16	38
cliff swallow	*Petrochelidon pyrrhonota*	3	4	0	0	0	0	0	0	3	4
bank swallow	*Riparia riparia*	1	1	0	0	0	0	0	0	1	1
tree swallow	*Tachycineta bicolor*	2	2	0	0	0	0	0	0	2	2
Shrikes		*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*
loggerhead shrike	*Lanius ludovicianus*	1	1	0	0	0	0	0	0	1	1
Thrushes		*14*	*21*	*1*	*1*	*0*	*0*	*0*	*0*	*15*	*22*
American robin	*Turdus migratorius*	14	21	1	1	0	0	0	0	15	22
Warblers		*3*	*3*	*0*	*0*	*0*	*0*	*0*	*0*	*3*	*3*
orange-crowned warbler	*Leiothlypis celata*	2	2	0	0	0	0	0	0	2	2
yellow warbler	*Setophaga petechia*	1	1	0	0	0	0	0	0	1	1
Woodpeckers		**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
downy woodpecker	*Dryobates pubescens*	1	1	0	0	0	0	0	0	1	1
Overall		**454**	**616**	**74**	**327**	**19**	**58**	**63**	**153**	**610**	**1,154**

[1] within a 100-meter (328-foot) radius of the survey point.

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019

Appendix B1. Mean eagle use[1], percent of total use (%), and frequency of occurrence (%) for eagles by season during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Eagles	*0.06*	*0.14*	*0.23*	*0.05*	*100*	*100*	*100*	*100*	*5.8*	*11.3*	*15.2*	*3.0*
bald eagle	0	0.02	0.07	0.02	0	14.5	30.4	33.3	0	2.1	5.1	1.5
golden eagle	0.06	0.12	0.14	0.03	100	85.5	60.9	66.7	5.8	10.2	12.1	1.5
unidentified eagle	0	0	0.02	0	0	0	8.7	0	0	0	2.0	0
Overall	**0.06**	**0.14**	**0.23**	**0.05**	**100**	**100**	**100**	**100**				

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix B2. Mean large birds use[1], percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Waterbirds	**0.32**	**0.30**	**0**	**0**	**7.7**	**3.1**	**0**	**0**	**1.6**	**1.0**	**0**	**0**
sandhill crane	0	0.30	0	0	0	3.1	0	0	0	1.0	0	0
great blue heron	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
American white pelican	0.31	0	0	0	7.5	0	0	0	0.8	0	0	0
Waterfowl	**1.57**	**7.37**	**0**	**2.58**	**37.5**	**75.8**	**0**	**50.6**	**23.6**	**8.1**	**0**	**15.2**
northern pintail	0.02	0	0	0.38	0.6	0	0	7.4	2.3	0	0	9.1
American wigeon	0.05	0	0	0	1.3	0	0	0	3.1	0	0	0
green-winged teal	0	0	0	0.24	0	0	0	4.8	0	0	0	1.5
mallard	0.19	0.10	0	0.27	4.5	1.0	0	5.4	7.8	1.0	0	6.1
snow goose	0	0.25	0	0	0	2.6	0	0	0	1.0	0	0
canvasback	0.06	0	0	0	1.4	0	0	0	0.8	0	0	0
Canada goose	0.27	7.00	0	1.68	6.4	72.0	0	33.0	4.8	5.1	0	9.1
tundra swan	0	0.02	0	0	0	0.2	0	0	0	1.0	0	0
gadwall	0.03	0	0	0	0.7	0	0	0	2.3	0	0	0
northern shoveler	0.18	0	0	0	4.3	0	0	0	5.5	0	0	0
blue-winged teal	0.16	0	0	0	3.9	0	0	0	4.7	0	0	0
unidentified waterfowl	0.60	0	0	0	14.4	0	0	0	3.1	0	0	0

Appendix B2. Mean large birds use[1], percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Shorebirds	**0.26**	**0**	**0**	**0.17**	**6.2**	**0**	**0**	**3.3**	**10.3**	**0**	**0**	**7.6**
upland sandpiper	0.02	0	0	0	0.4	0	0	0	0.8	0	0	0
killdeer	0.10	0	0	0.17	2.3	0	0	3.3	7.2	0	0	7.6
marbled godwit	0.02	0	0	0	0.6	0	0	0	0.8	0	0	0
Wilson's phalarope	0.09	0	0	0	2.2	0	0	0	2.3	0	0	0
American avocet	0.03	0	0	0	0.7	0	0	0	1.6	0	0	0
Rails/Coots	**0.01**	**0**	**0**	**0**	**0.2**	**0**	**0**	**0**	**0.8**	**0**	**0**	**0**
American coot	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Diurnal Raptors	**0.53**	**0.80**	**0.22**	**0.29**	**12.7**	**8.2**	**68.8**	**5.7**	**37.8**	**47.1**	**19.2**	**19.7**
Accipiters	*0*	*0*	*0.01*	*0*	*0*	*0*	*3.1*	*0*	*0*	*0*	*1.0*	*0*
unidentified accipiter	0	0	0.01	0	0	0	3.1	0	0	0	1.0	0
Buteos	*0.28*	*0.41*	*0.05*	*0.06*	*6.8*	*4.2*	*15.6*	*1.2*	*17.8*	*24.5*	*5.1*	*6.1*
red-tailed hawk	0.09	0.16	0	0.05	2.1	1.7	0	0.9	4.8	13.3	0	4.5
rough-legged hawk	0	0.15	0.05	0	0	1.6	15.6	0	0	10.1	5.1	0
ferruginous hawk	0.05	0	0	0	1.2	0	0	0	4.1	0	0	0
Swainson's hawk	0.15	0.09	0	0.02	3.5	1.0	0	0.3	10.5	5.2	0	1.5
Northern Harrier	*0.17*	*0.28*	*0.03*	*0.15*	*4.0*	*2.9*	*9.4*	*3.0*	*15.0*	*25.7*	*3.0*	*9.1*
northern harrier	0.17	0.28	0.03	0.15	4.0	2.9	9.4	3.0	15.0	25.7	3.0	9.1
Eagles	*0.03*	*0.07*	*0.13*	*0.05*	*0.6*	*0.7*	*40.6*	*0.9*	*2.5*	*6.2*	*10.1*	*3.0*
golden eagle	0.03	0.05	0.10	0.03	0.6	0.5	31.3	0.6	2.5	5.1	8.1	1.5
bald eagle	0	0.02	0.03	0.02	0	0.2	9.4	0.3	0	2.1	2.0	1.5
Falcons	*0*	*0.03*	*0*	*0.03*	*0*	*0.3*	*0*	*0.6*	*0*	*3.1*	*0*	*3.0*
prairie falcon	0	0.02	0	0.02	0	0.2	0	0.3	0	2.1	0	1.5
American kestrel	0	0.01	0	0.02	0	0.1	0	0.3	0	1.0	0	1.5
Other Raptors	*0.06*	*0.01*	*0*	*0*	*1.4*	*0.1*	*0*	*0*	*5.0*	*1.0*	*0*	*0*
unidentified raptor	0.06	0.01	0	0	1.4	0.1	0	0	5.0	1.0	0	0
Vultures	**0.02**	**0.01**	**0**	**0**	**0.6**	**0.1**	**0**	**0**	**2.3**	**1.0**	**0**	**0**
turkey vulture	0.02	0.01	0	0	0.6	0.1	0	0	2.3	1.0	0	0
Upland Game Birds	**0.15**	**0.12**	**0.06**	**1.00**	**3.5**	**1.3**	**18.8**	**19.6**	**12.5**	**2.1**	**4.0**	**6.1**
ring-necked pheasant	0.14	0	0.03	0.82	3.4	0	9.4	16.1	11.7	0	2.0	3.0
sharp-tailed grouse	0.01	0.12	0.03	0.18	0.2	1.3	9.4	3.6	0.8	2.1	2.0	3.0
Doves/Pigeons	**1.30**	**0.41**	**0.04**	**0.27**	**31.0**	**4.2**	**12.5**	**5.4**	**27.9**	**9.2**	**2.0**	**4.5**
rock pigeon	0.09	0.22	0.04	0.27	2.1	2.3	12.5	5.4	1.6	3.0	2.0	4.5
mourning dove	1.21	0.19	0	0	28.9	1.9	0	0	27.1	6.2	0	0

Appendix B2. Mean large birds use[1], percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Large Corvids	**0**	**0.71**	**0**	**0.79**	**0**	**7.3**	**0**	**15.5**	**0**	**1.0**	**0**	**1.5**
American crow	0	0.71	0	0.79	0	7.3	0	15.5	0	1.0	0	1.5
Goatsuckers	**0.02**	**0**	**0**	**0**	**0.6**	**0**	**0**	**0**	**1.6**	**0**	**0**	**0**
common nighthawk	0.02	0	0	0	0.6	0	0	0	1.6	0	0	0
Overall	**4.18**	**9.73**	**0.32**	**5.09**	**100**	**100**	**100**	**100**				

[1.] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix B3. Mean small birds use[1], percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Passerines	**4.86**	**3.36**	**0.59**	**2.32**	**99.8**	**100**	**100**	**100**	**87.9**	**46.3**	**19.2**	**50.0**
Blackbirds/Orioles	*3.19*	*1.73*	*0*	*0.76*	*65.5*	*51.5*	*0*	*32.7*	*78.4*	*24.9*	*0*	*34.8*
red-winged blackbird	0.76	0.64	0	0.11	15.7	18.9	0	4.6	35.4	4.2	0	4.5
bobolink	0.04	0	0	0	0.8	0	0	0	3.1	0	0	0
Brewer's blackbird	0.02	0	0	0	0.5	0	0	0	0.8	0	0	0
orchard oriole	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
brown-headed cowbird	0.80	0.07	0	0	16.4	2.2	0	0	32.0	1.0	0	0
common grackle	0.31	0.15	0	0	6.4	4.5	0	0	8.6	1.0	0	0
western meadowlark	1.24	0.31	0	0.65	25.5	9.3	0	28.1	62.5	19.7	0	34.8
European starling	0	0.56	0	0	0	16.7	0	0	0	2.1	0	0
yellow-headed blackbird	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Finches/Crossbills	*0.02*	*0.05*	*0*	*0.05*	*0.3*	*1.5*	*0*	*2.0*	*0.8*	*2.0*	*0*	*1.5*
house finch	0	0	0	0.02	0	0	0	0.7	0	0	0	1.5
American goldfinch	0.02	0.05	0	0.03	0.3	1.5	0	1.3	0.8	2.0	0	1.5
Flycatchers	*0.09*	*0.01*	*0*	*0*	*1.8*	*0.3*	*0*	*0*	*5.5*	*1.0*	*0*	*0*
eastern kingbird	0.06	0	0	0	1.1	0	0	0	3.2	0	0	0
western kingbird	0.03	0.01	0	0	0.7	0.3	0	0	3.2	1.0	0	0

Appendix B3. Mean small birds use[1], percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Mean Use				% of Use				% Frequency			
Type/Species	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Grassland/Sparrows	*1.03*	*1.54*	*0.59*	*1.52*	*21.1*	*45.7*	*100*	*65.4*	*38.8*	*27.7*	*19.2*	*18.2*
Baird's sparrow	0.11	0	0	0	2.3	0	0	0	8.7	0	0	0
grasshopper sparrow	0.33	0	0	0	6.9	0	0	0	21.3	0	0	0
lark bunting	0.06	0	0	0	1.3	0	0	0	1.6	0	0	0
Lapland longspur	0	0.01	0	0	0	0.3	0	0	0	1.0	0	0
chestnut-collared longspur	0.06	0	0	0	1.3	0	0	0	3.1	0	0	0
lark sparrow	0.04	0.07	0	0	0.8	2.2	0	0	1.6	4.2	0	0
horned lark	0.20	1.05	0.59	1.52	4.2	31.3	100	65.4	9.4	11.1	19.2	18.2
dark-eyed junco	0	0.03	0	0	0	0.9	0	0	0	2.0	0	0
house sparrow	0.08	0	0	0	1.6	0	0	0	0.8	0	0	0
savannah sparrow	0.06	0	0	0	1.3	0	0	0	4.7	0	0	0
spotted towhee	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
clay-colored sparrow	0.01	0.02	0	0	0.2	0.6	0	0	0.8	2.1	0	0
chipping sparrow	0	0.11	0	0	0	3.4	0	0	0	3.1	0	0
field sparrow	0.01	0.01	0	0	0.2	0.3	0	0	0.8	1.0	0	0
American tree sparrow	0	0.01	0	0	0	0.3	0	0	0	1.0	0	0
white-crowned sparrow	0.03	0	0	0	0.6	0	0	0	1.6	0	0	0
unidentified sparrow	0.02	0.22	0	0	0.3	6.5	0	0	1.7	9.4	0	0
Swallows	*0.35*	*0.02*	*0*	*0*	*7.1*	*0.6*	*0*	*0*	*14.3*	*2.1*	*0*	*0*
barn swallow	0.29	0.02	0	0	6.0	0.6	0	0	11.2	2.1	0	0
cliff swallow	0.03	0	0	0	0.6	0	0	0	1.6	0	0	0
bank swallow	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
tree swallow	0.02	0	0	0	0.3	0	0	0	1.6	0	0	0
Shrikes	*0.01*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*0.8*	*0*	*0*	*0*
loggerhead shrike	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Thrushes	*0.17*	*0.01*	*0*	*0*	*3.4*	*0.3*	*0*	*0*	*7.1*	*1.0*	*0*	*0*
American robin	0.17	0.01	0	0	3.4	0.3	0	0	7.1	1.0	0	0
Warblers	*0.02*	*0*	*0*	*0*	*0.5*	*0*	*0*	*0*	*1.6*	*0*	*0*	*0*
orange-crowned warbler	0.02	0	0	0	0.3	0	0	0	1.6	0	0	0
yellow warbler	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Woodpeckers	**0.01**	**0**	**0**	**0**	**0.2**	**0**	**0**	**0**	**0.8**	**0**	**0**	**0**
downy woodpecker	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Overall	**4.87**	**3.36**	**0.59**	**2.32**	**100**	**100**	**100**	**100**				

[1.] Number of small birds/100-meter (328-foot) plot/5-minute survey.

Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019

Appendix C1. Mean use by point for eagles[1] observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Bird Type	**1**	**2**	**4**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**15**
Diurnal Raptors	**0.17**	**0.25**	**0**	**0.08**	**0**	**0.25**	**0.42**	**0.08**	**0.09**	**0**	**0.17**
Eagles	*0.17*	*0.25*	*0*	*0.08*	*0*	*0.25*	*0.42*	*0.08*	*0.09*	*0*	*0.17*
golden eagle	0.17	0.25	0	0.08	0	0.25	0.42	0.08	0.09	0	0.17
bald eagle	0	0	0	0	0	0	0	0	0	0	0
unidentified eagle	0	0	0	0	0	0	0	0	0	0	0
All Large Birds	**0.17**	**0.25**	**0**	**0.08**	**0**	**0.25**	**0.42**	**0.08**	**0.09**	**0**	**0.17**

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (*continued*). Mean use by point for eagles[1] observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Bird Type	**16**	**17**	**18**	**19**	**20**	**21**	**27**	**28**	**29**	**38**	**40**
Eagles	*0*	*0.09*	*0.17*	*0.08*	*0*	*0.18*	*0.08*	*0.08*	*0.25*	*0.22*	*0.33*
bald eagle	0	0.09	0.08	0.08	0	0	0.08	0.08	0.08	0.22	0.25
golden eagle	0	0	0.08	0	0	0.09	0	0	0.17	0	0.08
unidentified eagle	0	0	0	0	0	0.09	0	0	0	0	0
All Eagles	**0**	**0.09**	**0.17**	**0.08**	**0**	**0.18**	**0.08**	**0.08**	**0.25**	**0.22**	**0.33**

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (*continued*). Mean use by point for eagles[1] observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Bird Type	**42**	**43**	**44**	**45**	**47**	**51**	**52**	**60**	**61**	**62**	**63**
Eagles	*0.08*	*0.50*	*0*	*0.17*	*0*	*0*	*0*	*0.17*	*0.08*	*0*	*0*
bald eagle	0.08	0.08	0	0.17	0	0	0	0.08	0.08	0	0
golden eagle	0	0.33	0	0	0	0	0	0.08	0	0	0
unidentified eagle	0	0.08	0	0	0	0	0	0	0	0	0
All Eagles	**0.08**	**0.50**	**0**	**0.17**	**0**	**0**	**0**	**0.17**	**0.08**	**0**	**0**

[1] Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C2. Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**1**	**2**	**4**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**15**
Waterbirds	**0**	**0**	**2.50**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
sandhill crane	0	0	2.50	0	0	0	0	0	0	0	0
great blue heron	0	0	0	0.08	0	0	0	0	0	0	0
American white pelican	0	0	0	0	0	0	0	0	0	0	0
Waterfowl	**6.25**	**0.58**	**4.92**	**0.50**	**0**	**0**	**0**	**0**	**9.27**	**33.33**	**0.08**
northern pintail	0.58	0	0	0	0	0	0	0	0	0	0.08
American wigeon	0	0	0.17	0.17	0	0	0	0	0	0	0
green-winged teal	0	0	0	0	0	0	0	0	0	0	0
mallard	0	0	0	0.17	0	0	0	0	0	0	0
snow goose	0	0	0	0	0	0	0	0	0	0	0
canvasback	0	0.58	0	0	0	0	0	0	0	0	0
Canada goose	5.67	0	4.50	0.17	0	0	0	0	9.27	33.33	0
tundra swan	0	0	0	0	0	0	0	0	0	0	0
gadwall	0	0	0.08	0	0	0	0	0	0	0	0
northern shoveler	0	0	0.08	0	0	0	0	0	0	0	0
blue-winged teal	0	0	0.08	0	0	0	0	0	0	0	0
unidentified waterfowl	0	0	0	0	0	0	0	0	0	0	0
Shorebirds	**0.25**	**0.08**	**0.50**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0.08**
upland sandpiper	0	0	0	0	0	0	0	0	0	0	0
killdeer	0.25	0.08	0.50	0.08	0	0	0	0	0	0.08	0.08
marbled godwit	0	0	0	0	0	0	0	0	0	0	0
Wilson's phalarope	0	0	0	0	0	0	0	0	0	0	0
American avocet	0	0	0	0	0	0	0	0	0	0	0
Rails/Coots	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
American coot	0	0	0.08	0	0	0	0	0	0	0	0
Diurnal Raptors	**0.42**	**0.58**	**0.33**	**0.17**	**0.25**	**0.50**	**0.33**	**0.67**	**0.36**	**0.42**	**0.50**
Accipiters	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
unidentified accipiter	0.08	0	0	0	0	0	0	0	0	0	0
Buteos	*0*	*0*	*0*	*0*	*0.17*	*0*	*0.17*	*0.50*	*0*	*0.17*	*0.25*
red-tailed hawk	0	0	0	0	0.08	0	0	0.08	0	0	0.08
rough-legged hawk	0	0	0	0	0.08	0	0	0	0	0	0.08
ferruginous hawk	0	0	0	0	0	0	0.08	0.08	0	0	0.08
Swainson's hawk	0	0	0	0	0	0	0.08	0.33	0	0.17	0
Northern Harrier	*0.08*	*0.25*	*0.25*	*0.08*	*0.08*	*0.17*	*0.08*	*0.08*	*0.27*	*0.25*	*0.08*
northern harrier	0.08	0.25	0.25	0.08	0.08	0.17	0.08	0.08	0.27	0.25	0.08
Eagles	*0*	*0.25*	*0*	*0*	*0*	*0.25*	*0.08*	*0.08*	*0.09*	*0*	*0.17*
golden eagle	0	0.25	0	0	0	0.25	0.08	0.08	0.09	0	0.17
bald eagle	0	0	0	0	0	0	0	0	0	0	0
Falcons	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
prairie falcon	0.08	0	0	0	0	0	0	0	0	0	0
American kestrel	0	0	0	0	0	0	0	0	0	0	0
Other Raptors	*0.17*	*0.08*	*0.08*	*0.08*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*
unidentified raptor	0.17	0.08	0.08	0.08	0	0.08	0	0	0	0	0
Vultures	**0**	**0.08**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**
turkey vulture	0	0.08	0	0	0.08	0	0	0	0	0	0
Upland Game Birds	**0**	**0**	**0.83**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**
ring-necked pheasant	0	0	0	0	0.08	0	0	0	0	0	0
sharp-tailed grouse	0	0	0.83	0	0	0	0	0	0	0	0

Appendix C2. Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**1**	**2**	**4**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**15**
Doves/Pigeons	**0.25**	**0.17**	**0.92**	**0.42**	**1.17**	**0.67**	**0.25**	**0**	**0.27**	**0.25**	**1.17**
rock pigeon	0	0	0	0	0	0.67	0	0	0.27	0	1.08
mourning dove	0.25	0.17	0.92	0.42	1.17	0	0.25	0	0	0.25	0.08
Large Corvids	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5.83**	**0**
American crow	0	0	0	0	0	0	0	0	0	5.83	0
Goatsuckers	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**
common nighthawk	0	0	0	0	0.08	0	0	0	0	0	0
All Large Birds	**7.17**	**1.50**	**10.08**	**1.25**	**1.67**	**1.17**	**0.58**	**0.67**	**9.91**	**39.92**	**1.83**

[1] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**16**	**17**	**18**	**19**	**20**	**21**	**27**	**28**	**29**	**38**	**40**
Waterbirds	**0**	**3.64**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
sandhill crane	0	0	0	0	0	0	0	0	0	0	0
great blue heron	0	0	0	0	0	0	0	0	0	0	0
American white pelican	0	3.64	0	0	0	0	0	0	0	0	0
Waterfowl	**2.92**	**11.73**	**0**	**0.25**	**6.50**	**9.00**	**2.17**	**0.33**	**0.25**	**0**	**0.92**
northern pintail	0.58	0	0	0	0	0.55	0	0	0	0	0.08
American wigeon	0	0	0	0	0	0	0	0	0	0	0
green-winged teal	1.33	0	0	0	0	0	0	0	0	0	0
mallard	0	1.00	0	0	0.08	1.91	0.08	0	0.25	0	0.33
snow goose	0	0	0	0	0	0	2.08	0	0	0	0
canvasback	0	0	0	0	0	0	0	0	0	0	0
Canada goose	0.42	9.09	0	0	6.25	0.27	0	0.33	0	0	0.50
tundra swan	0	0	0	0	0.17	0	0	0	0	0	0
gadwall	0	0.09	0	0	0	0	0	0	0	0	0
northern shoveler	0.25	1.18	0	0	0	0.36	0	0	0	0	0
blue-winged teal	0.33	0.36	0	0.25	0	0	0	0	0	0	0
unidentified waterfowl	0	0	0	0	0	5.91	0	0	0	0	0
Shorebirds	**1.25**	**0**	**0**	**0**	**0.33**	**0**	**0**	**0.17**	**0**	**0**	**0.17**
upland sandpiper	0	0	0	0	0	0	0	0.17	0	0	0
killdeer	0	0	0	0	0.33	0	0	0	0	0	0.17
marbled godwit	0.25	0	0	0	0	0	0	0	0	0	0
Wilson's phalarope	0.67	0	0	0	0	0	0	0	0	0	0
American avocet	0.33	0	0	0	0	0	0	0	0	0	0
Rails/Coots	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
American coot	0	0	0	0	0	0	0	0	0	0	0
Diurnal Raptors	**0.17**	**0.55**	**0.75**	**0.58**	**1.50**	**0.18**	**0.67**	**0.67**	**0.25**	**0.67**	**0.83**
Accipiters	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
unidentified accipiter	0	0	0	0	0	0	0	0	0	0	0

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**16**	**17**	**18**	**19**	**20**	**21**	**27**	**28**	**29**	**38**	**40**
Buteos	*0*	*0.36*	*0.33*	*0.50*	*1.25*	*0.09*	*0.50*	*0.50*	*0.08*	*0.22*	*0.42*
red-tailed hawk	0	0	0	0.17	0.67	0.09	0.17	0.25	0	0	0.08
rough-legged hawk	0	0.27	0.08	0.17	0.25	0	0	0	0.08	0.11	0.17
ferruginous hawk	0	0	0	0	0	0	0.17	0	0	0	0
Swainson's hawk	0	0.09	0.25	0.17	0.33	0	0.17	0.25	0	0.11	0.17
Northern Harrier	*0.17*	*0.18*	*0.25*	*0*	*0.25*	*0.09*	*0*	*0.17*	*0*	*0.22*	*0.17*
northern harrier	0.17	0.18	0.25	0	0.25	0.09	0	0.17	0	0.22	0.17
Eagles	*0*	*0*	*0.17*	*0.08*	*0*	*0*	*0.08*	*0*	*0.17*	*0.22*	*0.17*
golden eagle	0	0	0.08	0.08	0	0	0.08	0	0.08	0.22	0.17
bald eagle	0	0	0.08	0	0	0	0	0	0.08	0	0
Falcons	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*	*0*	*0*	*0.08*
prairie falcon	0	0	0	0	0	0	0.08	0	0	0	0.08
American kestrel	0	0	0	0	0	0	0	0	0	0	0
Other Raptors	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
unidentified raptor	0	0	0	0	0	0	0	0	0	0	0
Vultures	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
turkey vulture	0	0	0.08	0	0	0	0	0	0	0	0
Upland Game Birds	**0.33**	**0.36**	**0.08**	**0**	**0.17**	**0**	**0**	**0.25**	**4.50**	**0**	**0**
ring-necked pheasant	0.33	0	0.08	0	0.08	0	0	0.25	4.50	0	0
sharp-tailed grouse	0	0.36	0	0	0.08	0	0	0	0	0	0
Doves/Pigeons	**0**	**0.18**	**0.50**	**0.33**	**1.67**	**0**	**3.83**	**0**	**3.08**	**0**	**0**
rock pigeon	0	0	0.17	0	0.25	0	0	0	0	0	0
mourning dove	0	0.18	0.33	0.33	1.42	0	3.83	0	3.08	0	0
Large Corvids	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
American crow	0	0	0	0	0	0	0	0	0	0	0
Goatsuckers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.17**
common nighthawk	0	0	0	0	0	0	0	0	0	0	0.17
All Large Birds	**4.67**	**16.45**	**1.42**	**1.17**	**10.17**	**9.18**	**6.67**	**1.42**	**8.08**	**0.67**	**2.08**

[1] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**42**	**43**	**44**	**45**	**47**	**51**	**52**	**60**	**61**	**62**	**63**
Waterbirds	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
sandhill crane	0	0	0	0	0	0	0	0	0	0	0
great blue heron	0	0	0	0	0	0	0	0	0	0	0
American white pelican	0	0	0	0	0	0	0	0	0	0	0
Waterfowl	**0**	**0**	**0.67**	**0.67**	**0**	**0**	**1.25**	**0**	**1.42**	**0.50**	**0.58**
northern pintail	0	0	0	0	0	0	0	0	0	0.42	0.08
American wigeon	0	0	0	0	0	0	0.25	0	0	0	0
green-winged teal	0	0	0	0	0	0	0	0	0	0	0
mallard	0	0	0	0.67	0	0	0	0	0	0.08	0
snow goose	0	0	0	0	0	0	0	0	0	0	0
canvasback	0	0	0	0	0	0	0	0	0	0	0
Canada goose	0	0	0	0	0	0	0.08	0	1.42	0	0

Appendix C2 (*continued*). Mean use by point for large birds[1] and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**42**	**43**	**44**	**45**	**47**	**51**	**52**	**60**	**61**	**62**	**63**
tundra swan	0	0	0	0	0	0	0	0	0	0	0
gadwall	0	0	0	0	0	0	0	0	0	0	0.17
northern shoveler	0	0	0	0	0	0	0.17	0	0	0	0
blue-winged teal	0	0	0	0	0	0	0.75	0	0	0	0
unidentified waterfowl	0	0	0.67	0	0	0	0	0	0	0	0.33
Shorebirds	**0**	**0**	**0**	**0**	**0**	**0**	**0.42**	**0.08**	**0**	**0**	**0.17**
upland sandpiper	0	0	0	0	0	0	0	0	0	0	0
killdeer	0	0	0	0	0	0	0.08	0.08	0	0	0.17
marbled godwit	0	0	0	0	0	0	0	0	0	0	0
Wilson's phalarope	0	0	0	0	0	0	0.33	0	0	0	0
American avocet	0	0	0	0	0	0	0	0	0	0	0
Rails/Coots	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
American coot	0	0	0	0	0	0	0	0	0	0	0
Diurnal Raptors	**0.58**	**0.50**	**0.50**	**0.08**	**0.25**	**0.27**	**0.25**	**0.83**	**0.42**	**0.50**	**0.17**
Accipiters	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
unidentified accipiter	0	0	0	0	0	0	0	0	0	0	0
Buteos	*0.58*	*0*	*0.25*	*0*	*0*	*0.09*	*0.25*	*0.17*	*0.17*	*0*	*0.08*
red-tailed hawk	0.50	0	0.25	0	0	0	0.08	0	0	0	0
rough-legged hawk	0.08	0	0	0	0	0.09	0.17	0	0	0	0.08
ferruginous hawk	0	0	0	0	0	0	0	0	0.08	0	0
Swainson's hawk	0	0	0	0	0	0	0	0.17	0.08	0	0
Northern Harrier	*0*	*0.17*	*0.25*	*0*	*0.25*	*0.18*	*0*	*0.50*	*0.17*	*0.50*	*0*
northern harrier	0	0.17	0.25	0	0.25	0.18	0	0.50	0.17	0.50	0
Eagles	*0*	*0.25*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0.08*	*0*	*0*
golden eagle	0	0	0	0	0	0	0	0	0.08	0	0
bald eagle	0	0.25	0	0	0	0	0	0.08	0	0	0
Falcons	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*	*0*	*0*
prairie falcon	0	0	0	0	0	0	0	0	0	0	0
American kestrel	0	0.08	0	0	0	0	0	0.08	0	0	0
Other Raptors	*0*	*0*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*
unidentified raptor	0	0	0	0.08	0	0	0	0	0	0	0.08
Vultures	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**
turkey vulture	0	0	0	0	0.08	0	0	0	0	0	0
Upland Game Birds	**0.67**	**0**	**0.08**	**0.17**	**0.25**	**0**	**0.67**	**0**	**0.08**	**0**	**0.08**
ring-necked pheasant	0.50	0	0.08	0	0.25	0	0	0	0	0	0.08
sharp-tailed grouse	0.17	0	0	0.17	0	0	0.67	0	0.08	0	0
Doves/Pigeons	**0.17**	**0.17**	**0.25**	**0.17**	**0.17**	**0**	**0.83**	**1.75**	**0**	**0.25**	**0**
rock pigeon	0	0	0	0	0	0	0.42	1.75	0	0	0
mourning dove	0.17	0.17	0.25	0.17	0.17	0	0.42	0	0	0.25	0
Large Corvids	**0**	**4.33**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
American crow	0	4.33	0	0	0	0	0	0	0	0	0
Goatsuckers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
common nighthawk	0	0	0	0	0	0	0	0	0	0	0
All Large Birds	**1.42**	**5.00**	**1.50**	**1.08**	**0.75**	**0.27**	**3.42**	**2.67**	**1.92**	**1.25**	**1.00**

[1] Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C3. Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**1**	**2**	**4**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**15**
Passerines	**2.00**	**2.75**	**2.58**	**4.83**	**2.17**	**0.75**	**7.08**	**2.08**	**2.18**	**2.58**	**2.75**
red-winged blackbird	0	0.42	0.25	2.33	0.17	0	0.17	0.25	0.55	0.42	0.08
bobolink	0.08	0	0	0	0	0	0	0.08	0	0	0
Brewer's blackbird	0	0	0	0	0	0	0	0	0	0	0
orchard oriole	0	0	0	0	0	0	0	0	0	0	0
brown-headed cowbird	0.58	0.67	0.08	0.17	0.25	0	0.08	0.17	0.73	0.92	0
common grackle	0	0.08	0	0	0	0	0	0	0.09	0	0
western meadowlark	0.92	0.25	0.42	0.75	0.50	0.67	0.67	1.00	0.45	0.58	0.75
European starling	0	0	0	0	0	0	0	0	0	0	0
yellow-headed blackbird	0	0	0	0.08	0	0	0	0	0	0	0
house finch	0	0	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0	0	0	0	0	0	0	0	0
eastern kingbird	0	0	0	0	0	0	0	0	0	0.08	0
western kingbird	0	0	0	0	0	0	0	0	0	0	0.08
Baird's sparrow	0	0	0	0	0	0	0	0	0	0	0
grasshopper sparrow	0.17	0	0.33	0	0	0.08	0.33	0.08	0.09	0	0
lark bunting	0	0	0	0	0	0	0	0	0	0	0
Lapland longspur	0	0	0	0	0	0	0.08	0	0	0	0
chestnut-collared longspur	0	0	0	0	0	0	0	0	0	0	0
lark sparrow	0	0	0.08	0	0	0	0	0	0	0	0
horned lark	0.17	0	1.33	1.08	0.75	0	5.08	0.50	0.09	0.25	1.75
dark-eyed junco	0	0	0	0	0	0	0	0	0	0	0
house sparrow	0	0	0	0	0	0	0	0	0	0	0
savannah sparrow	0.08	0	0	0	0	0	0	0	0.09	0	0
spotted towhee	0	0	0	0	0	0	0	0	0	0	0
clay-colored sparrow	0	0	0	0	0.08	0	0	0	0	0	0
chipping sparrow	0	0	0.08	0	0	0	0	0	0	0	0
field sparrow	0	0.08	0	0	0	0	0	0	0	0	0
American tree sparrow	0	0	0	0	0	0	0	0	0	0	0
white-crowned sparrow	0	0	0	0	0	0	0	0	0	0	0
unidentified sparrow	0	0	0	0.17	0	0	0	0	0	0.25	0.08
barn swallow	0	0.75	0	0	0	0	0.67	0	0	0	0
cliff swallow	0	0	0	0	0	0	0	0	0	0	0
bank swallow	0	0	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0.09	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0.08	0
American robin	0	0.50	0	0.25	0.42	0	0	0	0	0	0
orange-crowned warbler	0	0	0	0	0	0	0	0	0	0	0
yellow warbler	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
downy woodpecker	0	0	0	0	0	0	0	0	0	0	0
All Small Birds	**2.00**	**2.75**	**2.58**	**4.83**	**2.17**	**0.75**	**7.08**	**2.08**	**2.18**	**2.58**	**2.75**

[1] Number of small birds/100-meter (328-foot) plot/5-minute survey.

Appendix C3 (*continued*). Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**16**	**17**	**18**	**19**	**20**	**21**	**27**	**28**	**29**	**38**	**40**
Passerines	**4.33**	**4.09**	**3.00**	**2.67**	**2.42**	**2.73**	**2.42**	**3.17**	**4.33**	**0**	**2.08**
red-winged blackbird	2.00	0.73	0.08	0.33	0.33	0.18	0.25	0.08	1.17	0	0.25
bobolink	0	0	0	0	0	0	0	0	0	0	0
Brewer's blackbird	0	0	0	0	0	0	0	0	0	0	0
orchard oriole	0	0	0	0	0	0	0.08	0	0	0	0
brown-headed cowbird	0.25	1.36	0	0.50	0.25	0	0.33	0.42	0	0	0.33
common grackle	0	0	0	0.08	0	0	0.25	0.25	1.33	0	0
western meadowlark	0.75	0.73	0.25	0.67	0.33	0.73	1.08	1.00	0.17	0	1.08
European starling	0	0	0	0	0	0	0	0	0	0	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0	0	0
house finch	0	0	0	0	0	0	0	0	0.08	0	0
American goldfinch	0	0.18	0	0	0.33	0	0	0	0.25	0	0
eastern kingbird	0	0.18	0	0	0	0	0	0	0.25	0	0
western kingbird	0.08	0	0.08	0	0	0	0	0	0	0	0
Baird's sparrow	0.17	0	0.08	0.08	0	0	0	0	0	0	0.08
grasshopper sparrow	0.25	0.09	0.08	0	0.25	0	0	0.58	0	0	0
lark bunting	0	0	0	0	0	0.64	0	0	0	0	0
Lapland longspur	0	0	0	0	0	0	0	0	0	0	0
chestnut-collared longspur	0	0	0	0	0	0.27	0	0	0	0	0
lark sparrow	0.25	0	0	0	0.42	0	0	0	0	0	0
horned lark	0.42	0	2.25	1.00	0	0.64	0.33	0	0	0	0.17
dark-eyed junco	0	0.09	0	0	0	0	0	0	0.17	0	0
house sparrow	0	0	0	0	0	0	0	0	0	0	0
savannah sparrow	0	0	0	0	0	0.09	0	0	0	0	0
spotted towhee	0	0.09	0	0	0	0	0	0	0	0	0
clay-colored sparrow	0	0.09	0	0	0	0	0	0	0	0	0
chipping sparrow	0	0	0	0	0	0	0	0	0	0	0
field sparrow	0	0	0	0	0	0	0	0	0	0	0
American tree sparrow	0	0	0	0	0	0	0	0	0.08	0	0
white-crowned sparrow	0	0.18	0	0	0	0.18	0	0	0	0	0
unidentified sparrow	0	0.09	0	0	0	0	0.08	0.58	0.17	0	0.17
barn swallow	0.17	0	0.17	0	0.42	0	0	0.25	0.08	0	0
cliff swallow	0	0	0	0	0	0	0	0	0	0	0
bank swallow	0	0	0	0	0.08	0	0	0	0	0	0
tree swallow	0	0.09	0	0	0	0	0	0	0	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0	0
American robin	0	0	0	0	0	0	0	0	0.58	0	0
orange-crowned warbler	0	0.09	0	0	0	0	0	0	0	0	0
yellow warbler	0	0.09	0	0	0	0	0	0	0	0	0
Woodpeckers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
downy woodpecker	0	0	0	0	0	0	0	0	0	0	0
All Small Birds	**4.33**	**4.09**	**3.00**	**2.67**	**2.42**	**2.73**	**2.42**	**3.17**	**4.33**	**0**	**2.08**

[1] Number of small birds/100-meter (328-foot) plot/5-minute survey.

Appendix C3 (*continued*). Mean use by point for small birds[1] and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

	Survey Point										
Type/Species	**42**	**43**	**44**	**45**	**47**	**51**	**52**	**60**	**61**	**62**	**63**
Passerines	**3.83**	**2.25**	**1.17**	**5.08**	**0.75**	**4.64**	**1.92**	**4.58**	**1.75**	**4.83**	**3.42**
red-winged blackbird	0.17	0.33	0	0	0	0.09	0.50	2.08	0.17	0	0.42
bobolink	0	0	0	0	0	0	0	0.08	0	0.17	0
Brewer's blackbird	0	0.25	0	0	0	0	0	0	0	0	0
orchard oriole	0	0	0	0	0	0	0	0	0	0	0
brown-headed cowbird	0	0	0	0.25	0.08	0.09	0.42	0.25	0.17	0	0.92
common grackle	1.00	0	0.08	0	0	1.36	0	0	0	0	0.08
western meadowlark	0.42	0.50	0.67	0.25	0.25	0.82	0.67	0.50	0.83	0.17	0.58
European starling	0	0	0	4.17	0	0.36	0	0	0	0	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0	0	0
house finch	0	0	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0	0	0	0	0	0	0	0	0
eastern kingbird	0	0	0	0	0	0	0	0.08	0	0	0
western kingbird	0	0	0	0	0	0	0	0.08	0	0.08	0
Baird's sparrow	0	0	0	0	0.08	0.18	0	0.25	0.17	0	0.08
grasshopper sparrow	0	0	0.17	0	0.17	0.09	0.08	0.08	0.08	0.33	0.17
lark bunting	0	0	0	0	0	0.09	0	0	0	0	0
Lapland longspur	0	0	0	0	0	0	0	0	0	0	0
chestnut-collared longspur	0	0	0	0	0	0.45	0	0	0	0	0
lark sparrow	0.08	0	0	0	0	0	0	0	0	0.17	0
horned lark	1.67	1.17	0.08	0.33	0.17	0.27	0.17	0.25	0	3.67	0.50
dark-eyed junco	0	0	0	0	0	0	0	0	0	0	0
house sparrow	0	0	0	0	0	0	0	0.83	0	0	0
savannah sparrow	0.17	0	0	0	0	0.18	0	0	0.08	0	0
spotted towhee	0	0	0	0	0	0	0	0	0	0	0
clay-colored sparrow	0	0	0	0	0	0	0	0	0	0	0.08
chipping sparrow	0.33	0	0	0	0	0.55	0	0	0	0	0
field sparrow	0	0	0	0	0	0	0	0	0.08	0	0
American tree sparrow	0	0	0	0	0	0	0	0	0	0	0
white-crowned sparrow	0	0	0	0	0	0	0	0	0	0	0
unidentified sparrow	0	0	0	0	0	0	0	0	0	0.08	0.25
barn swallow	0	0	0.17	0	0	0.09	0.08	0	0.17	0.08	0.08
cliff swallow	0	0	0	0	0	0	0	0	0	0.08	0.25
bank swallow	0	0	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0	0
American robin	0	0	0	0.08	0	0	0	0	0	0	0
orange-crowned warbler	0	0	0	0	0	0	0	0.08	0	0	0
yellow warbler	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**
downy woodpecker	0	0	0	0	0	0	0	0.08	0	0	0
All Small Birds	**3.83**	**2.25**	**1.17**	**5.08**	**0.75**	**4.64**	**1.92**	**4.67**	**1.75**	**4.83**	**3.42**

[1] Number of small birds/100-meter (328-foot) plot/5-minute survey.

EAGLE AND RAPTOR NEST SURVEY REPORT

BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

CONFIDENTIAL BUSINESS INFORMATION

AUGUST 2018

PREPARED BY

SWCA Environmental Consultants

EAGLE AND RAPTOR NEST SURVEY REPORT

BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

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Appendix A. Nest Data for the Bowman Wind Project Raptor/Eagle Nest Surveys completed March 2018

Appendix B. Eagle Nest Photographs

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INTRODUCTION

SWCA Environmental Consultants (SWCA) completed raptor and eagle nest aerial surveys in March 2018 and additional follow-up nest monitoring for three potential eagle nests in June 2018 for the proposed Bowman Wind Project (Project). The Project site is located approximately 5 miles west of Bowman in Bowman County, North Dakota (Figure 1). The Project Area is comprised of approximately 102,316 acres.

Raptor nest aerial surveys were completed within the Project Area and a 1-mile (1.6-kilometer [km]) survey buffer and eagle nest aerial surveys were completed within the Project Area and a 10-mile (16.1-km) survey buffer (see Figure 1). The raptor nest survey buffer covered approximately 148,750 acres and the eagle nest survey buffer covered approximately 708,439 acres. The aerial survey buffers were based on recommendations from the U.S. Fish and Wildlife Service (USFWS 2012) and the North Dakota Game and Fish Department (NDGFD) and completed in general accordance with the *Eagle Conservation Plan Guidance*: *Module 1—Land-based Wind Energy* (USFWS 2013) and the USFWS's *Land-Based Wind Energy Guidelines* (USFWS 2014).

The objective of the aerial surveys was to identify and map non-eagle raptor, bald eagle (*Haliaeetus leucocephalus*), and golden eagle (*Aquila chrysaetos*) nests within the respective survey buffers, and document 2018 activity status. Based on the results of the aerial surveys, follow-up nest monitoring occurred at three potential eagle nests to observe potential late nesting activity at these sites.

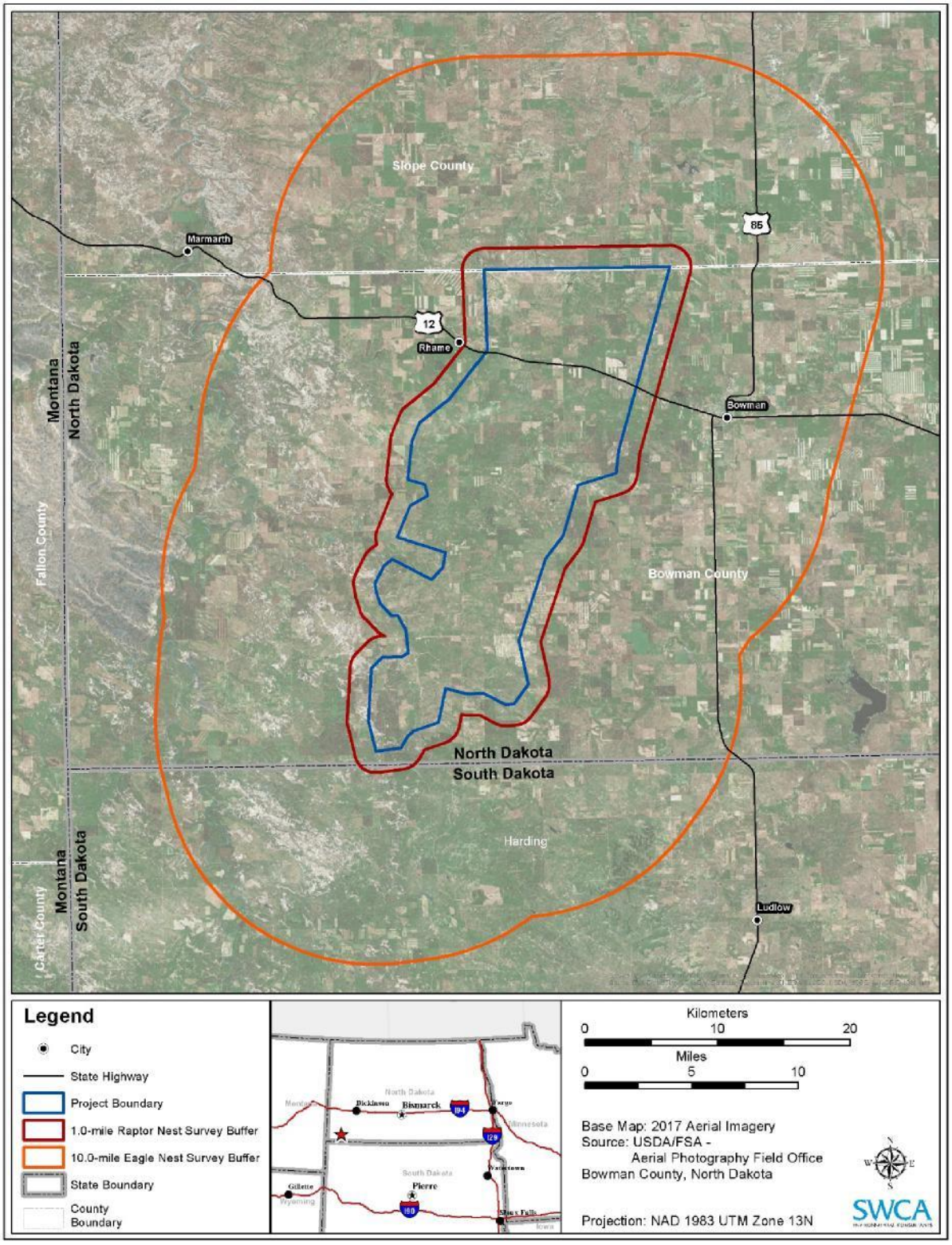

Figure 1. Raptor and eagle nest survey buffers for the proposed Bowman Wind Project.

METHODS

Raptor Nest Aerial Survey

Prior to conducting the raptor nest aerial survey, SWCA staff reviewed NDGFD historic and active raptor nest data. In total, 16 raptor nest locations were previously recorded within the raptor nest survey buffer. Of the 16 agency raptor nest records, eight were recorded in the Project Area and eight within the 1-mile survey buffer.

One raptor nest aerial survey was completed by two SWCA biologists and a pilot, using a fixed-wing Cessna 205 aircraft on March 9 and 11, 2018. Linear north–south transects were pre-established using ArcGIS software and loaded into the aircraft's global positioning system (GPS) unit for guidance during the survey. The pilot flew the pre-established transects within the survey buffer at an altitude of approximately 200 to 300 feet above ground level, depending on terrain and flight safety conditions, at speeds averaging 100 miles per hour. Each nest location in the agency database was checked during the survey, and all new nests found were recorded.

Data recorded at each raptor nest location included nest location; substrate; status (e.g., occupied or unoccupied); raptor species using occupied nests; and number of adults, eggs, and/or nestlings, if observed.

Eagle Nest Aerial Survey

Prior to conducting the eagle nest aerial survey, SWCA staff obtained and reviewed available agency historic and active eagle nest data from the NDGFD, USFWS (Reinisch 2018), and South Dakota Game, Fish, and Parks (Heimerl 2018). Thirty-one eagle nest locations were previously recorded in the various agency datasets within the Project Area and 10-mile eagle nest survey buffer; however, one record was determined to be a duplicate record, based on GPS location and field observations, and is not included in this report. None of the 30 eagle nest records from the agency datasets occur within the Project Area.

Prior to the aerial survey, a desktop analysis of the eagle survey buffer was completed, and potential habitat areas were identified and marked using geographic information system (GIS) software. Potential eagle nesting habitat was defined as cliff bands, rock outcrops, wooded riparian corridors, utility structures, and stands of or individual large trees capable of supporting the weight of an eagle nest. This information was used to inform the aerial survey.

One eagle nest aerial survey was completed by two SWCA biologists and a pilot, using a fixed-wing Cessna 205 aircraft, over 3 days: March 9, 11, and 21, 2018. The Project Area and a 1-mile survey buffer was surveyed by flying pre-established, linear north–south transects, as described above for the raptor nest aerial survey. Additionally, all potentially suitable habitats identified within the desktop analysis within the 10-mile survey buffer were visually inspected from an altitude of 100 to 300 feet above ground level for eagle nests. Areas between identified suitable habitat were also visually inspected for eagle nests using roaming transects. All previously recorded golden and bald eagle nest locations provided in the agency datasets were checked during the aerial survey, and all new nests found were recorded.

Data recorded at each eagle nest location included nest location; substrate; status (e.g., occupied or unoccupied); eagle species using occupied nests; and number of adults, eggs, and/or nestlings, if observed.

Nest Monitoring

Based on the results of the March 2018 aerial surveys, SWCA biologists identified three potential unoccupied golden eagle nests (31, 32 and 52) within the Project area. Follow-up nest monitoring was completed at these three potential eagle nests in June 2018. Nests 31 and 32 are located in the Project Area and Nest 52 is located 30 feet outside the Project boundary, but due to its close proximity to the Project Area it was also monitored. Each nest was monitored twice for a total of 4 hours each; 0.5 hour before sunrise to 1.5 hours after sunrise and again 1.5 hours before sunset to 0.5 hour after sunset. Each monitoring period was separated by a minimum of 24 hours, so that if a nest was monitored at sunset it was not monitored again the following morning or if a nest was monitored at sunrise it was not monitored again that evening.

None of the three nests are located on parcels in which land access has been granted, so monitoring occurred from the closest location possible. Two nests were monitored from a public roadway and the third nest was monitored from a neighboring parcel in which ground access was permitted.

Nest 31 is located in Section 16, Township (T) 131 North (N), Range (R) 103 West (W) and was monitored at sunrise on June 22 and at sunset on June 24. Monitoring of Nest 31 occurred from a public road located approximately 0.6 mile west of the nest location (Figure 3). This nest was partially obstructed by dense foliage of surrounding trees.

Nest 32 is located in Section 21, T131N, R103W and was monitored at sunset on June 22 and at sunrise on June 24. Monitoring of Nest 32 occurred from a neighboring parcel located approximately 0.2 mile south of the nest location where ground access was permitted (Figure 3). The nest was clearly visible from the monitoring location.

Nest 52 is located in Section 30 T130N, R104W and was monitored at sunrise on June 22 and at sunset on June 23. Monitoring of Nest 52 occurred from a public road located approximately 1.1 miles northeast of the nest location (Figure 3). This nest was clearly visible with the use of a spotting scope as the nest was located in a dead tree.

RESULTS

The results of the aerial surveys are presented in tabular format in Appendix A; representative photographs taken within the Project Area and survey buffers are provided in Appendix B.

Raptor Nest Aerial Survey

A total of forty-five non-eagle raptor nests (5 occupied, 40 unoccupied) were observed within the raptor nest survey area, of which 42 (4 occupied, 38 unoccupied) were within the Project boundary. The occupied nests included one great horned owl and three unknown species.

Of the 16 agency nest record locations evaluated, only 3 nests were located and all three were confirmed unoccupied (nests ND12, ND15, and ND16; see Figure 2 and Table A-1).

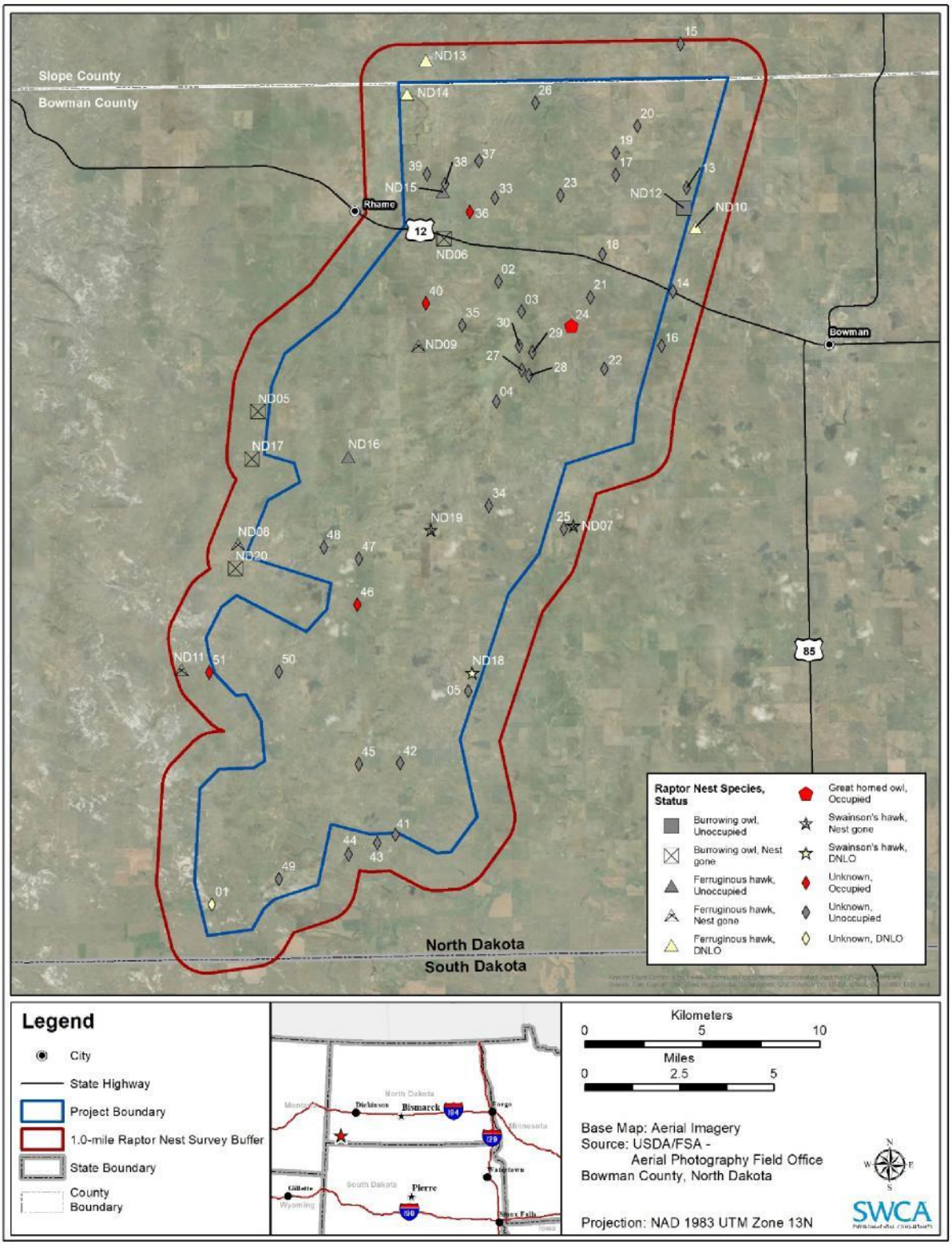

Figure 2. Raptor nest aerial survey results for the proposed Bowman Wind Project.

Eagle Nest Aerial Survey

No known bald eagle nests and 11 known golden eagle nests (4 occupied, 7 unoccupied) were located within the eagle nest survey area (Figure 3; Table A-2). Fourteen potential eagle nests were documented during the aerial survey, two of which are located within the Project boundary.

Of the 30 agency nest record locations evaluated, only 9 nests were located. Nests SD06 and US19 were active with golden eagles (see Figure 3 and Table A-2).

Nest Monitoring

Nest 31 was unoccupied during the aerial survey. During follow-up ground surveys it was confirmed occupied. On June 22, one nestling was observed in the nest. On June 24, two nestlings were observed in the nest and an adult was observed feeding the nestlings; however, due to landowner access restrictions and the dense foliage prevented a clear view of the adult to identify the species and no adult was observed flying in the area during the monitoring periods.

Nests 32 and 52 were unoccupied during the aerial survey. During the follow-up ground surveys these were confirmed unoccupied with no eagles or other raptors observed at either site during any of the monitoring period.

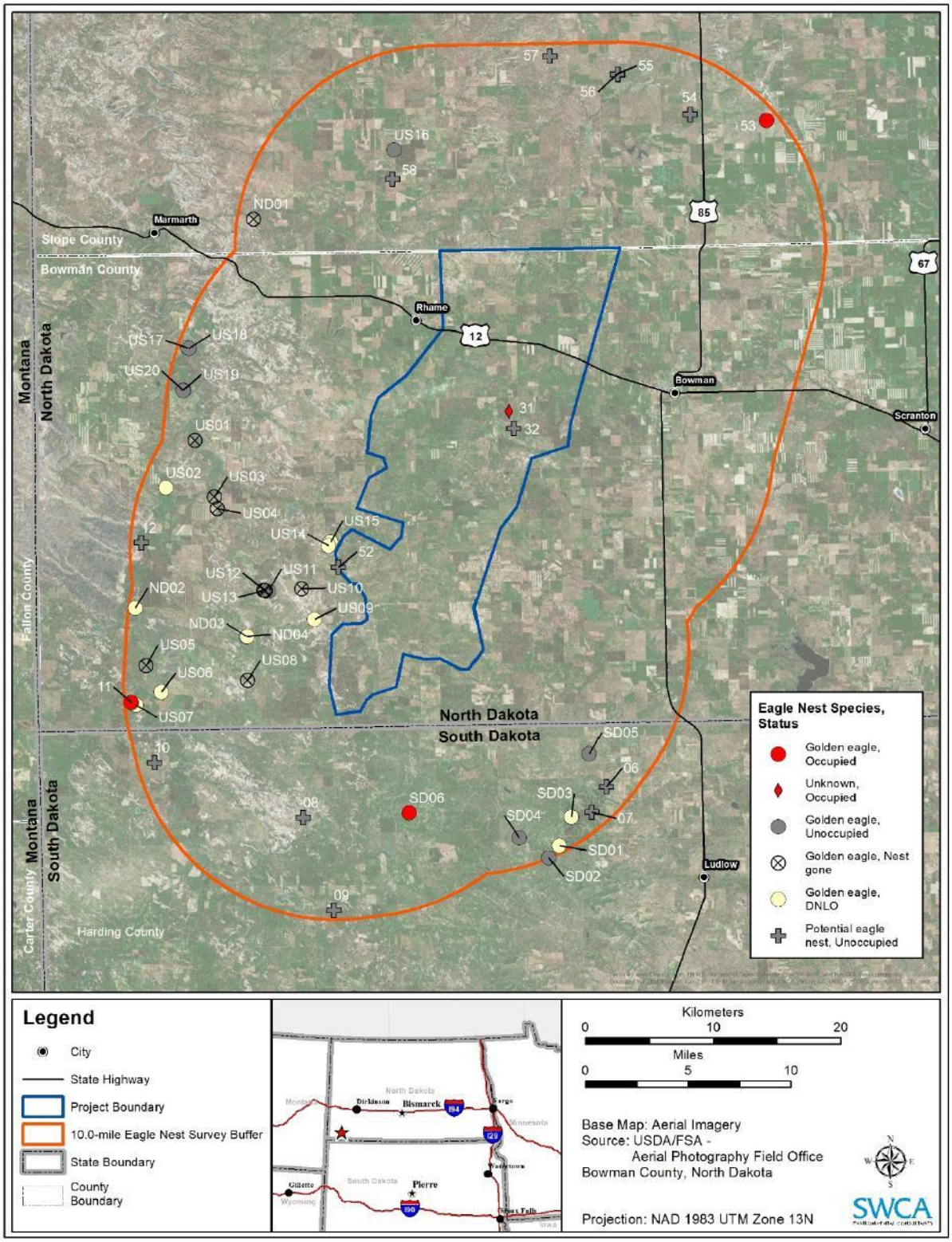

Figure 3. Eagle nest survey results for the proposed Bowman Wind Project.

CONCLUSIONS

Forty-five non-eagle raptor nests were documented within the Project Area and 1-mile survey buffer. Historic and current records indicate that great horned owl, red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), burrowing owl, and ferruginous hawk (*Buteo regalis*) species have nested within the Project Area and survey buffer. Only the great horned owl was observed nesting in the area during the March aerial survey.

No known bald eagle nests, 11 known golden eagle nests, and 14 potential eagle nests were documented within the Project Area and 10-mile survey buffer. No occupied golden eagle nests were documented within the Project area during the survey; however, one potential eagle nest was active, but species could not be determined. The nearest occupied golden eagle nest was approximately 5.5 miles south of the Project Area. The other three nests were 9.2 miles west, 9.5 miles northeast, and 9.7 miles southwest. Suitable nesting habitat for golden eagles was present in isolated patches throughout the Project Area and survey buffer, which included trees, hillsides, and cliff faces. Nesting habitat for bald eagles was present in isolated areas in the survey buffer, which included mature trees in wooded riparian areas. Historic and current records indicate that golden eagles have nested within the survey buffer.

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APPENDIX A

Nest Data for the Bowman Wind Project Raptor/Eagle Nest Surveys Completed March 2018

Table A-1. Nest Data for the Bowman Wind Project Raptor Nest Survey, March 2018

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance (miles) to Project Boundary	Survey Date	Species‡	Nest Status§	Comment
			NAD 83, Zone 13N†						
01	Ground/ Hillside	30, 129N, 104W	597470.1	5091074.5	Inside	3/11/2018	UNK	DNLO	Snow covered
02	Tree	5, 131N, 103W	609650.6	5117614.1	Inside	3/9/2018	UNK	Unoccupied	–
03	Tree	4, 131N, 103W	610645.8	5116323.7	Inside	3/9/2018	UNK	Unoccupied	–
04	Tree	20, 131N, 103W	609582.8	5112506.2	Inside	3/9/2018	UNK	Unoccupied	–
05	Tree	31, 130N, 103W	608392.1	5100173.2	Inside	3/9/2018	UNK	Unoccupied	–
13	Tree	19, 132N, 102W	617683.6	5121613.3	Inside	3/9/2018	UNK	Unoccupied	–
14	Tree	6, 131N, 102W	617097.3	5117208.6	0.13	3/9/2018	UNK	Unoccupied	–
15	Tree	34, 133N, 102W	617429.7	5127731.9	0.89	3/9/2018	UNK	Unoccupied	–
16	Tree	7, 131N, 102W	616619.0	5114878.1	0.23	3/9/2018	UNK	Unoccupied	–
17	Tree	24, 132N, 103W	614667.4	5122165.1	Inside	3/9/2018	UNK	Unoccupied	–
18	Tree	35, 132N, 103W	614100.2	5118788.9	Inside	3/9/2018	UNK	Unoccupied	–
19	Tree	13, 132N, 103W	614663.8	5123098.7	Inside	3/9/2018	UNK	Unoccupied	–
20	Tree	13, 132N, 103W	615577.8	5124244.0	Inside	3/9/2018	UNK	Unoccupied	–
21	Tree	2, 131N, 103W	613582.0	5116949.4	Inside	3/9/2018	UNK	Unoccupied	–
22	Tree	14, 131N, 103W	614175.2	5113895.2	Inside	3/9/2018	UNK	Unoccupied	–
23	Tree	22, 132N, 103W	612299.2	5121285.3	Inside	3/9/2018	UNK	Unoccupied	–
24	Tree	1, 131N, 103W	612770.0	5115738.3	Inside	3/9/2018	GHOW	Occupied	Adult prone on nest; incubating
25	Tree	3, 130N, 103W	612452.7	5107074.1	0.45	3/9/2018	UNK	Unoccupied	–
26	Tree	9, 132N, 103W	611231.5	5125228.8	Inside	3/9/2018	UNK	Unoccupied	–
27	Tree	16, 131N, 103W	610663.2	5113842.0	Inside	3/9/2018	UNK	Unoccupied	–
28	Tree	16, 131N, 103W	610968.2	5113616.1	Inside	3/9/2018	UNK	Unoccupied	–
29	Tree	16, 131N, 103W	611112.4	5114603.6	Inside	3/9/2018	UNK	Unoccupied	–
30	Tree	9, 131N, 103W	610539.9	5114872.5	Inside	3/9/2018	UNK	Unoccupied	–
33	Tree	20, 132N, 103W	609508.0	5121171.0	Inside	3/9/2018	UNK	Unoccupied	–
34	Tree	5, 130N, 103W	609259.4	5108062.2	Inside	3/9/2018	UNK	Unoccupied	–
35	Tree	7, 131N, 103W	608143.7	5115747.1	Inside	3/9/2018	UNK	Unoccupied	–

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X NAD 83, Zone 13N†	UTM Y NAD 83, Zone 13N†	Distance (miles) to Project Boundary	Survey Date	Species‡	Nest Status§	Comment
36	Tree	29, 132N, 103W	608453.1	5120582.6	Inside	3/9/2018	UNK	Occupied	Species probable great horned owl
37	Tree	17, 132N, 103W	608829.2	5122756.1	Inside	3/9/2018	UNK	Unoccupied	–
38	Tree	19, 132N, 103W	607411.5	5121763.7	Inside	3/11/2018	UNK	Unoccupied	–
39	Tree	19, 132N, 103W	606633.3	5122196.3	Inside	3/11/2018	UNK	Unoccupied	–
40	Tree	1, 131N, 103W	606592.4	5116681.6	Inside	3/11/2018	UNK	Occupied	Species probable great horned owl
41	Tree	14, 129N, 104W	605297.4	5094043.7	0.05	3/11/2018	UNK	Unoccupied	–
42	Tree	1, 129N, 104W	605497.0	5097095.6	Inside	3/11/2018	UNK	Unoccupied	–
43	Tree	14, 129N, 104W	604527.6	5093691.9	0.25	3/11/2018	UNK	Unoccupied	–
44	Tree	22, 129N, 104W	603300.9	5093214.4	0.63	3/11/2018	UNK	Unoccupied	–
45	Tree	2, 129N, 104W	603728.1	5097049.5	Inside	3/11/2018	UNK	Unoccupied	–
46	Tree	14, 130N, 104W	603659.8	5103854.9	Inside	3/11/2018	UNK	Occupied	Species probable great horned owl
47	Tree	11, 130N, 104W	603730.4	5105803.1	Inside	3/11/2018	UNK	Unoccupied	–
48	Tree	10, 130N, 104W	602242.3	5106286.3	Inside	3/11/2018	UNK	Unoccupied	–
49	Tree	20, 129N, 104W	600320.6	5092164.5	Inside	3/11/2018	UNK	Unoccupied	–
50	Tree	29, 130N, 104W	600321.2	5100996.8	Inside	3/11/2018	UNK	Unoccupied	–
51	Tree	30, 130N, 104W	597352.1	5100960.8	0.13	3/11/2018	UNK	Occupied	Species probable great horned owl
ND05	Burrow	20, 131N, 104W	599436.3	5112085.8	0.28	3/11/2018	BUOW	Gone	No prairie dog colony at this location
ND06	Burrow	31, 132N, 103W	607368.8	5119443.8	Inside	3/11/2018	BUOW	Gone	No prairie dog colony at this location
ND07	Tree	3, 130N, 103W	612859.0	5107213.0	0.67	3/9/2018	SWHA	Gone	Broken branches and debris on ground at nest location
ND08	Tree	7, 130N, 104W	598584.3	5106425.8	0.29	3/11/2018	FEHA	Gone	No tree at location
ND09	Tree	12, 131N, 104W	606269.4	5114897.1	Inside	3/11/2018	FEHA	Gone	No nest in tree patch at this location
ND10	Ground/ Hillside	29, 132N, 102W	618063.6	5119924.7	0.25	3/9/2018	FEHA	DNLO	Snow covered
ND11	Tree	25, 130N, 105W	596169.8	5101089.2	0.81	3/9/2018	FEHA	Gone	No nest in tree at this location
ND12	Burrow	30, 132N, 102W	617562.9	5120750.0	Inside	3/9/2018	BUOW	Unoccupied	Prairie dog colony present

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance (miles) to Project Boundary	Survey Date	Species‡	Nest Status§	Comment
			NAD 83, Zone 13N†						
ND13	Ground/ Hillside	33, 133N, 103W	606587.1	5127053.1	0.58	3/11/2018	FEHA	DNLO	Snow covered
ND14	Ground/ Hillside	12, 132N, 104W	605787.9	5125607.2	Inside	3/11/2018	FEHA	DNLO	
ND15	Tree	19, 132N, 103W	607316.4	5121455.8	Inside	3/11/2018	FEHA	Unoccupied	–
ND16	Tree	27, 131N, 104W	603277.4	5110146.9	Inside	3/11/2018	FEHA	Unoccupied	–
ND17	Burrow	29, 131N, 104W	599177.1	5110070.6	0.34	3/11/2018	BUOW	Gone	No prairie dog colony at this location
ND18	Tree	29, 130N, 103W	608554.7	5100936.7	Inside	3/9/2018	SWHA	DNLO	–
ND19	Tree	6, 130N, 103W	606804.4	5107023.3	Inside	3/11/2018	SWHA	Gone	No nest in tree patch at this location
ND20	Burrow	7, 130N, 104W	598479.5	5105391.6	0.41	3/11/2018	BUOW	Gone	No prairie dog colony at this location

* Nest labels were generated based on agency datasets (ND = North Dakota Game and Fish) and nest labels without preceding abbreviations were new nests documented during the March 2018 aerial survey.

† UTM locations were obtained during the aerial survey and corrected where possible using aerial photographs. These locations are approximations and should be ground-truthed to verify actual UTM location. ‡ BUOW = burrowing owl; FEHA = ferruginous hawk; GHOW = great horned owl; SWHA = Swainson's hawk; UNK = unknown raptor species.

§ Occupied = presence of adult prone on the nest or perched on the nest; Unoccupied = lack of incubating adult or eggs in the nest; Gone = agency notations that the nest was destroyed in a previous year or the nest was not at the location due to a lack of suitable substrate; DNLO = did not locate due to an inability to view the nest from the air.

Table A-2. Nest Data for the Bowman Wind Project Eagle Nest Surveys, March and June 2018

Nest Label*	Substrate	Section, Township Range (R) (T),	UTM X NAD 83, Zone 13N†	UTM Y NAD 83, Zone 13N†	Distance (miles) to Project Boundary	Survey Date	Species‡	Nest Status§	Comment
06	Cliff	2, 22N, 5E	618416.0	5084103.7	8.81	3/9/2018	UNK	Unoccupied	
07	Cliff	10, 22N, 5E	617247.6	5082116.9	9.17	3/9/2018	UNK	Unoccupied	
08	Cliff	8, 22N, 3E	594698.5	5081670.3	5.28	3/9/2018	UNK	Unoccupied	Recent mudslide, nest filled with mud
09	Cliff	4, 21N, 3E	597114.1	5074394.7	9.55	3/9/2018	UNK	Unoccupied	Two golden eagles perched on hilltop near nest
10	Cliff	30, 23N, 2E	583041.1	5085960.2	9.16	3/9/2018	UNK	Unoccupied	
11	Cliff	29, 129N, 106W	581261.4	5090663.2	9.65	3/9/2018	GOEA	Occupied	Adult prone on nest; incubating/second adult nearby
12	Tree	16, 130N, 106W	582003.3	5103211.3	9.46	3/9/2018	UNK	Unoccupied	Two adult bald eagles perched in tree; nothing in nest
31	Tree	16, 131N, 103W	610772.5	5113487.4	Inside	3/9/2018	UNK	Occupied	Unoccupied during aerial surveys; 2 nestlings and an adult were observed at this nest site during June nest monitoring
32	Ground/ Hillside	21, 131N, 103W	611156.1	5112164.7	Inside	3/9/2018	UNK	Unoccupied	Unoccupied during June nest monitoring
52	Tree	30, 130N, 104W	597462.3	5101288.7	0.005	3/11/2018	UNK	Unoccupied	Unoccupied during June nest monitoring
53	Cliff	31, 133N, 100W	630932.0	5136289.5	9.45	3/21/2018	GOEA	Occupied	One adult at nest; second adult nearby
54	Tree	33, 134N, 101W	624972.1	5136756.5	7.34	3/21/2018	UNK	Unoccupied	
55	Cliff	23, 134N, 102W	619310.4	5139873.2	8.42	3/21/2017	UNK	Unoccupied	
56	Cliff	23, 134N, 102W	619283.0	5139892.7	8.43	3/21/2018	UNK	Unoccupied	
57	Tree	17, 134N, 102W	613967.8	5141325.6	9.37	3/21/2018	UNK	Unoccupied	Juvenile bald eagle perched in tree
58	Tree	13, 133N, 103W	601685.4	5131688.0	4.18	3/21/2018	UNK	Unoccupied	
ND01	Cliff	25, 133N, 105W	590823.4	5128537.6	9.19	3/21/2018	GOEA	Gone	
ND02	Cliff	4, 129N, 106W	581543.0	5098093.6	9.66	3/9/2018	GOEA	DNLO	
ND03	Cliff	8, 129N, 105W	590251.4	5095867.4	4.15	3/9/2018	GOEA	DNLO	Snow covered
ND04	Cliff	8, 129N, 105W	590302.3	5095852.8	4.12	3/9/2018	GOEA	DNLO	Snow covered

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X NAD 83, Zone 13N†	UTM Y NAD 83, Zone 13N†	Distance (miles) to Project Boundary	Survey Date	Species‡	Nest Status§	Comment
SD01	Cliff	20, 22N, 5E	614719.0	5079465.6	9.67	3/9/2018	GOEA	DNLO	–
SD02	Cliff	20, 22N, 5E	613874.5	5078516.5	9.98	3/9/2018	GOEA	Unoccupied	–
SD03	Cliff	9, 22N, 5E	615657.8	5081710.2	8.76	3/9/3018	GOEA	DNLO	–
SD04	Cliff	13, 22N, 5E	611574.4	5080085.8	8.58	3/9/2018	GOEA	Unoccupied	–
SD05	Cliff	27, 23N, 5E	617046.7	5086661.4	7.15	3/9/2018	GOEA	Unoccupied	–
SD06	Cliff	7, 22N, 4E	603012.7	5082035.8	5.50	3/9/2018	GOEA	Occupied	Two adults on nest
US01	Tree	24, 131N, 106W	586216.0	5111210.3	8.40	3/9/2018	GOEA	Gone	Broken branches and debris on ground at nest location
US02	Cliff	3, 130N, 106W	583943.5	5107491.7	8.82	3/9/2018	GOEA	DNLO	–
US03	Cliff	6, 130N, 105W	587744.5	5106787.3	6.47	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US04	Cliff	7, 130N, 105W	587981.2	5105888.8	6.12	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US05	Tree	16, 129N, 106W	582397.1	5093576.0	8.94	3/9/2018	GOEA	Gone	Broken branches and debris on ground at nest location
US06	Cliff	27, 129N, 106W	583597.2	5091514.5	8.16	3/9/2018	GOEA	DNLO	–
US07	Cliff	28, 129N, 106W	581594.9	5090496.6	9.45	3/9/2018	GOEA	DNLO	Recent erosion; rest of ridge snow covered
US08	Cliff	20, 129N, 105W	590337.7	5092434.8	3.97	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US09	Cliff	2, 129N, 105W	595590.0	5097203.9	1.12	3/9/2018	GOEA	DNLO	–
US10	Cliff	35, 130N, 105W	594580.6	5099597.9	2.04	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US11	Cliff	33, 130N, 105W	592016.9	5099423.3	3.58	3/9/2018	GOEA	Unoccupied	–
US12	Cliff	33, 130N, 105W	591739.8	5099443.9	3.74	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US13	Cliff	33, 130N, 105W	591609.2	5099464.1	3.82	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US14	Cliff	24, 130N, 105W	596672.8	5102979.0	0.45	3/11/2018	GOEA	DNLO	Snow covered
US15	Cliff	13, 130N, 105W	596878.2	5103266.5	0.42	3/11/2018	GOEA	DNLO	Snow covered
US16	Tree	12, 133N, 103W	601821.3	5133984.0	5.38	3/21/2018	GOEA	Unoccupied	–
US17	Tree	35, 132N, 106W	585661.4	5118467.1	9.50	3/9/2018	GOEA	DNLO	Not a second nest in this area
US18	Tree	35, 132N, 106W	585746.1	5118453.4	9.45	3/9/2018	GOEA	Unoccupied	–

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance (miles) to Project Boundary	Survey Date	Species‡	Nest Status§	Comment
			NAD 83, Zone 13N†						
US19	Cliff	11, 131N, 106W	585297.0	5115154.8	9.22	3/9/2018	GOEA	Occupied	Two adults in area; one flushes to nest
US20	Cliff	11, 131N, 106W	585278.5	5115108.8	9.23	3/9/2018	GOEA	Unoccupied	–

* Nest labels were generated based on agency datasets (ND = North Dakota Game and Fish; SD = South Dakota Game, Fish, and Parks; US = USFWS) and nest labels without preceding abbreviations were new nests documented during the March 2018 aerial survey.

† UTM locations were obtained during the aerial survey and corrected where possible using aerial photographs. These locations are approximations and should be ground-truthed to verify actual UTM location.

‡ GOEA = golden eagle; UNK = unknown eagle species.

§ Occupied = presence of adult prone on the nest or perched on the nest; Unoccupied = lack of incubating adult or eggs in the nest; Gone = agency notations that the nest was destroyed in a previous year or the nest was not at the location due to a lack of suitable substrate; DNLO = did not locate due to an inability to view the nest from the air.

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APPENDIX B

Eagle Nest Photographs

Figure B-1a. Nest 11, occupied golden eagle nest.

Figure B-1b. Nest 11, occupied golden eagle nest.

Figure B-2a. Nest 12, unoccupied eagle nest.

Figure B-2b. Nest 12, unoccupied eagle nest.

Figure B-3a. Nest SD06, occupied golden eagle nest.

Figure B-3b. Nest SD06, occupied golden eagle nest.

Figure 4. Nest US18, unoccupied eagle nest.

Figure 5. Nest US19, occupied golden eagle nest.

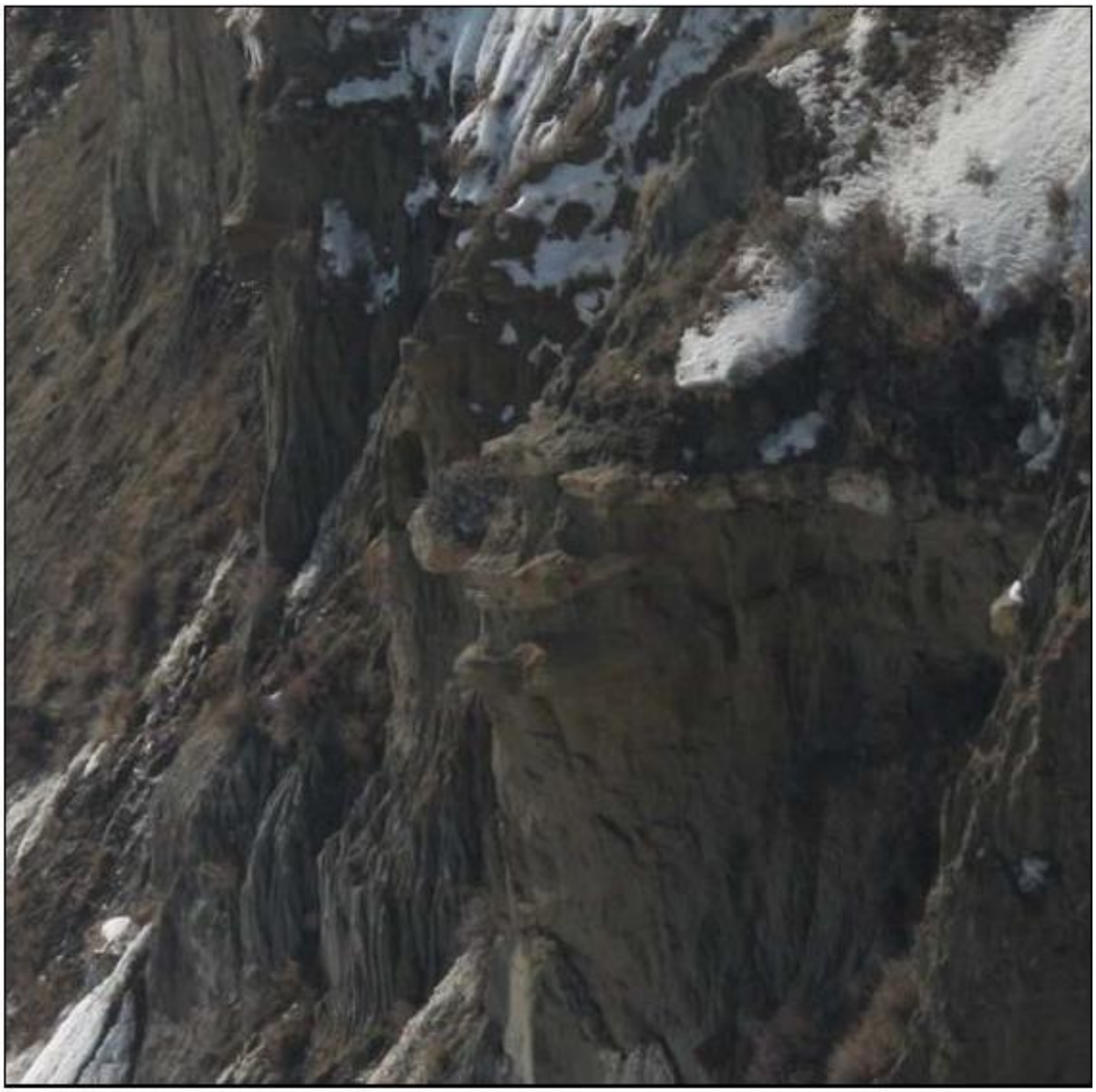

Figure 6. Nest US20, unoccupied eagle nest.

GROUSE LEK SURVEY REPORT

BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

CONFIDENTIAL BUSINESS INFORMATION

JULY 2018

PREPARED BY

SWCA Environmental Consultants

GROUSE LEK SURVEY REPORT

BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

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July 2018

Confidential Business Information

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Figure 1. Grouse lek survey results for the proposed Bowman Wind Project. 3

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INTRODUCTION

SWCA Environmental Consultants, LLC (SWCA) completed ground surveys of known prairie grouse leks located within the proposed Bowman Wind Project (Project) area and 1.0-mile survey buffer in Bowman County, North Dakota. All known greater sage-grouse (*Centrocercus urophasianus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) lek locations within the Project area and 1.0-mile survey buffer were evaluated from the ground on two mornings during the lekking period. Leks were surveyed in accordance with North Dakota Game and Fish Census (NDGFD) Procedure: Count Techniques (personal communication, grouse census protocol provided to SWCA via email from the NDGFD, September 26, 2016). The purpose of the surveys was to document lek activity and the number of individuals attending each active lek in accordance with NDGFD recommendations.

METHODS

Prior to conducting the lek surveys, SWCA staff reviewed NDGFD lek data (personal communication, S. Johnson, June 1, 2017) for the Project area and 1.0-mile survey buffer. SWCA avian biologists checked the six greater sage-grouse and three sharp-tailed grouse leks documented within 1.0-mile of the Project area in the NDGFD lek dataset on April 11 and then again on April 23 and 24, 2018. Each lek was surveyed twice, separated by a minimum of 11 days. Surveys began half an hour before sunrise and ended no later than 2 hours after sunrise, per NDGFD survey protocol. SWCA biologists recorded any visual or auditory detections of grouse near the known leks. Lek surveys were conducted from public roads only, and observation points were selected that provided the best viewing of the general lek site area. Data recorded for each lek location included number of males and females if a visual observation was made. If a lek site or activity could not be seen from the observation location, SWCA biologists relied on auditory detection as outlined in NDGFD protocols.

RESULTS

Weather conditions for the first survey were light winds (less than 8 miles per hour [mph]), no precipitation, variable snow cover (between 15% and 60%), mostly cloudy (80%), and temperatures in the low 30s degrees Fahrenheit. Weather conditions for the second survey were light winds (less than 10 mph), no precipitation, variable snow cover (10% on April 23 and 90% on April 24), mostly cloudy (70%–80%), and temperatures between 30 and 40 degrees Fahrenheit.

Of the nine known lek locations evaluated, no grouse lekking activity was noted at six leks (five greater sage-grouse and one sharp-tailed grouse). Grouse lekking activity was recorded at one greater sage-grouse and two sharp-tailed grouse leks during the 2018 ground surveys (see Figure 1).

One displaying male and two female greater sage-grouse were seen in the proximity of lek 25085 on April 11. Drumming sharp-tailed grouse males were heard in the vicinity of lek 23640 on April 11, and drumming sharp-tailed grouse males were heard near lek 25129 on April 23. The number of sharp-tailed grouse at these lek locations could not be determined given the lack of visual observation; however, based on SWCA biologists' experience, both leks were considered to have low numbers of booming males (i.e., two to five). Data recorded at each lek site are provided in Table 1.

Table 1. Lek Survey Results for the Proposed Bowman Wind Project

Lek ID	Species	Date/Time	Male	Female	Unknown	Detection Type	Distance lek area was observed from
Confidential Business Information				2			
23640	Sharp-tailed grouse	4/11/2018 7:13	5	0	0	Auditory; approximate count	0.27 mile
		4/23/2018 6:42	0	0	0		0.27 mile
23681	Greater sage-grouse	4/11/2018 5:44	0	0	0		0.70 mile
		4/24/2018 6:20	0	0	0		0.70 mile
25067	Greater sage-grouse	4/11/2018 6:12	0	0	0		0.26 mile
		4/24/2018 5:57	0	0	0		0.26 mile
25085	Greater sage-grouse	4/11/2018 6:57	1	2	0	Visual	0.11 mile
		4/23/2018 6:19	0	0	0		0.11 mile
25086	Greater sage-grouse	4/11/2018 7:16	0	0	0		0.12 mile
		4/23/2018 5:48	0	0	0		0.12 mile
25087	Greater sage-grouse	4/11/2018 6:50	0	0	0		0.35 mile
		4/23/2018 5:24	0	0	0		0.32 mile
25129	Sharp-tailed grouse	4/11/2018 6:57	0	0	0		0.32 mile
		4/23/2018 6:30	2	0	0	Auditory; approximate count	0.32 mile
25152	Sharp-tailed grouse	4/11/2018 7:01	0	0	0		0.46 mile
		4/24/2018 5:23	0	0	0		0.46 mile
25530	Greater sage-grouse	4/11/2018 5:44	0	0	0		0.70 mile
		4/24/2018 6:20	0	0	0		0.70 mile

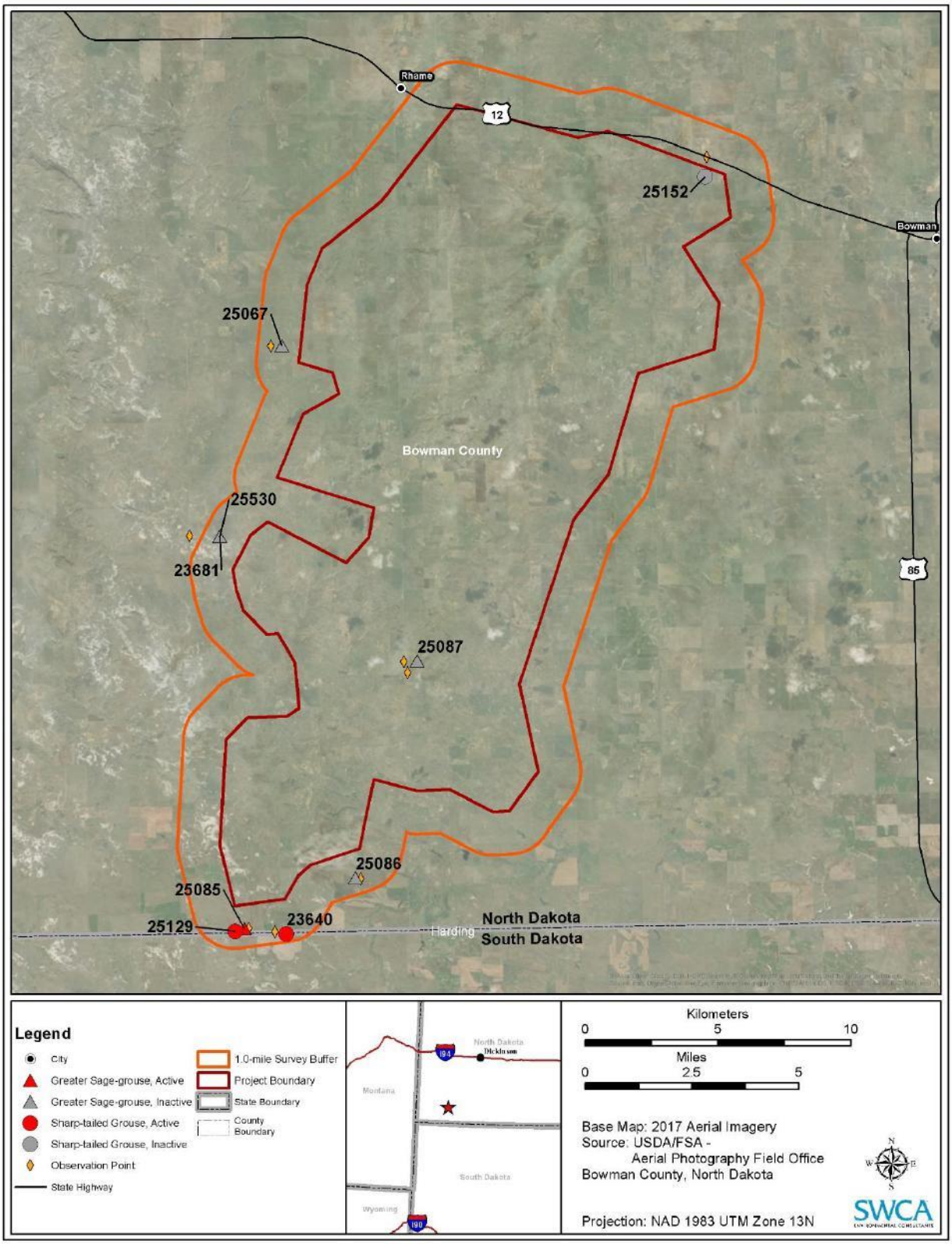

Figure 1. Grouse lek survey results for the proposed Bowman Wind Project.

CONCLUSIONS

Activity was recorded at one greater-sage grouse and two sharp-tailed grouse leks in spring 2018. All three leks were located south of the Project area within the 1.0-mile survey buffer. No grouse lek activity was documented at known lek sites within the Project area.*Confidential Business Information 4*

PRAIRIE DOG COLONY SURVEY REPORT

BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

CONFIDENTIAL BUSINESS INFORMATION

AUGUST 2018

PREPARED BY

SWCA Environmental Consultants

PRAIRIE DOG COLONY SURVEY REPORT

BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

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Figure 1. 2018 Prairie Dog Colony Survey Results for the Proposed Bowman Wind Project. 2

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INTRODUCTION

SWCA Environmental Consultants, LLC (SWCA) completed a ground survey for black-tailed prairie dog (*Cynomys ludovicianus*) colonies within accessible portions of the proposed Bowman Wind Project (Project) area in Bowman County, North Dakota. The purpose of the survey was to identify and map prairie dog colonies to inform siting of Project facilities. The Project area includes approximately 77,210 acres, and this report addresses the original Project area as provided to SWCA on July 4, 2017.

METHODS

On June 19 and 21, 2018, SWCA biologists conducted a road-based search using available roads and two-tracks within accessible parcels of the Project area. Areas were visually inspected to locate prairie dogs where present.

Because private land access was limited, SWCA biologist attempted to evaluate the areas with binoculars and spotting scopes (where possible). In general, topography dependent, an additional 500 meters were scanned from public roadways to locate sign of prairie dog colonies (mounds, devoid vegetation, prairie dogs). These additional areas were unable to be field verified at the time of survey.

Boundaries of prairie dog colonies were mapped using a handheld global positioning system by walking around the outer-most burrows of the colony. For the colony located on inaccessible lands, the boundary was estimated using aerial photos, topographic maps and ground features. Data recorded at each colony included activity status (i.e., active or inactive) depending on presence of prairie dogs, scat or evidence of recent use.

RESULTS

Three active colonies and no inactive colonies were located during the survey (Figure 1). Colony A was approximately 27.7 acres and located in the northern most portion of the Project area. Colony B was approximately 3.7 acres and was located the central portion of the Project area. Colony C was approximately 112.5 acres and located the southern portion of the Project area where ground access was not permitted. This colony was visible from a public roadway and the boundary was estimated (Figure 1). If the project moves forward, additional surveys are recommended.

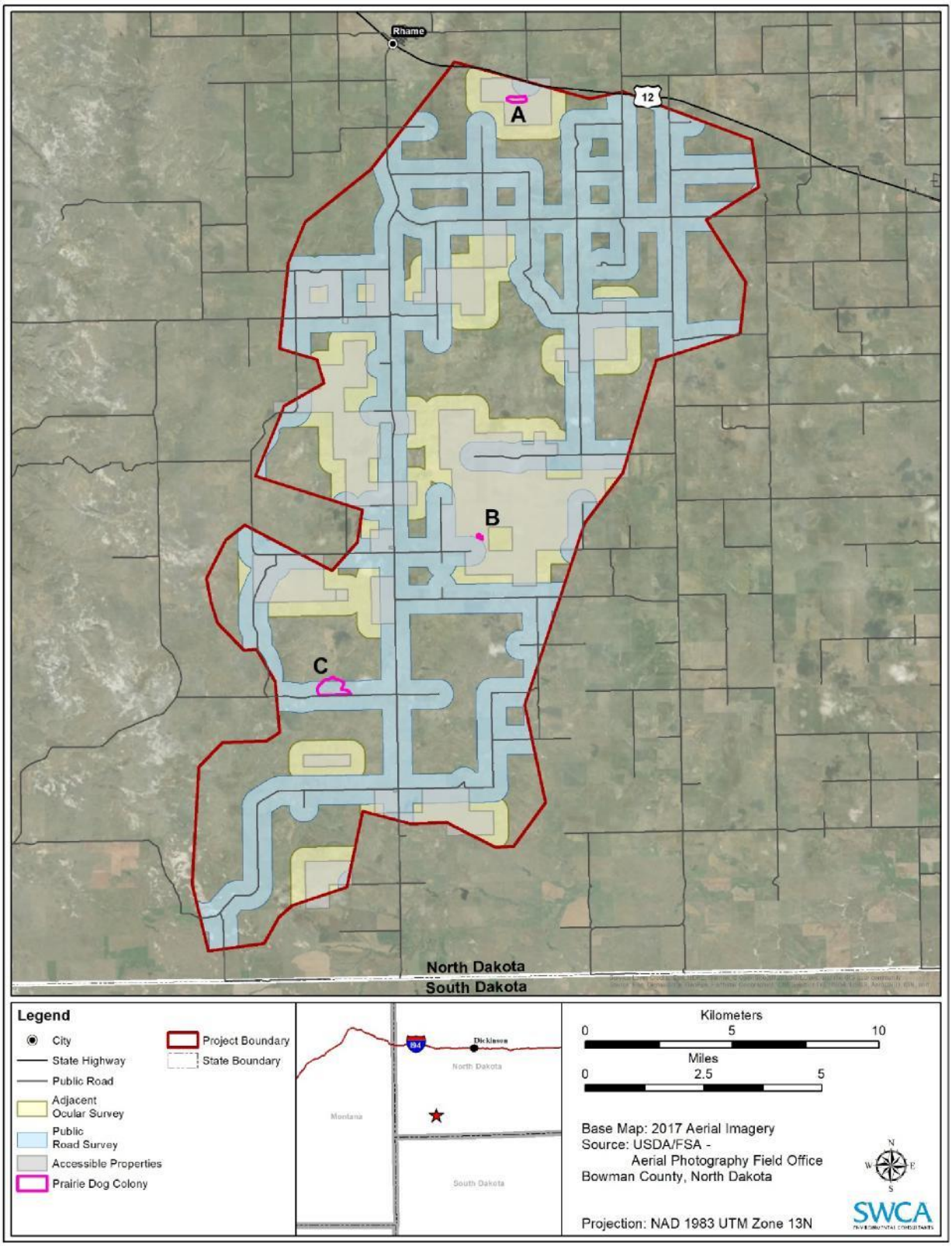

Figure 1. 2018 Prairie Dog Colony Survey Results for the Proposed Bowman Wind Project.

Eagle Environmental, Inc.

Expertise in Natural Resource Science

PRAIRIE DOG COLONY MAPPING REPORT
BOWMAN WIND, LLC
BOWMAN COUNTY, NORTH DAKOTA

Confidential Business Information

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October 21, 2019

Introduction

Bowman Wind, LLC is evaluating the potential for wind energy development within the Bowman Wind Project (Project) in Bowman County, ND (Figure 1). In March 2019, Eagle Environmental, Inc. (EEI) opportunistically documented evidence of black-tailed prairie dog (*Cynomys ludovicianus*) towns during the aerial raptor nest survey. The survey was completed in conjunction with the aerial raptor nest surveys. The specific objective of the prairie dog survey was to identify their colonies as potential raptor, including eagles, prey sources within the Project area in accordance with previous North Dakota Game and Fish Department (NDGFD) and U.S. Fish and Wildlife Service (USFWS) agency consultation recommendations. The black-tailed prairie dog is not federally (UFWS 2019) or state-listed (NDGFD 2019) as threatened or endangered.

Survey Area Habitat

The Project area includes 212,446 acres, and the Project area and 1-mile buffer (Survey Area) totals 308,947 acres. Most of the Project area is managed as grazing lands for domesticated livestock, though it also included many agricultural fields. Pastures and fields were deemed possible sites for prairie dog towns.

Methods

EEI biologists Dale Stahlecker and Megan Ruehmann conducted an aerial survey on March 27, 2019, in a Roberts R-44 helicopter between the hours of 0800 to 1200. The sky was clear, and winds were light to moderate throughout the survey. The aerial survey was conducted by flying 0.75 to 1 mile wide transects (i.e., 0.5-mile viewed from either side of the helicopter) at an altitude of approximately 300 feet above ground level, depending on terrain and flight safety conditions. The Project area boundary was pre-established in ArcGIS software and loaded into the aircraft's global positioning system (GPS) unit for guidance during the survey. The pilot maintained proper distance between transects with his on-board GPS system; thus, pre-determined transects were not needed. Waypoints were taken when a series of mounds and holes typical of this species were observed. The objective of the survey was to locate prairie dog colonies. Therefore, colony boundaries were not mapped or demarcated during the aerial survey.

Results

Six black-tailed prairie-dog colony locations were documented within the Survey Area during the survey (Figure 1). Four of the colonies were observed within the Project area and two colonies were observed in the 1.0-mile buffer. Snow cover within some fields and pastures was moderate (~25%), which may have resulted in prairie dog colonies being missed. No active prairie dogs were observed above ground at the six colony locations. Of note, the black-tailed prairie dog does not hibernate like some of its congeners (Hoogland 1995).

Conclusions

Evidence of black-tailed prairie dog colonies was observed at six locations during the Survey Area. Prairie dogs may be a potential prey source for eagles, as this species occurs in concentrated densities and is easily visible to aerial predators. While

unoccupied dog towns will not attract raptors, they could become occupied again. Any active or inactive colony location should be used to inform Project siting of wind turbines and the transmission line.

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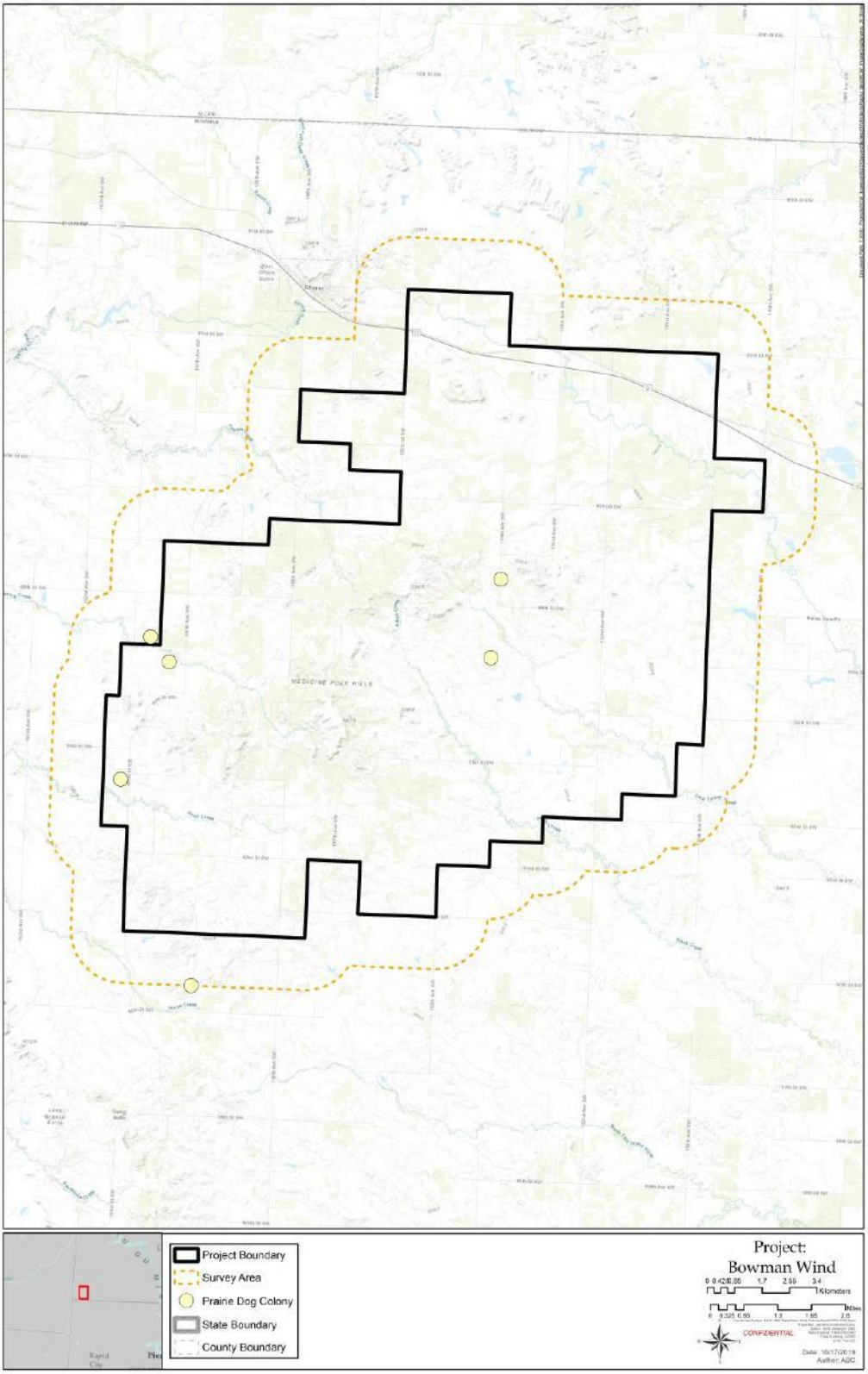

Figure 1. Locations of the proposed Bowman Wind Project and black-tailed prairie dog mounds/holes mapped during aerial surveys, Bowman County, North Dakota.

BOWMAN WIND PROJECT GRASSLAND ASSESSMENT REPORT, BOWMAN COUNTY, NORTH DAKOTA

AUGUST 2018

Confidential Business Information

PREPARED BY

SWCA Environmental Consultants

BOWMAN WIND PROJECT DESKTOP GRASSLAND ASSESSMENT REPORT, BOWMAN COUNTY, NORTH DAKOTA

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August 2018

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INTRODUCTION

SWCA Environmental Consultants (SWCA) completed a desktop assessment of grasslands within the proposed Bowman Wind Project (Project), located in Bowman County, North Dakota. The purpose of the assessment was to identify 'unbroken' grassland habitats greater than 160 acres in size within the area proposed for development (assessment area), as recommended by North Dakota Game and Fish Department (NDGFD) in a coordination meeting between the Project proponent and the NDGFD held on January 30, 2018.

BACKGROUND

For this assessment, unbroken grasslands include intact grassland areas that have either never been tilled/broken or that may have been tilled in the late nineteenth and early twentieth century where the plow did not cut deep enough to destroy the soil profile and/or change the landscape topography and grassland potential. NDGFD recommends avoiding or minimizing impacts to these areas due to their unique conservation value. The primary area of concern is intact grassland tracts of 160 acres or greater (personal communication, confidential client to SWCA on February 1, 2018).

The North Dakota State Wildlife Action Plan (SWAP) (Dyke et al 2015) identified nine primary Landscape Components and 21 Focus Areas. The nine Landscape Components encompass the major habitat types of North Dakota. In some cases, the SWAP identified Focus Areas within a particular Landscape Component. Focus Areas are highly variable in size and often represent an area of native vegetation or natural community type rare to North Dakota. The assessment area primarily lies within the western mixed-grass/short-grass prairie (Missouri Slope) Landscape Component. In addition to the Missouri Slope, the following three Landscape Components are present in the assessment area: 1) Planted or Tame Grassland; 2) Wetlands and Lakes; and 3) Rivers, Streams, and Riparian. Focus Areas located in the assessment area include the Sagebrush Shrub-Steppe and the Conservation Reserve Program (CRP).

Unbroken grassland in the assessment area is primarily located in the Missouri Slope Landscape Component, however these unbroken areas can also encompass areas of the Wetlands and Lakes and Rivers, Streams, and Riparian Landscape Components. The Sagebrush Shrub-Steppe Focus Area is found within the Missouri Slope Landscape Component and is generally dominated by unbroken grassland areas.

The Missouri Slope Landscape Component is located in the semiarid, unglaciated region of North Dakota which includes level to rolling plains topography with isolated sandstone buttes. Natural wetland basins are minimal, but small creeks and streams are abundant. Land-use is predominantly dryland farming and livestock grazing. A considerable amount of native vegetation remains in the Missouri Slope Landscape Component (Dyke et al. 2015). Grassland areas in the assessment area include mixed-grass prairie and short-grass prairie.

Mixed-grass prairie is a combination of tallgrass species found in eastern North Dakota and short-grass species found farther west. It is dominated by warm and cool season grasses as well as sedges (*Carex* spp.). Common grass species include prairie junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), needle-and-thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), little bluestem (*Schizachyrium scoparium*), and needleleaf sedge (*Carex duriuscula*). Other associated grasses include Canada wild-rye (*Elymus canadensis*), spike oats (*Danthonia* spp.), mat muhly (*Muhlenbergia richardsonis*), spikemoss (*Selaginella* spp.), plains reedgrass

(*Calamagrostis montanensis*), and buffalograss (*Bouteloua dactyloides*). Mixed-grass prairie is also known for a rich variety of forbs such as pasque flower (*Pulsatilla* sp.), western wallflower (*Erysimum asperum*), prairie smoke (*Geum triflorum*), Missouri milkvetch (*Astragalus missouriensis*), Indian breadroot (*Psoralea esculenta*), purple prairie clover (*Dalea purpurea*), gaura (*Gaura* spp.), harebell (*Campanula* spp.), blazing star (*Mentzelia* spp.), ball cactus (*Escobaria* spp.), purple coneflower (*Echinacea angustifolia*), yarrow (*Achillea millefolium*), and several species of goldenrods (*Solidago* spp.). Most of North Dakota is dominated by mixed-grass prairie (Dyke et al. 2015).

The short-grass prairie is found mostly in the elevated portions of the Missouri Slope Landscape Component of North Dakota; this grassland habitat is dominated by warm season species that can survive on little rainfall. Grass species mature at 6 to 12 inches in height and include spikemoss, blue grama, needleleaf sedge, threadleaf sedge (*Carex filifolia*), buffalograss, and needle-and-thread. Forbs include sandlily (*Leucrocrinum montanum*), white wild onion (*Allium textile*), death camas (*Zigadenus* sp.), buffalo-bean (*Thermopsis rhombifolia*), purple loco (*Oxytropis lambertii*), silverleaf scurfpea (*Pediomelum argophyllum*), prickly pear (*Opuntia* sp.), phlox (*Phlox* spp.), beardtongue (*Penstemon* spp.), and fringed sage (*Artemisia frigida*) (Dyke et al. 2015).

The Sagebrush Shrub-Steppe Focus Area, within the Missouri Slope Landscape Component, is comprised of eroded buttes, scoria mounds, and salt pans that make this area similar to the badlands. This characteristic big sagebrush ecosystem has been altered by livestock grazing, conversion to cropland, and, in more recent years, oil development (Dyke et al. 2015).

The Wetlands and Lakes Landscape Component includes all wetlands and lakes distributed throughout the state. The Rivers, Streams, and Riparian Landscape Component includes all rivers, streams, and associated riparian areas distributed throughout the state.

METHODS

An SWCA grassland biologist, experienced in aerial imagery interpretation and familiar with Northern Great Plains ecology and remote sensing techniques, used aerial imagery and geospatial datasets to conduct a qualitative desktop assessment of the assessment area and identify the unbroken grassland areas. The assessment was completed within a geographic information system (GIS) database. The datasets were either publicly available (see references below) or provided by the Project proponent.

Listed below are the publicly available datasets used in the assessment.

- Color-infrared imagery (North Dakota Geographic Information System 2018)
- Current and historical aerial imagery (North Dakota Geographic Information System 2018)
- 2017 cropland data layer (National Agricultural Statistics Service 2018)
- 2010 National Gap Analysis Project (GAP) landcover (U.S. Geological Survey 2010)
- National Wetlands Inventory (U.S. Fish and Wildlife Service 2018)
- City and county roads (North Dakota Department of Transportation 2018)
- State and federal roads (North Dakota Department of Transportation 2017)

The following datasets were provided by the confidential client.

- Natural gas pipelines (Ventyx Energy LLC [Ventyx] 2012)
- Electric substations (Ventyx 2015a)

- Electric transmission lines (Ventyx 2015b)

The assessment focused on differentiating between two categorical areas: 1) broken, where the soil profile has been tilled or degraded; and 2) unbroken, areas where the soil profile is intact (including areas that may have received light tillage in the late nineteenth and early twentieth century where the plow did not cut deep enough to destroy the soil profile and/or change the landscape topography and grassland potential). Features in the broken category included cultivated areas, farmsteads and associated disturbed areas (i.e., road to homes, livestock facilities, outbuildings, etc.), county and state roads, pipeline scars, and oil and gas developments. Features in the unbroken category included all grassland areas with no identifiable history of plowing (including hayed areas that have no history of plowing), two-track roads that are primarily vegetated (including non-county section line roads), and undisturbed wetland, stream, and riparian areas.

After completing the assessment of grassland areas within the assessment area and identifying unbroken grassland polygons in the GIS database, the polygon layer was evaluated to identify those polygons that were 160 acres or greater.

RESULTS

Approximately 51,251 acres (50%) of the assessment area met the broken criteria, due to evidence of past cultivation or other disturbance (Attachment A).

Approximately 51,070 acres (50%) of the assessment area met the unbroken criteria. A total of 46,164 acres (90%) of the unbroken grassland areas were in parcels greater than 160 acres in size. These parcels consisted of 50 unbroken grassland polygons, ranging in size from 172.15 to 8,061.37 acres (Attachment B).

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APPENDIX A

Results Map

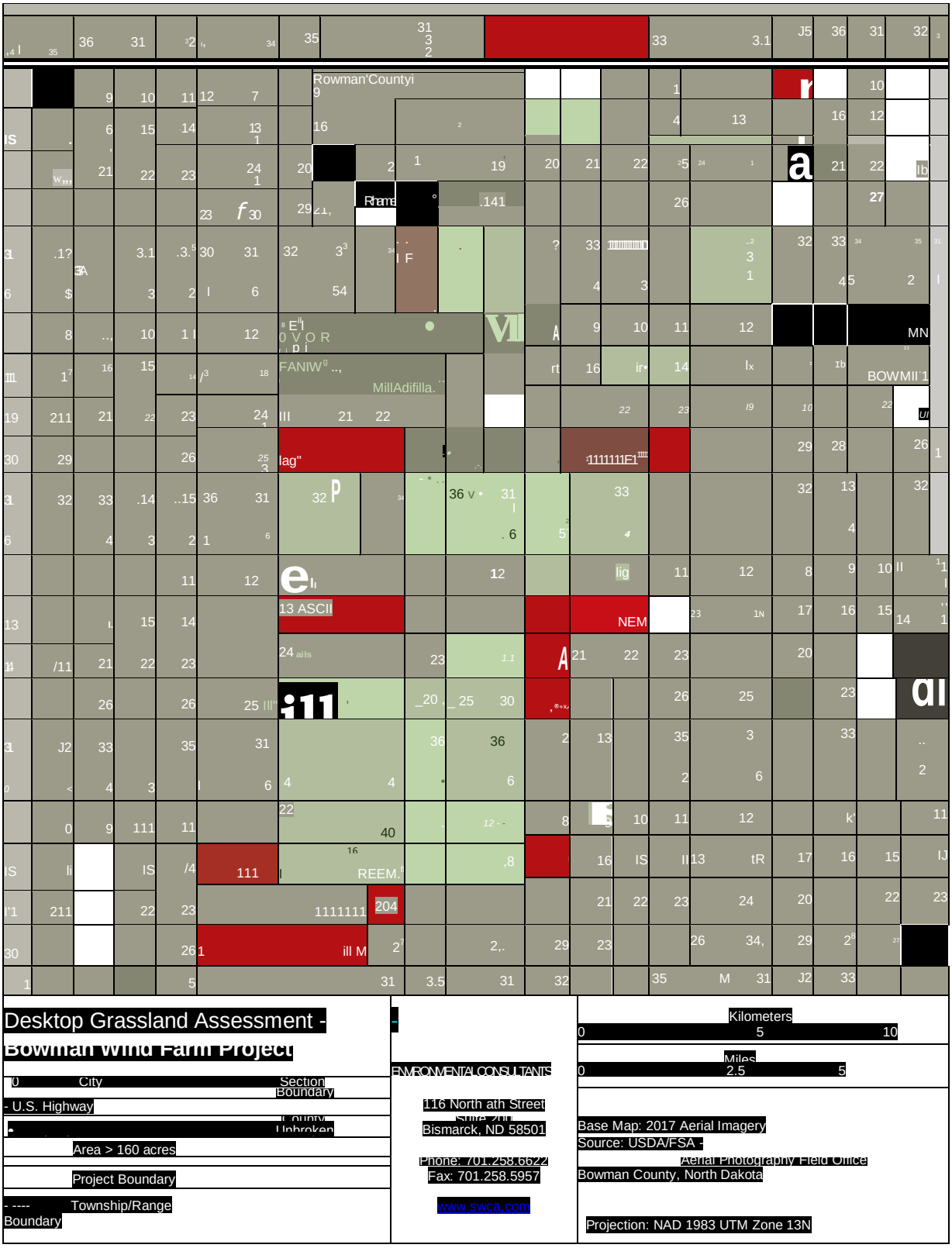

Figure 1. 2018 Desktop Grassland Assessment Results for the Proposed Bowman Wind Project in Bowman County, North Dakota.

APPENDIX B

Grassland Parcels Greater Than 160 Acres

Table 1. Grassland parcels greater than 160 acres in size identified during the 2018 grassland assessment for the proposed Bowman Wind Project in Bowman County, North Dakota.

Grassland Parcel ID	Acres	Location Township/Range(s)	Section(s)
1	178.05	T132N, R104W	12
2	847.46	T131N, R104W	1, 2, 35, 36
3	186.10	T131N, R104W	2
4	425.21	T131N, R103W	5, 6, 31, 32
5	356.46	T131N, R103W	3, 10
6	726.15	T131N, R102W	6, 7
		T131N, R103W	1 - 3, 12
		T131N, R103W	35, 36
7	203.35	T131N, R104W	11
8	339.51	T131N, R104W	3, 10, 11
9	220.90	T131N, R103W	13, 14, 23, 24
10	242.67	T131N, R103W	15, 16
11	617.32	T131N, R104W	9, 10, 15 - 17
12	214.91	T131N, R104W	14, 23, 24
13	278.72	T131N, R103W	16, 21
14	277.48	T131N, R103W	13, 23, 24
15	217.68	T131N, R103W	23, 26
16	664.30	T130N, R104W	3
		T131N, R104W	27, 28, 33, 34
17	8,061.37	T130N, R103W	3 – 7
		T130N, R104W	1, 2, 11, 12
		T131N, R103W	18 – 20, 27 - 34
		T131N, R104W	23 – 26, 35, 36
18	1,642.18	T130N, R104W	3 – 5, 8 - 10
19	797.77	T130N, R103W	7 – 9, 16, 17
20	252.01	T130N, R104W	14
21	385.00	T130N, R104W	10, 15
22	1,664.18	T130N, R103W	7, 17 - 20
		T130N, R104W	12, 13, 24
23	448.45	T130N, R104W	17 – 20
24	583.76	T130N, R104W	19, 20, 29 – 31, 34
		T130N, R105W	24
25	4,066.14	T129N, R104W	4, 5
		T130N, R104W	20 – 22, 27 – 29, 32 -34
26	1,920.63	T129N, R104W	3 – 5, 8 - 10
27	2,095.06	T129N, R103W	7, 8, 17 - 19
		T129N, R104W	12 – 14, 24

Grassland Parcel ID	Acres	Location Township/Range(s)	Section(s)
28	403.04	T129N, R104W	17, 20
29	1,917.90	T129N, R104W	5 – 8, 17 - 19
		T129N, R105W	12, 13
30	629.54	T129N, R104W	18, 19, 30
		T129N, R105W	13, 24
31	499.26	T129N, R104W	19, 30
		T129N, R105W	24, 24
32	2,362.65	T129N, R104W	15 – 17, 20 – 22, 28 – 32
33	172.15	T129N, R104W	30, 31
		T129N, R105W	25, 36
34	3,894.38	T129N, R103W	6
		T129N, R104W	1, 2, 11, 12
		T130N, R103W	30, 31
		T130N, R104W	25, 26, 35, 36
35	450.32	T131N, R104W	10, 11, 14 – 16, 21
36	252.20	T130N, R104W	23, 24
37	562.60	T132N, R103W	30, 31
		T132N, R104W	25, 36
38	499.62	T131N, R103W	4 - 9
39	230.61	T131N, R103W	5 -8
		T131N, R104W	12
40	374.00	T132N, R103W	11, 13, 14
41	260.74	T133N, R102W	31, 32
		T132N, R103W	2, 3, 9 – 11, 14, 36
42	961.60	T132N, R103W	14, 15, 22 – 24, 26, 27
43	600.25	T131N, R102W	6, 31
		T131N, R103W	1, 36
44	403.97	T132N, R103W	18, 19
		T132N, R104W	13, 24
45	567.28	T132N, R102W	18, 19
		T132N, R103W	13
46	334.22	T132N, R102W	19, 30
47	311.25	T132N, R103W	28 – 30, 32, 33
48	201.75	T132N, R103W	30, 31
		T132N, R104W	25
49	2,175.14	T132N, R103W	4, 5, 7 – 9, 16 – 18, 20, 21,
50	186.90	T132N, R102W	6, 7

Raptor Nest Check Surveys
Bowman Wind Project
Bowman County, North Dakota

Final Report

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September 5, 2019

REPORT REFERENCE

Chodachek, K. 2018. Raptor Nest Check Surveys, Bowman Wind Project, Bowman County, North Dakota. Final Report. Prepared for Bowman Wind, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 5, 2019.

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9.0 INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed a ground nest check survey to evaluate **three raptor nests** (nest IDs 31, 32, and 52**) located during the spring 2018 aerial raptor nest surveys conducted within the Bowman Wind Project (Project) in the southwest corner of Bowman (Figure 1).** The principal objectives of the raptor nest check surveys were to: 1) d**etermine whether the raptor nests exhibited the key characteristics of an eagle nest** and 2) provide background information that could be used to assess risk to eagles and raptors from operation of the proposed Project.

10.0 STUDY AREA

The proposed Project is located in the Missouri Plateau and Sagebrush Steppe Level IV Ecoregions within the Northwestern Great Plains Level III Ecoregion (US Environmental Protection Agency 2018). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns which now support a mosaic of spring wheat, alfalfa, and grazing lands. The Sagebrush Steppe ecoregion is characterized by minimal rainfall, erode buttes, scoria mounds, sparse human inhabitants, and minimal cultivation. According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project area is herbaceous, which covers 54.7% of the total area (120,772 acres [ac]; Table 1, Figure 2). Cultivated crops is the second most common land cover type and covers 29.5% (65,184 ac) of the Project area. Only a small portion of the Project area consists of land cover types that provide potentially suitable foraging and roosting habitat for NLEB, including woody wetlands (0.3%), evergreen forest (<0.1%; 81 ac), deciduous forest cover (<0.1%; 78 ac), and mixed forest (<0.1%; 12 ac; Table 1; Figure 2).

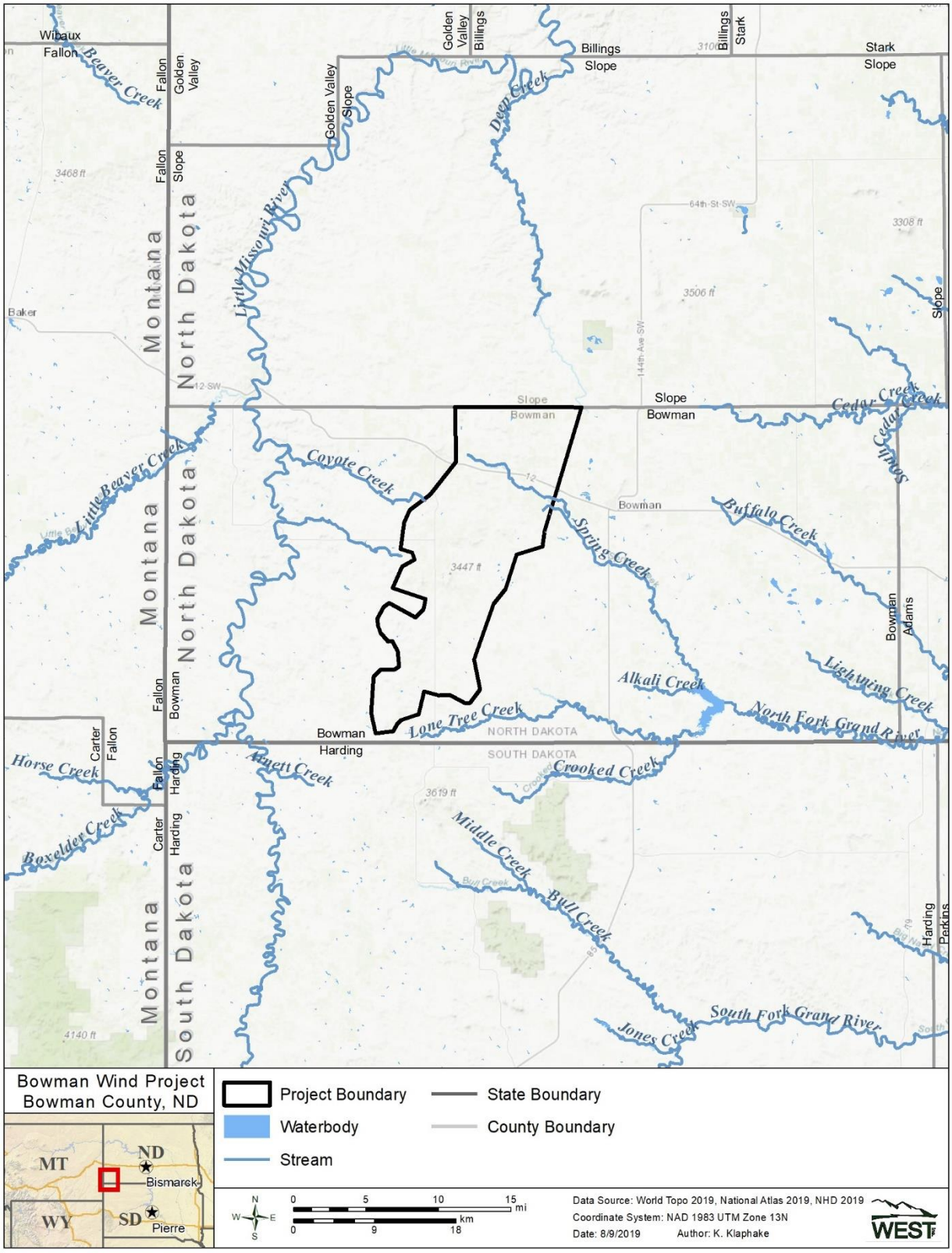

Figure 1. Location of the proposed Bowman Wind Project in Bowman County, North Dakota.

Table 1. Land Cover types, acreage, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota.

Land Cover/Land Use Type	Acres	% Composition
Herbaceous	120,772	54.7
Cultivated Crops	65,184	29.5
Shrub/Scrub	16,128	7.3
Hay/Pasture	9,418	4.3
Developed, Open Space	6,229	2.8
Open Water	919	0.4
Developed, Low Intensity	828	0.4
Woody Wetlands	**754**	**0.3**
Emergent Herbaceous Wetlands	377	0.2
Evergreen Forest	**81**	**<0.1**
Deciduous Forest	**78**	**<0.1**
Barren Land	57	<0.1
Developed, Medium Intensity	17	<0.1
Mixed Forest	**12**	**<0.1**
Developed, High Intensity	<1	<0.1
Total	**220,854**	**100**

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019.

Sums may not total values shown due to rounding.

Land use in bold signifies habitats that could be potentially used by NLEB.

11.0 METHODS

On October 15, 2018, one experienced WEST biologist conducted a follow-up ground nest check survey to determine if three nests (nest ID 31, 32, and 52; Figure 2) identified during the spring 2018 raptor nest survey (SWCA 2018) were consistent with an eagle nest. Due to no access, nest 52 was not evaluated. The biologist walked to each nest to review substrate, nest type, nest condition, and nest location to determine if the nest was consistent with an eagle nest (Buehler 2000, Pagel et al. 2010).

The substrate in which a nest was observed was recorded to further aid in determining raptor species.

Nest type describes the size and material used for nesting. General nest types include:

- Small Stick – roughly eight to 10 inches (20 to 25 centimeters [cm]) in diameter, bowl-shaped, comprised of small sticks, grasses, mud and other material, and typical of nests used by accipiter species.
- Medium Stick - typically 10 to 20 inches (25 to 51 cm) in diameter, bowl-shaped, comprised of larger sticks, and typical of nests used by buteo species.
- Large Stick/Extra Large – typically greater than 20 inches in diameter, large bowl or flat platform-shaped, comprised of intertwined large to extra-large sticks from trees, or other scrub species (i.e., big sagebrush), and typical of nests used by eagles or osprey (*Pandion haliaetus*).

Nest condition was subjectively categorized using descriptions ranging from poor to excellent. Nests in poor to fair condition appear in disrepair, sloughing, or sagging heavily, and would require some level of effort to rebuild in order to be suitable for successful nesting. Nests in good to excellent condition are those that appear to have been well maintained, have a well-defined bowl shape, are not sagging or sloughing, and appear to be suitable for nesting. Due to the timing of the nest check, the status of the nest was not evaluated.

The location of each nest was confirmed using a hand-held Global Positioning System unit; coordinates were set at Universal Transverse Mercator (UTMs) North American Datum (NAD) 83 unit.

12.0 RESULTS

Nest 31
Nest 31 is located in the center of the Project area in a wind row adjacent to an active farmstead (Figure 2). The nest was in good condition and no raptors were present at the time of the nest check (Table 2). Based on the size, shape, stick size, and tree size, this nest is not consistent with an eagle nest (Appendix A).

Nest 32
Nest 32 is located in the center of the Project area within a rocky outcrop south of an active farmstead (Figure 2). Upon closer inspection there is no nest present at the current location or on any nearby rocky outcrops (Table 2). The current location has some woody vegetation present and lots of white wash present on an adjacent rock (Appendix A). When walking up to the nest, an adult golden eagle was perched on the rock and flew off to the grasslands to the west of the rocky outcrop. It is likely with the grasslands below that this is a commonly used perching point.

Nest 52
Nest 52 is located in the southwestern portion of the Project area in a wind row adjacent to an active farmstead (Figure 2). Site access was not granted to the check Nest 52.

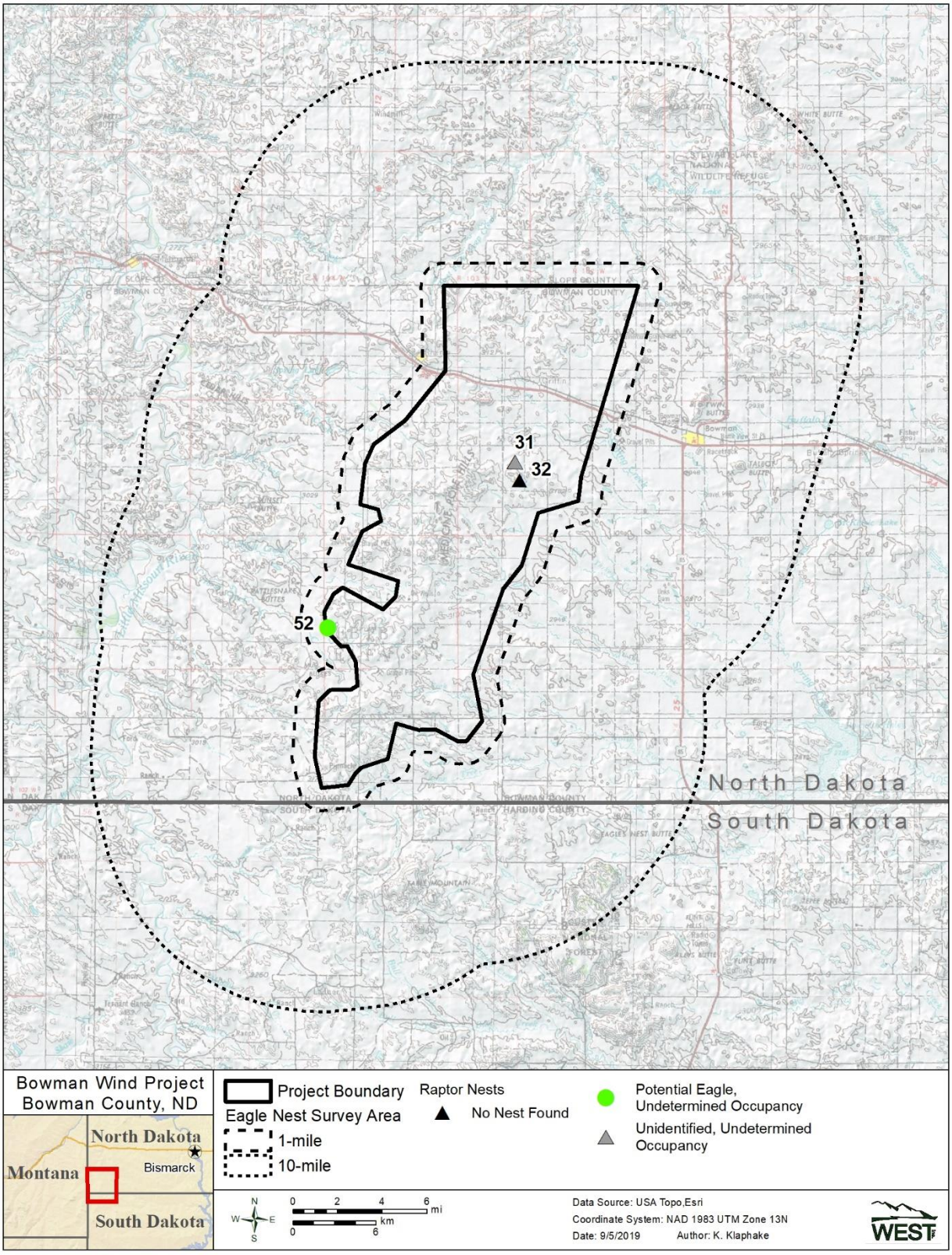

Figure 2. Raptor nest check results conducted October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota.

Table 2. Raptor nest checks conducted October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota.

ID	Species	Easting	Northing	Status at Time of Survey	Condition	Substrate	Consistent With an Eagle Nest	Comments
31	Undetermined	610772	5113487	Unoccupied - Inactive	Good	Medium sized Deciduous Tree	No	Nest is a medium to large and is built with smaller branches and is located mid-canopy in the tree
32	---	611156	5112164	---	---	Rocky Outcrop	---	Nest does not exist; no nest present at current location or in the vicinity, matted down vegetation
51*	Undetermined	597462	5101289	Undetermined	Undetermined	Deciduous Tree	Undetermined	

* - Site access not granted, nest check was not conducted

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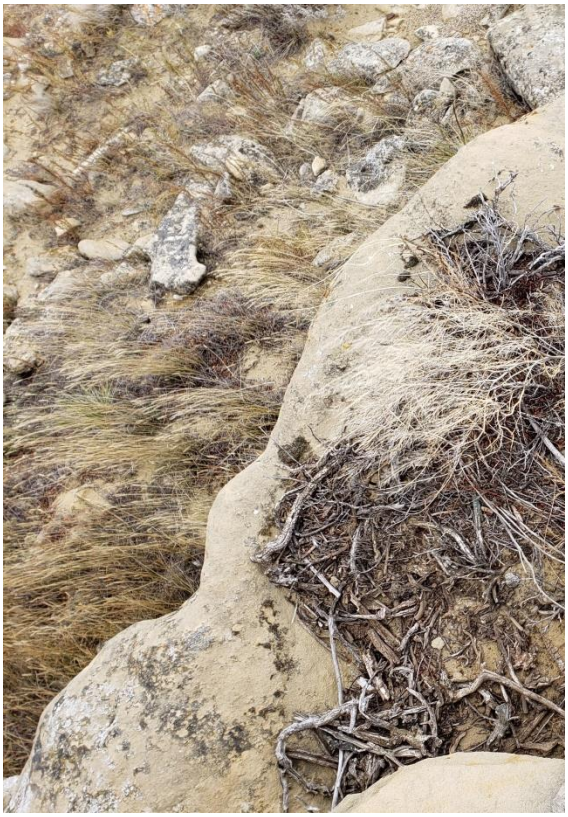
Appendix A. Images of Raptor Nests Checked on October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota

Appendix A. Nest 31 located within the Bowman Wind Project, Bowman County, North Dakota.



Appendix A. Nest 32 located within the Bowman Wind Project, Bowman County, North Dakota.

Eagle Environmental, Inc.

Expertise in Natural Resource Science

2019 RAPTOR NEST REPORT
BOWMAN WIND, LLC
BOWMAN COUNTY, NORTH DAKOTA

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October 21, 2019

Introduction

Eagle Environmental, Inc. (EEI) completed raptor nest surveys for the proposed Bowman Wind, LLC Project (Project) in March 2019. The Project is located approximately five miles west of the town of Bowman, Bowman County, North Dakota (Figure 1). The purpose of the surveys was to identify bald eagle (*Haliaeetos leucocephalus*) and golden eagle (*Aquila chrysaetos*) nests in or within 10 miles of the Project, and all raptor nests in or within one mile of the Project (Figure 2). The survey was completed in accordance with North Dakota Game and Fish Department (NDGFD) and U.S. Fish and Wildlife Service (USFWS) agency consultation and recommendations in the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012) and *Eagle Conservation Plan Guidance* (USFWS 2013). No federally listed raptors are known to nest in North Dakota, and North Dakota has no state-endangered species list (North Dakota Game and Fish 2019).

Survey Area Habitat

The survey area contained grazing lands for domesticated livestock along with agricultural fields. Suitable nesting habitat, including cliffs attractive to golden eagles, occurs primarily west of the Project area. Drainages were mostly intermittent and larger trees (i.e., eastern cottonwoods [*Populus deltoides*]) were found along drainages, including the Little Missouri River, approximately 7.5-10 miles from Project area on the western side of the survey area. Planted tree shelterbelts also occur in some agricultural fields and may provide potential nesting habitat for raptors. The Project area did not contain any suitable cliffs that would likely attract nesting golden eagles. However, ridges or bluffs associated with the Little Missouri River cliffs occur approximately 8-10 miles north and west of the Project area. The Project area contained some large hills, which may provide suitable sites for ground nesting ferruginous hawks (*Buteo regalis*) and possibly golden eagles. Pastures and fields were possible sites for black-tailed prairie dog colonies, which may attract eagles as a potential prey source.

Methods

EEI biologists Dale Stahlecker and Megan Ruehmann conducted an aerial survey on March 26 and 27, 2019, in a Roberts R-44 helicopter between the hours of 1730 and 1830 on March 26, and 0800 to 1500 on March 27, 2019. Surveys were completed during daylight hours with weather conditions were favorable for flying and locating nests during both survey days. Prior to conducting the aerial survey, all potentially suitable eagle nesting habitat was identified within the Project Area and a 10-mile buffer and used to inform and guide survey efforts. Potential eagle nesting habitat was defined as including cliff bands, rock outcrops, wooded riparian corridors, utility structures, and stands of large trees capable of supporting the weight of an eagle nest. Locations of these features were used for guidance during the aerial survey.

Aerial Raptor Nest Survey

The Project area and 1-mile buffer were flown on transects spaced 0.75 to 1 mile transects (i.e., 0.5-mile viewed from either side of the helicopter) at an altitude of approximately 300 feet above ground level, depending on terrain and flight safety conditions (Figure 2). The Project area boundary was pre-established in ArcGIS software and loaded into the aircraft's global positioning system (GPS) unit for guidance during the survey. The pilot maintained proper distance between transects with his on-board GPS system; thus, pre-determined transects were not needed. In addition, 45 historical nest sites were previously documented with the Project area and 1-mile survey buffer area and were checked during the survey.

Aerial Eagle Nest Survey

The aerial eagle nest survey within the 10-mile buffer was conducted by flying a generalized pattern at about 300 feet above ground level and looking for nest structures suitable for supporting an eagle nest (Figure 2). If potential or historical eagle nesting habitat (i.e., as previously described) was observed, the helicopter was piloted closer to the nest structure until it could be determined if it was occupied or unoccupied.

Data

Data recorded at each nest location included nest substrate (e.g., tree, cliff or human-made structure), status (e.g., occupied or unoccupied), raptor species using occupied nests, number of adults, eggs, and/or nestlings, if observed, and GPS location. The following criteria were used to label a nest as occupied: 1) an adult observed in an incubating posture (lying rather than standing), 2) eggs, 3) nestlings (including fledglings near a nest with obvious recent use, 4) a raptor pair, sometimes including subadults, at or near a nest through at least the time period when incubation normally occurs, and 5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor has been seen early during the breeding season, or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs (greenery) on top, and/or droppings and/or molted feathers on its rim or underneath (Postupalsky 1974, U. S. Fish and Wildlife Service 2013, U.S. Fish and Wildlife Service 2016, Steenhof et al. 2017). During the survey options of 1-3 and 6 (greenery or other fresh lining) as discussed above were most possible to be seen and used to determine nest occupancy. Option 4 could occur, and Option 5 was difficult due to a lack of historical data in this area.

Results

Aerial Raptor Nest Survey

A total of 35 raptor nests were observed within the Project and 1-mile buffer during surveys. In addition, there were nine Buteo or Corvus nests, one ferruginous hawk, one great horned owl, one Swainson's hawk and six unknown raptor species nests that were historically known but not located during surveys. Of the observed 35 raptor nests, 27 were historical nests or previously known, and eight were previously undocumented. Nine of the nests were occupied and 26 were unoccupied; three of the unoccupied nests had the potential to be golden eagle nests, though they were likely built by Buteos . Of the nine occupied nests, six were occupied by great horned owls (*Bubo virginianus*) and three were occupied by ferruginous hawks (*Buteo regalis*) (Table 1; Figure 3).

Table 1. Spring 2019 aerial raptor nest survey results, raptors only, for the proposed Bowman Wind Project in Bowman County, North Dakota.

Species	Nest Status	Nest Substrate	Longitude	Latitude
Buteo or Corvus	Unoccupied	Tree	-103.517703	46.146979
Buteo or Corvus	Unoccupied	Tree	-103.555155	46.116427
Buteo or Corvus	Unoccupied	Tree	-103.560644	46.205906
Buteo or Corvus	Unoccupied	Tree	-103.628194	46.114048
Buteo or Corvus	Unoccupied	Tree	-103.581126	46.157541
Buteo or Corvus	Unoccupied	Tree	-103.598106	46.186621
Buteo or Corvus	Unoccupied	Tree	-103.579211	46.203077
Buteo or Corvus	Unoccupied	Tree	-103.57972	46.235161
Buteo or Corvus	DNLO	NA	-103.589563	46.248196
Buteo or Corvus	Unoccupied	Tree	-103.58902	46.245869
Buteo or Corvus	Unoccupied	Tree	-103.60513	46.232594
Buteo or Corvus	Unoccupied	Tree	-103.6288	46.181762
Buteo or Corvus	Unoccupied	Tree	-103.662975	46.137264
Buteo or Corvus	Unoccupied	Tree	-103.658356	46.097295
Buteo or Corvus	Unoccupied	Tree	-103.566105	46.191498
Buteo or Corvus	DNLO	Tree	-103.598992	46.046547
Buteo or Corvus	Unoccupied	Tree	-103.461016	46.197033
Buteo or Corvus	Unoccupied	Tree	-103.482305	46.198379
Buteo or Corvus	DNLO	Tree	-103.520759	46.213105
Buteo or Corvus	DNLO	Tree	-103.527917	46.196644
Buteo or Corvus	DNLO	Tree	-103.520964	46.169064
Buteo or Corvus	Unoccupied	Tree	-103.54489	46.107978
Buteo or Corvus	Unoccupied	Tree	-103.56256	46.167083
Buteo or Corvus	DNLO	Tree	-103.560463	46.175945
Buteo or Corvus	DNLO	Tree	-103.567819	46.178455
Buteo or Corvus	Unoccupied	Tree	-103.593535	46.230167
Buteo or Corvus	Unoccupied	Tree	-103.703112	46.055187
Buteo or Corvus	DNLO	Tree	-103.741484	46.055293
Buteo or Corvus	Unoccupied	Tree	-103.623123	46.17936
Buteo or Corvus	DNLO	Tree	-103.596718	46.053391
Ferruginous Hawk	Unoccupied	Ground	-103.610776	46.115546
Ferruginous Hawk	Occupied	Tree	-103.628234	46.17997
Ferruginous Hawk	Occupied	Other	-103.689144	46.152792
Ferruginous Hawk	Occupied	Tree	-103.56646	46.169166
Ferruginous Hawk	Unoccupied	Ground	-103.56047	46.153996
Ferruginous Hawk	DNLO	Cliff	-103.724429	46.10429
Golden Eagle or Buteo	Unoccupied	Cliff	-103.747225	46.076128
Golden Eagle or Buteo	Unoccupied	Other	-103.739997	46.05838
Golden Eagle or Buteo	Unoccupied	Tree	-103.585967	46.11739
Great Horned Owl	Occupied	Tree	-103.521037	46.14364
Great Horned Owl	Occupied	Tree	-103.540849	46.10955
Great Horned Owl	Occupied	Tree	-103.566671	46.165911
Great Horned Owl	Occupied	Tree	-103.617885	46.195016
Great Horned Owl	Occupied	Tree	-103.676654	46.102223
Great Horned Owl	Occupied	Tree	-103.659177	46.080832
Great Horned Owl	DNLO	Tree	-103.538729	46.185883
Swainson's Hawk	DNLO	NA	-103.618831	46.107832
Unknown (non eagle)	Missed	Tree	-103.489074	46.177496
Unknown (non eagle)	Missed	Tree	-103.606765	46.240958
Unknown (non eagle)	Missed	Tree	-103.616764	46.244978
Unknown (non eagle)	Missed	Other	-103.712223	46.155096
Unknown (non eagle)	Missed	Other	-103.607851	46.220092
Unknown (non eagle)	Missed	Other	-103.60807	46.238206

DNLO = Did Not Locate

Aerial Eagle Nest Survey

Golden Eagle

No occupied golden eagle nests occurred within the Project area, and two occupied nests were observed within the 10-mile survey buffer (Figure 4). The closest occupied nest was 8.2 miles and the other occupied nest occurred 9.1 miles from the Project area.

Two historical golden eagle nests from agency files were 1 mile of the Project area and five more historical agency nests were within four miles to the southwest of the Project area (Figure 4) in badland escarpments, as reported from the federal and state agencies. Only two of these seven nests were found in 2019; since golden eagles have not repaired them, it is likely these nests/territories are not currently occupied.

Bald Eagle

No bald eagle nests occurred within the Project area and one occupied bald eagle nest was found along the Little Missouri River, approximately 9.1 miles from the Project area (Figure 4). In addition, no historical records of bald eagle nests were reported from the agencies.

Table 2. Spring 2019 aerial raptor nest survey results, eagles only, for the proposed Bowman Wind Project in Bowman County, North Dakota.

Species	Nest Status	Nest Substrate	Distance to Project (Miles)	Longitude	Latitude
Bald Eagle	Occupied	Tree	9.1	-103.87933	46.222319
Golden Eagle	Unoccupied	Cliff	1.0	-103.750099	46.073648
Golden Eagle	Unoccupied	Cliff	2.7	-103.777674	46.043400
Golden Eagle	Unoccupied	Cliff	4.3	-103.810908	46.042439
Golden Eagle	Unoccupied	Cliff	3.0	-103.765865	46.021650
Golden Eagle	Unoccupied	Tree	8.5	-103.677206	46.351624
Golden Eagle	Occupied	Tree	9.1	-103.887878	46.214298
Golden Eagle	Unoccupied	Cliff	8.7	-103.894313	46.185039
Golden Eagle	Unoccupied	Cliff	8.6	-103.913852	46.115899
Golden Eagle	Occupied	Cliff	8.2	-103.9042	46.103572
Golden Eagle	DNLO	Tree	7.7	-103.886148	46.148308
Golden Eagle	DNLO	Cliff	7.3	-103.834108	45.982647
Golden Eagle	DNLO	Cliff	6.1	-103.834231	46.010433
Golden Eagle	DNLO	Cliff	6.1	-103.833575	46.010296
Golden Eagle	DNLO	Cliff	6.3	-103.864584	46.10902
Golden Eagle	Missed	Cliff	6.2	-103.861695	46.100905
Golden Eagle	DNLO	Cliff	4.4	-103.814314	46.042418
Golden Eagle	DNLO	Cliff	4.5	-103.816001	46.04262

DNLO = Did Not Locate

Conclusions

Six occupied great horned owl and three occupied ferruginous hawk nests were recorded within the Project Area and 1-mile buffer. Twenty-one unoccupied nests also within 1-mile of the Project were likely built by *Buteo*s or Corvids. This would include resident but not yet nesting red-tailed hawks (*Buteo jamiacensis*), migrant Swainson's hawks (*Buteo swainsonii*) that were not yet present in March, and resident/migrant Common Ravens (*Corvus corax*) and American crows (*Corvus americana*). Nests of the two hawk species were previously documented by agencies (Heimerl *in lit.*, Reinish *in lit.*, SWCA 2018).

The 2019 survey was timed to best document nesting eagles, but was conducted too early to document nests of some raptor species. These 21 unoccupied nests are unlikely candidates for future golden eagle occupancy. Six large unoccupied nests likely built by ferruginous hawks on hilltops or in trees and one historical golden eagle nest, would be somewhat more likely than the other 21nests to be occupied by golden eagles, if a pair were to form in the Project or 1-mile buffer. Golden eagles have occasionally been documented taking over both ground and tree nests initially built by ferruginous hawks (Wallace, *in lit*., Kochert et al. 2002). Any nesting attempts by golden eagles in the previously built nests would also require proximal suitable prey densities and other localized habitat variables.

No occupied eagle nests were identified in the Project area. One occupied bald eagle and two occupied golden eagle nests were documented within the Survey Area, with the nearest occupied golden eagle nest 8.2 miles from the Project. The other occupied golden eagle nest occurred approximately 9.2 miles from the Project. Most cliffs attractive to nesting golden eagles occurs more than 8 miles from the Project, though the three occupied eagle nests occur all along the western boundary of the Survey Area adjacent to the Little Missouri River. The likelihood of these territorial adults visiting the Project area is probably low. However, the presence of these occupied eagle nests may warrant siting consideration and evaluation of eagle use to allow for the assessment of the potential risk (i.e., dispersing juveniles) of the proposed Project to eagles.

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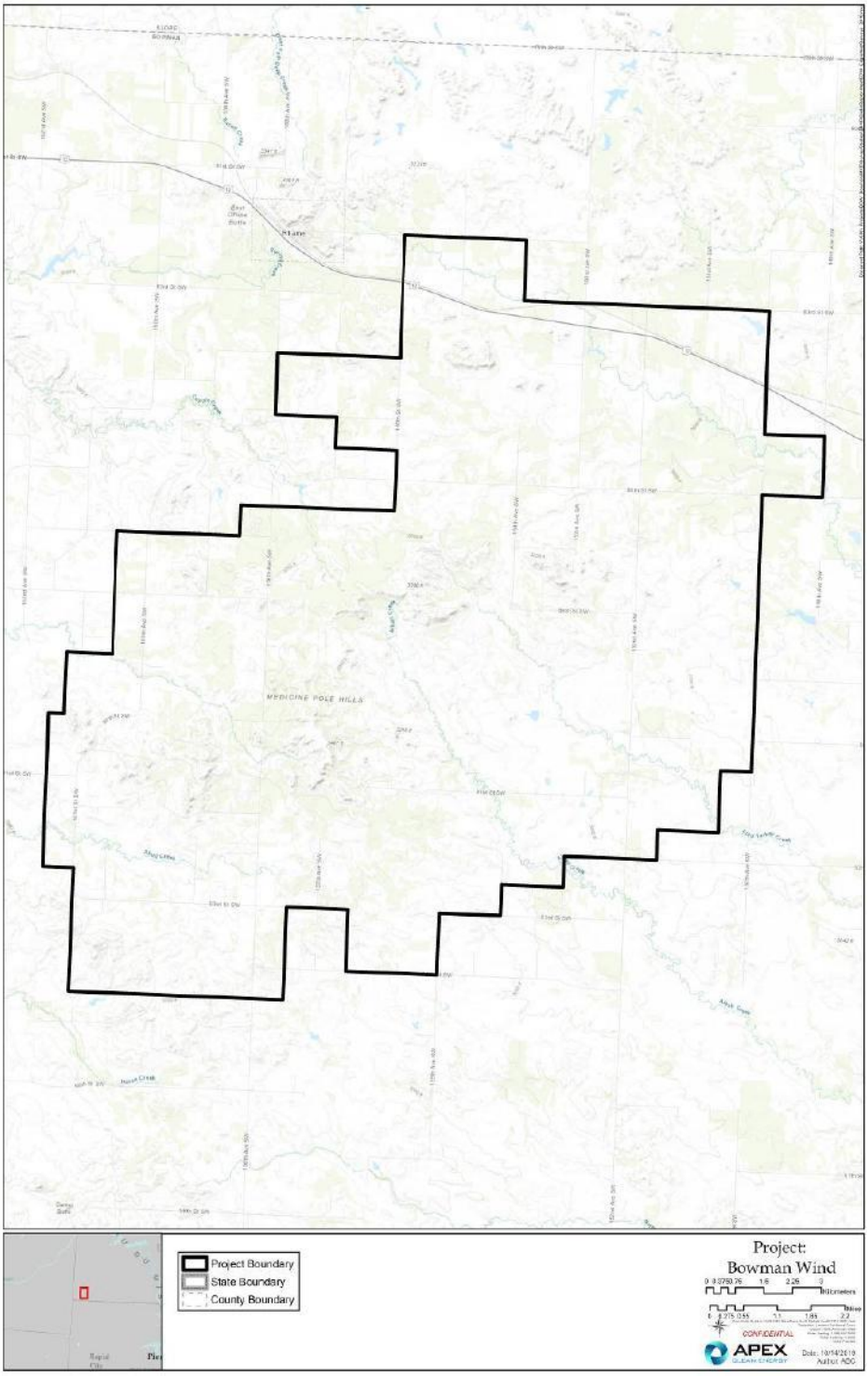


Figure 1. The proposed Bowman Wind LLC Project, Bowman County, North Dakota.

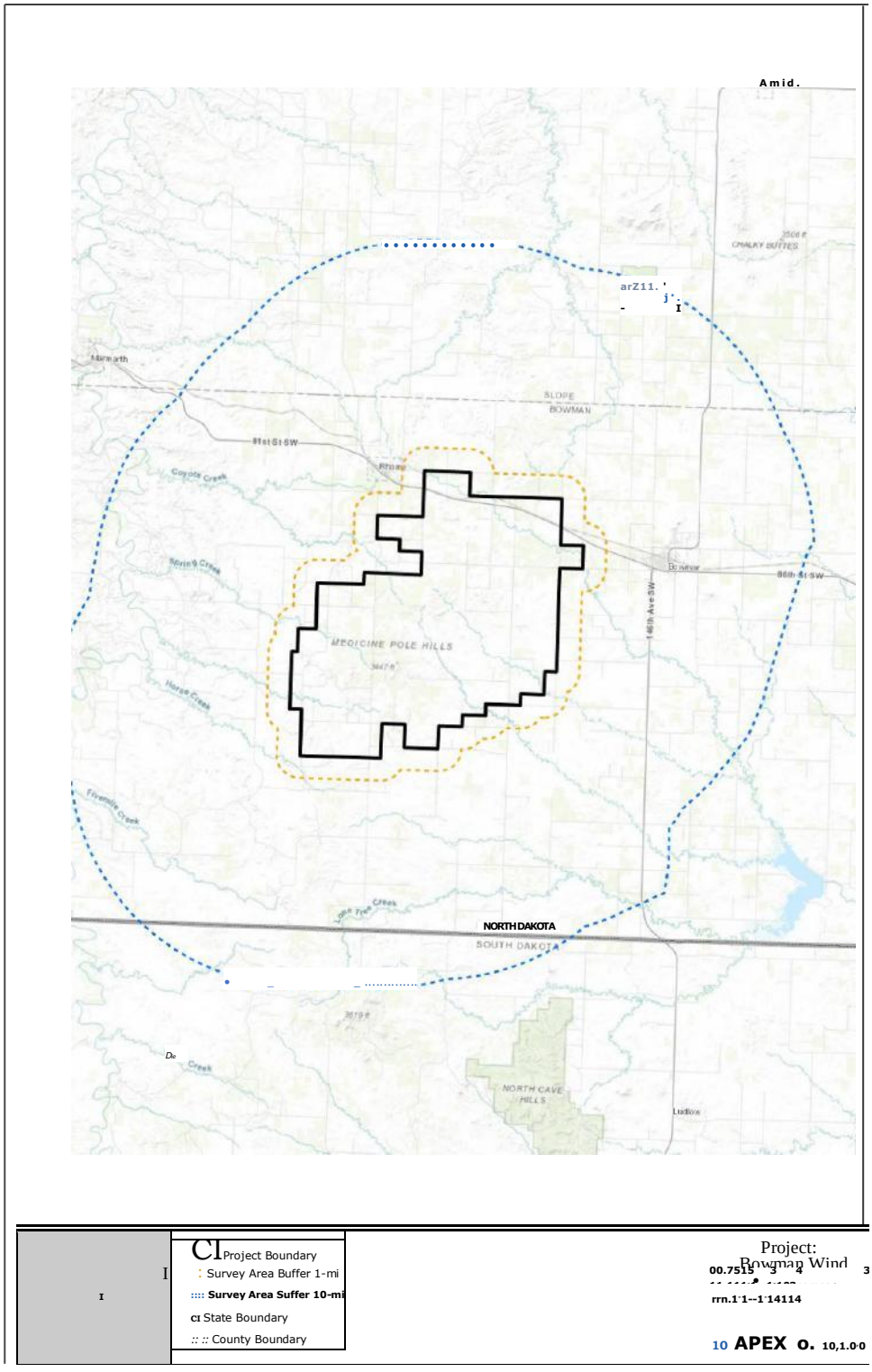


Figure 2. 2019 1-mile buffer for all raptors and 10-mile buffer Survey Area for eagles, the proposed Bowman Wind LLC Project, Bowman County, North Dakota.

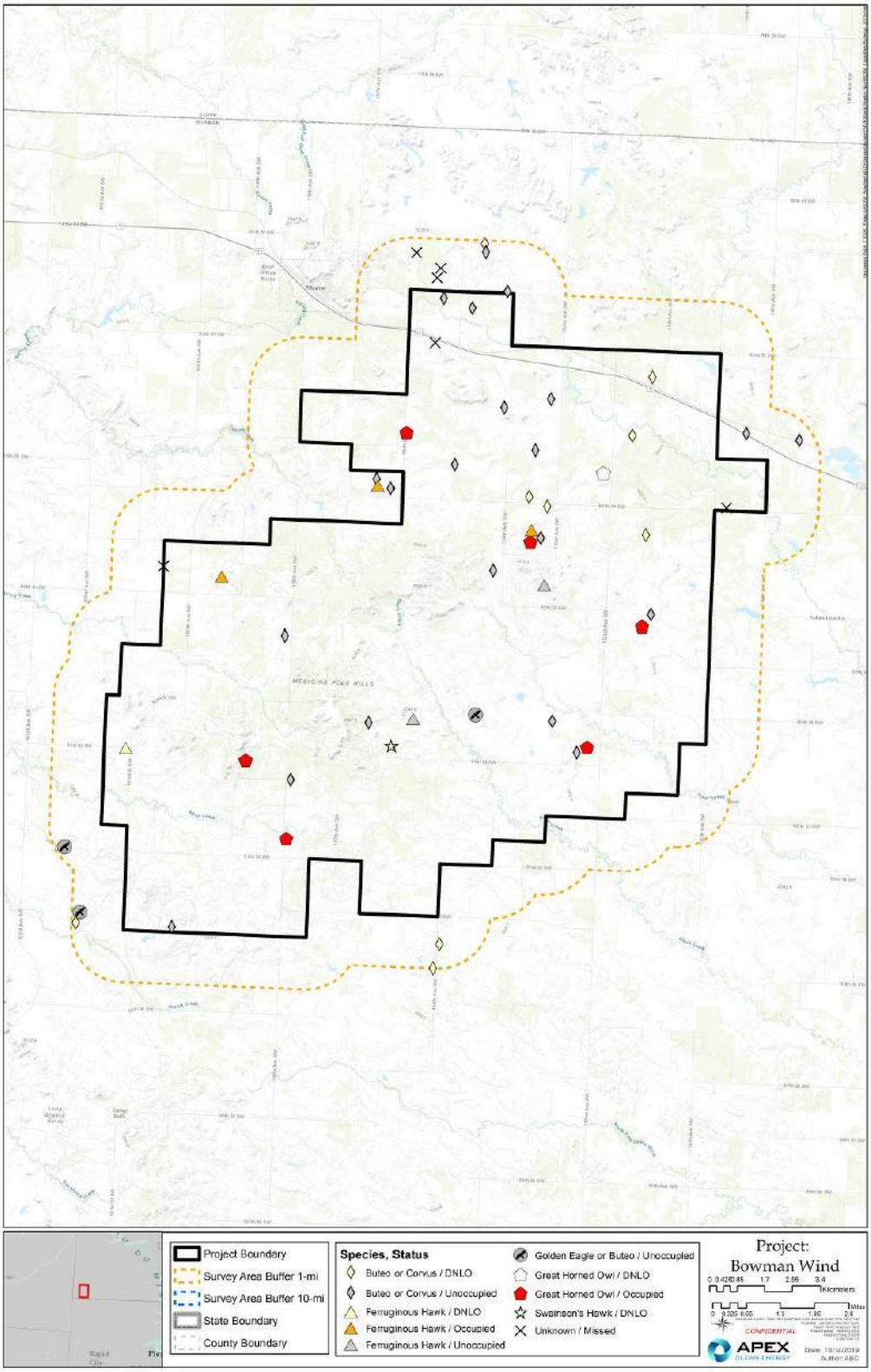


Figure 3. Raptor nests encountered in 2019 in the proposed Bowman Wind Project area and the 1-mile buffer, Bowman County, North Dakota.

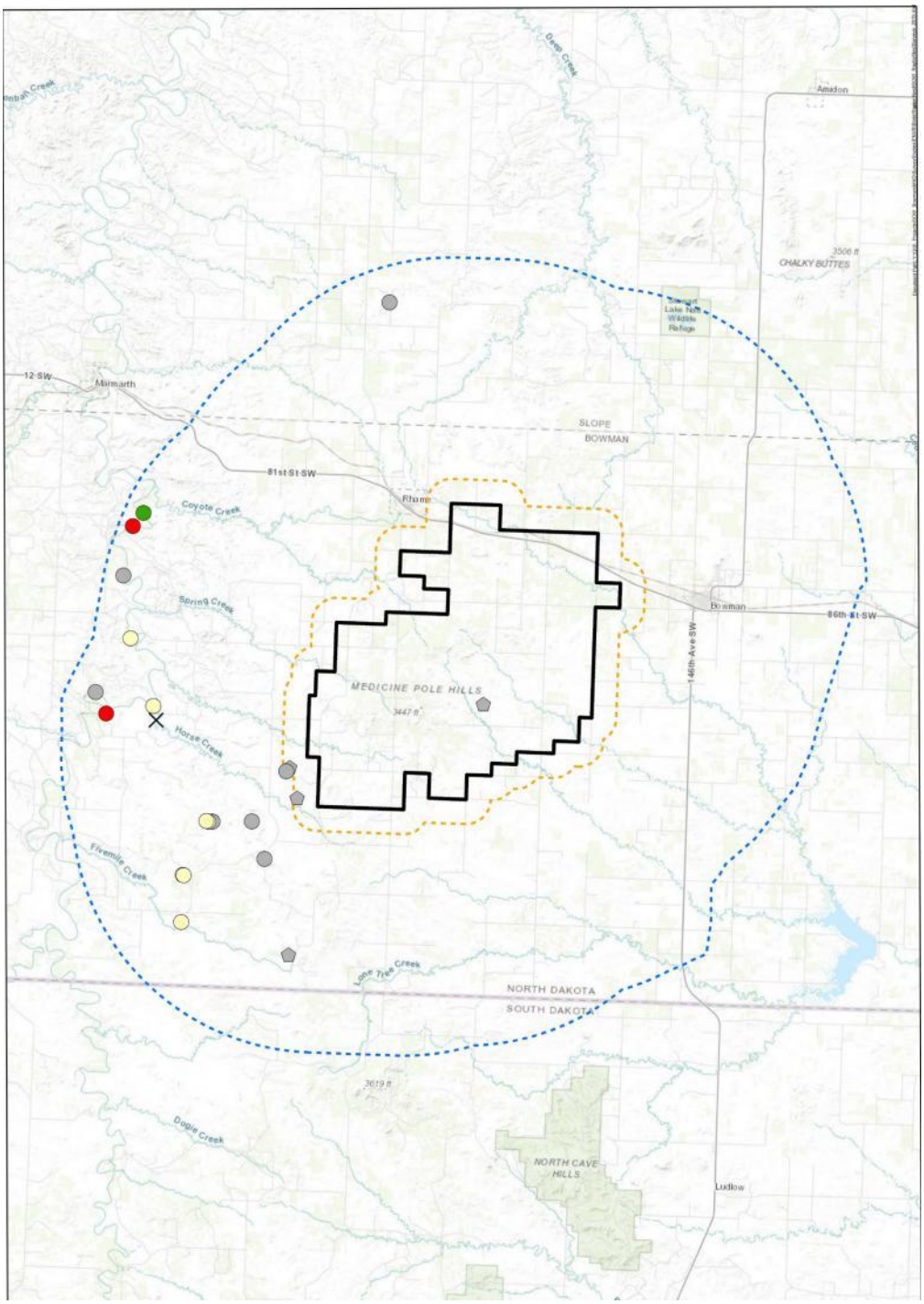
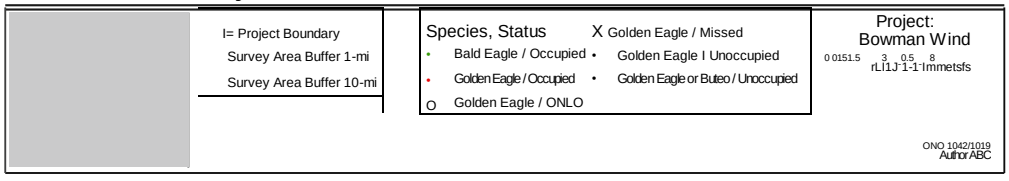


Figure 4. Eagle nests within the 10-mile Survey Area in 2019 for the proposed Bowman Wind Project, Bowman County, North Dakota.



Prairie Grouse Lek Monitoring Surveys

Bowman Wind Project

Bowman County, North Dakota

Final Report

April 2019

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Bowman Wind, LLC

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REPORT REFERENCE

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1) INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed ground-based lek monitoring surveys at the proposed Bowman Wind, LLC Project (Project) in Bowman County, North Dakota (Figure 1). Lek monitoring surveys were completed to record activity at all known greater sage-grouse (*Centrocercus urophasianus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) leks within the proposed Project area and associated 1.0-mile (mi; 1.6-kilometer) buffer to assist in Project siting. This report presents the results of the ground based lek monitoring surveys completed April 2 − 24, 2019.

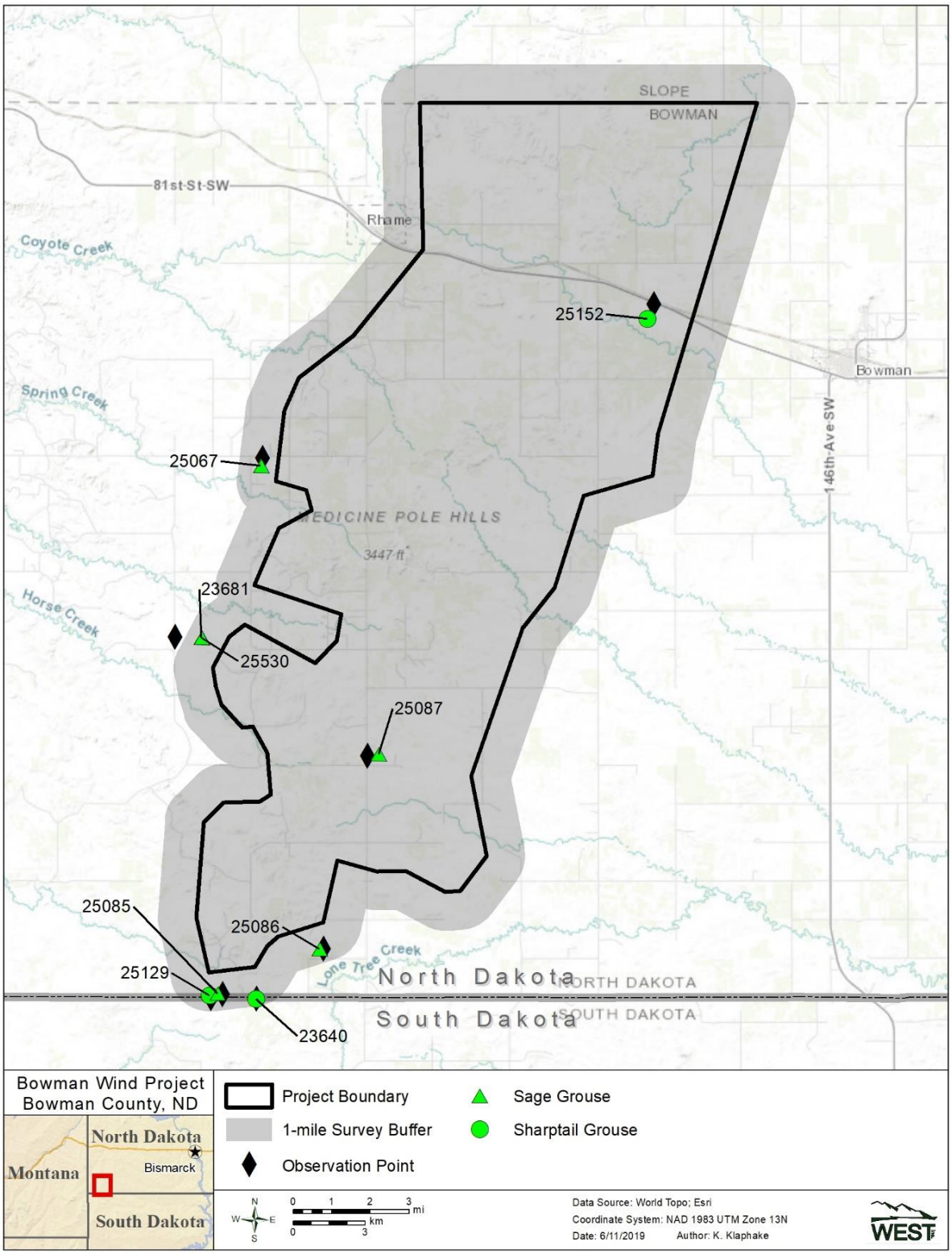

Figure 1. Survey locations for ground based lek monitoring surveys conducted from April 2 – 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (1.6-kilometer) buffer.

2) METHODS

Prior to conducting the lek surveys, existing sharp-tailed grouse and greater sage-grouse leks were reviewed and plotted within the Project area and 1.0-mi (1.6-km) survey buffer. Following the guidelines of the North Dakota Game and Fish Department, two rounds of ground-based lek monitoring surveys were completed within the Project area and 1.0-mi buffer for the seven greater sage-grouse and three sharp-tailed grouse leks during the lekking period. Round 1 was conducted April 2 – 12, 2019 and Round 2 was conducted April 12 – 24, 2019. Each lek was surveyed twice, separated by a minimum of seven days. Monitoring surveys were completed from a vehicle from public roads only, with the observer located at an optimal viewing location to observe each lek (Figure 2). Surveys began approximately one half hour before sunrise and continued until two hours after sunrise. Data recorded for each lek included lek location and total number of males and females observed visually or through auditory detection. Weather conditions and time of day were also be recorded for each survey.

3) RESULTS

Lekking activity was observed at Lek Identification (ID) 23640 on April 11, 2019 where a total of two male sharp-tailed grouse were visually observed displaying and Lek ID 25129 on April 24, 2019 where a total of two male sharp-tailed grouse were auditory observations (Table 1; Figure 2). No grouse lekking activity was recorded at Lek IDs 23681, 25067, 25085, 25086, 25087, 25152, or 25530. No incidental observations of greater sage-grouse or sharp-tailed grouse were recorded within the Project area or associated 1.0-mi buffer during the 2019 lek monitoring surveys.

Table 1. Activity recorded at known greater sage-grouse and sharp-tailed grouse leks surveyed during ground based lek monitoring surveys conducted from April 2 – April 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (mi; 1.6-kilometer) buffer.

Lek ID	Type[1]	Survey Round	Date	Total # of Males	Total # of Females	Total # of Unknown	Total # of Birds	Detection Type	Distance lek was Observed from (miles)
23640	STGR	1	4/11/2019	2	0	0	2	visual	0.02 mi north of historic lek location
		2	4/24/2019	0	0	0	0	---	
23681	GRSG	1	4/2/2019	0	0	0	0	---	0.70 mi west of historic lek location
		2	4/12/2019	0	0	0	0	---	
25067	GRSG	1	4/2/2019	0	0	0	0	---	0.20 mi northwest of historic lek location
		2	4/11/2019	0	0	0	0	---	
25085	GRSG	1	4/11/2019	0	0	0	0	---	0.11 mi east of historic lek location
		2	4/24/2019	0	0	0	0	---	
25086	GRSG	1	4/11/2019	0	0	0	0	---	0.09 mi east of historic lek location
		2	4/24/2019	0	0	0	0	---	
25087	GRSG	1	4/2/2019	0	0	0	0	---	0.30 mi west of historic lek location
		2	4/11/2019	0	0	0	0	---	
25129	STGR	1	4/11/2019	0	0	0	0	---	0.10 mi south of historic lek location
		2	4/24/2019	2	0	0	2	Auditory, approx. count	
25152	STGR	1	4/12/2019	0	0	0	0	---	0.40 mi northeast of historic lek location
		2	4/24/2019	0	0	0	0	---	
25530	GRSG	1	4/2/2019	0	0	0	0	---	0.70 mi west of historic lek location
		2	4/12/2019	0	0	0	0	---	

[1] STGR = sharp-tailed grouse; GRSG = greater sage-grouse.

= number; Approx. = approximately.

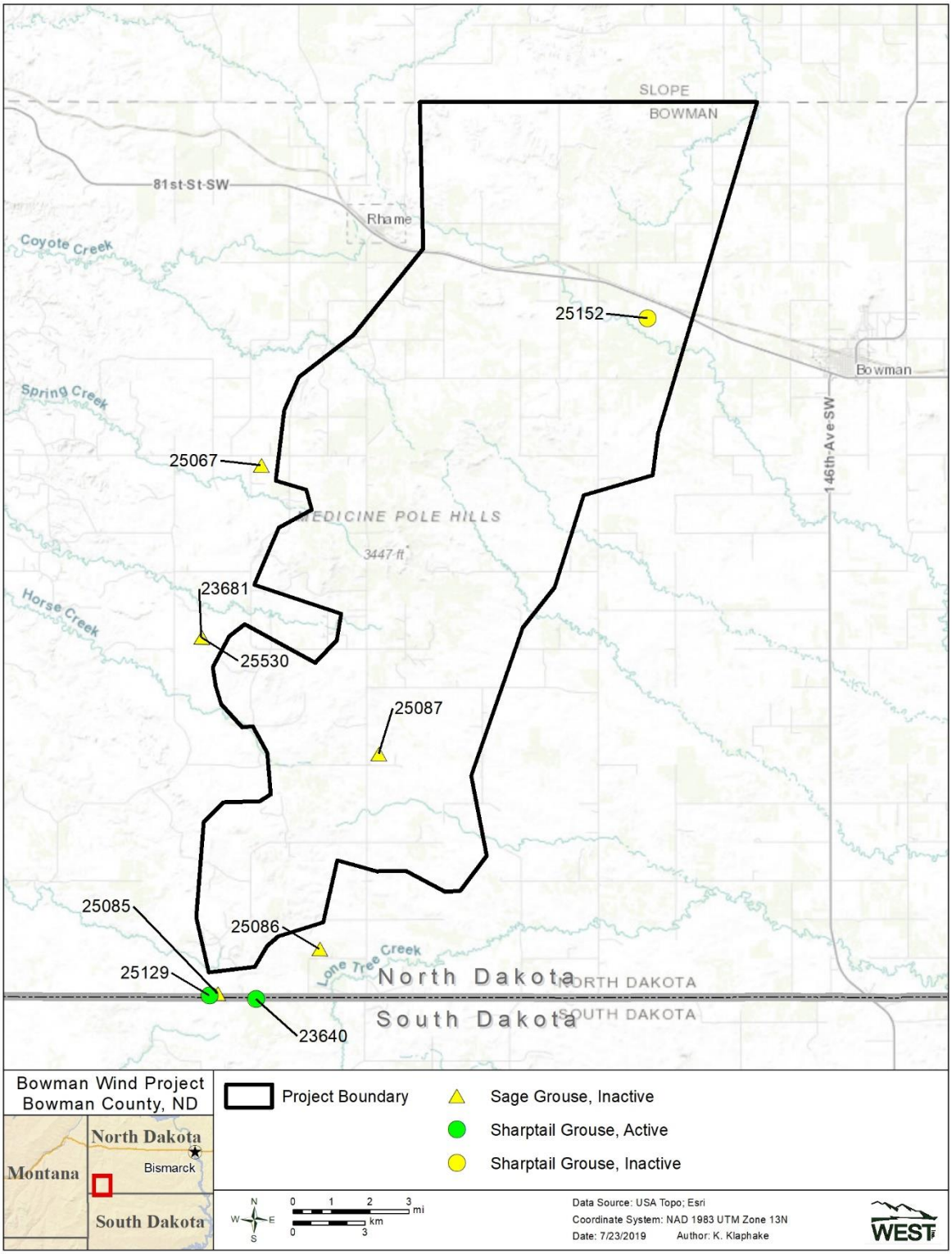

Figure 2. Location of greater sage-grouse and sharp-tailed grouse leks surveyed during ground based lek monitoring surveys conducted from April 2 – April 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (1.6-kilometer) buffer.

4) CONCLUSIONS

Two sharp-tailed grouse leks were active during monitoring surveys. Both leks were located south of the Project area but within the 1.0-mi (1.6-km) survey buffer. No greater sage-grouse leks were active during monitoring surveys within the Project area and associated 1.0-mi (1.6-km) buffer. No grouse lek activity was documented at known lek sites within the Project area.

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Northern Long-Eared Bat Habitat Assessment
Bowman Wind Project
Bowman County, North Dakota

Final Report

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14.0 INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed a Phase I Bat Habitat Desktop Assessment for the federally threatened northern long-eared bat (NLEB; *Myotis septentrionalis*) for the proposed Bowman Wind Project (Project) located in the southwest corner of Bowman County, North Dakota (Figure 1). The purpose of the desktop assessment was to identify potentially suitable NLEB summer habitat (roosting and foraging) within the Project and 1,000-foot (ft; 305-meter [m]) buffer to inform turbine siting. The desktop assessment was completed in accordance with the recommendations provided by the USFWS *Range-Wide Indiana Bat Survey Guidelines* (USFWS 2019), which also applies to NLEB, and the North Dakota Game and Fish Department (NDGFD) during early project coordination.

14.1 NORTHERN LONG-EARED BAT BACKGROUND AND ECOLOGY

The NLEB is currently listed as threatened under the ESA (USFWS 2015; 80 Fed. Reg. 17,934 (2015); however, the final 4(d) Rule for the species published January 14, 2016 (81 Fed. Reg. 1,900 (2016); USFWS 2016), exempts the incidental take of NLEB resulting from most otherwise lawful activities, including incidental take due to the operation of wind turbines, from ESA Section 9 take prohibitions.

The NLEB favors summer maternity habitat located in intact, interior forests with late successional characteristics (Timpone et al. 2010, Carter and Feldhamer 2005). Although the NLEB tends to favor intact forests, this species also can use relatively small forest patches connected by shelterbelts (Henderson and Broders 2008). The NLEB is a roost generalist, using a much broader array of roost types (e.g. cavities, crevices, exfoliating bark, stumps, artificial structures), smaller roost trees (as small as three inches [in] diameter breast high [DBH]; USFWS 2019), and more tree species than other bat species (Carter and Feldhamer 2005, Lacki et al. 2009, USFWS 2014). NLEBs use roosts with greater canopy cover and typically greater clutter than other similar bat species, usually requiring 56−84% canopy cover around roosts (Carter and Feldhamer 2005, Sasse and Perkins 1996, Foster and Kurta 1999, Lacki and Schwierjohann 2001, Timpone et al. 2010). Linear forested features, including shelterbelts and other loose aggregates of trees with variable amount of canopy closure, may also represent suitable habitat for NLEB if within proximity (1,000 ft [305 m) of suitable habitat (USFWS 2019). The NLEB tends to be an interior forest specialist, and stays close to forest features while foraging (Henderson and Broders 2008) preferring to forage in upland, mature forest above or below the canopy, but can also use forest clearings, riparian forest, forested ponds, and forested flyways (Foster and Kurta 1999, Amelon and Burhans 2006).

Based on current records for North Dakota, NLEBs are considered rare in North Dakota (Dyke et al. 2015). Recent research by North Dakota State University found that presence is unlikely throughout the state, except for potential presence in the badlands of North Dakota in the extreme western edge of the State (Dr. E. Gillam, pers. com).

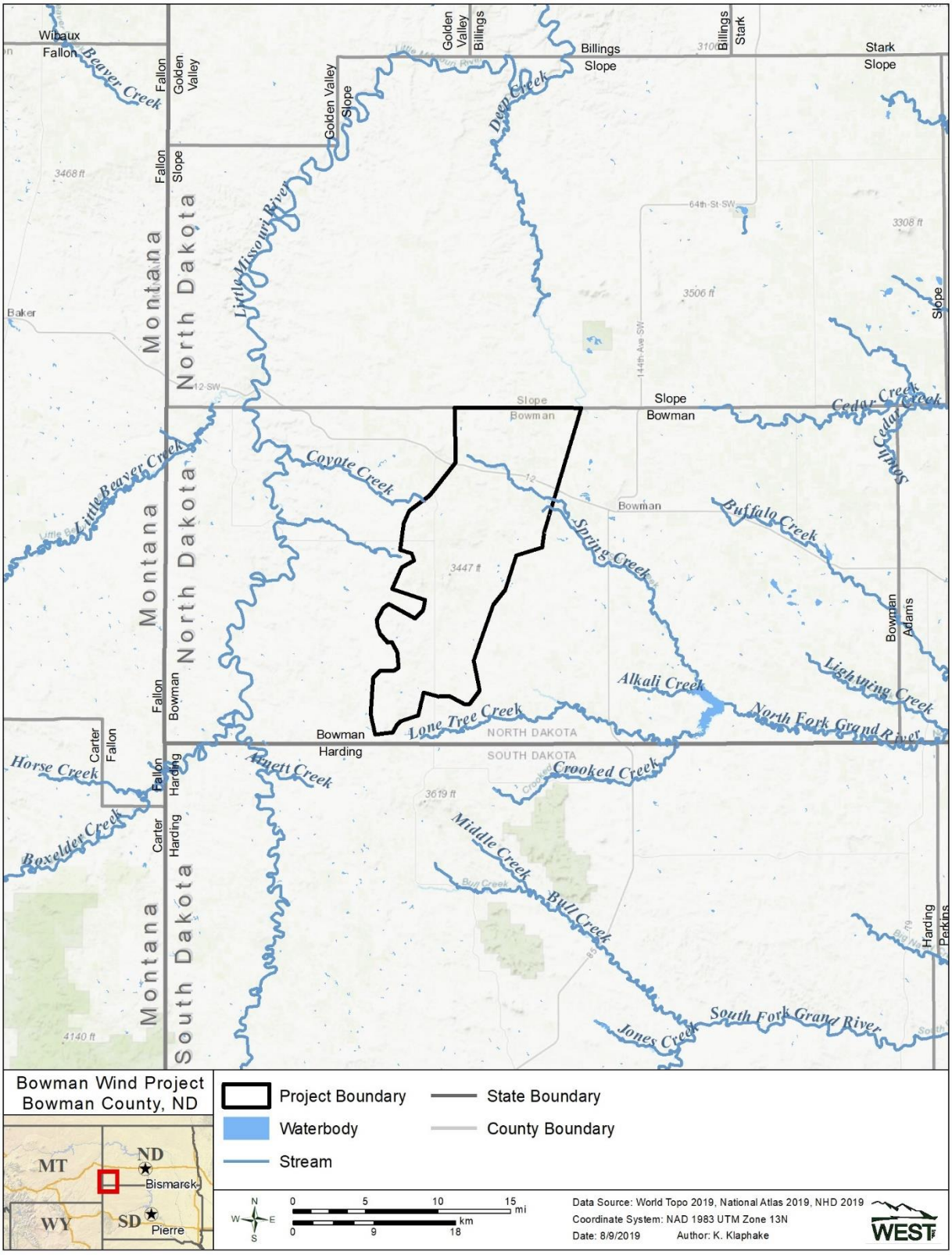

Figure 1. Location of the proposed Bowman Wind Project. Bowman County, North Dakota.

15.0 PROJECT AREA

The proposed Project is located in the Missouri Plateau and Sagebrush Steppe Level IV Ecoregions within the Northwestern Great Plains Level III Ecoregion (US Environmental Protection Agency (EPA) 2018). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns which now support a mosaic of spring wheat, alfalfa, and grazing lands. The Sagebrush Steppe ecoregion is characterized by minimal rainfall, erode buttes, scoria mounds, sparse human inhabitants, and minimal cultivation (EPA 2018).

Two named streams are present within the Project area and include portions of Spring Creek and Coyote Creek (Figure 1). The Little Missouri River is approximately 6.5 miles (mi; 10.5 kilometers [km]) west of the Project area (Figure 1). The Project area is characterized by flat to gently rolling topography dominated by pastureland (US Geological Survey [USGS] Digital Elevation Model 2016).

According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project area is herbaceous, which covers 54.7% of the total area (120,772 acres [ac]; Table 1, Figure 2). Cultivated crops is the second most common land cover type and covers 29.5% (65,184 ac) of the Project area. Only a small portion of the Project area consists of land cover types that provide potentially suitable foraging and roosting habitat for NLEB, including woody wetlands (0.3%), evergreen forest (<0.1%; 81 ac), deciduous forest cover (<0.1%; 78 ac), and mixed forest (<0.1%; 12 ac), which total approximately 0.5% of Project area (Table 1; Figure 2).

Table 1. Land Cover types, acreage, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota.

Land Cover/Land Use Type	Acres	% Composition
Herbaceous	120,772	54.7
Cultivated Crops	65,184	29.5
Shrub/Scrub	16,128	7.3
Hay/Pasture	9,418	4.3
Developed, Open Space	6,229	2.8
Open Water	919	0.4
Developed, Low Intensity	828	0.4
Woody Wetlands	**754**	**0.3**
Emergent Herbaceous Wetlands	377	0.2
Evergreen Forest	**81**	**<0.1**
Deciduous Forest	**78**	**<0.1**
Barren Land	57	<0.1
Developed, Medium Intensity	17	<0.1
Mixed Forest	**12**	**<0.1**
Developed, High Intensity	<1	<0.1
Total	**220,854**	**100**

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019.

Sums may not total values shown due to rounding.

Land use in bold signifies habitats that could be potentially used by NLEB.

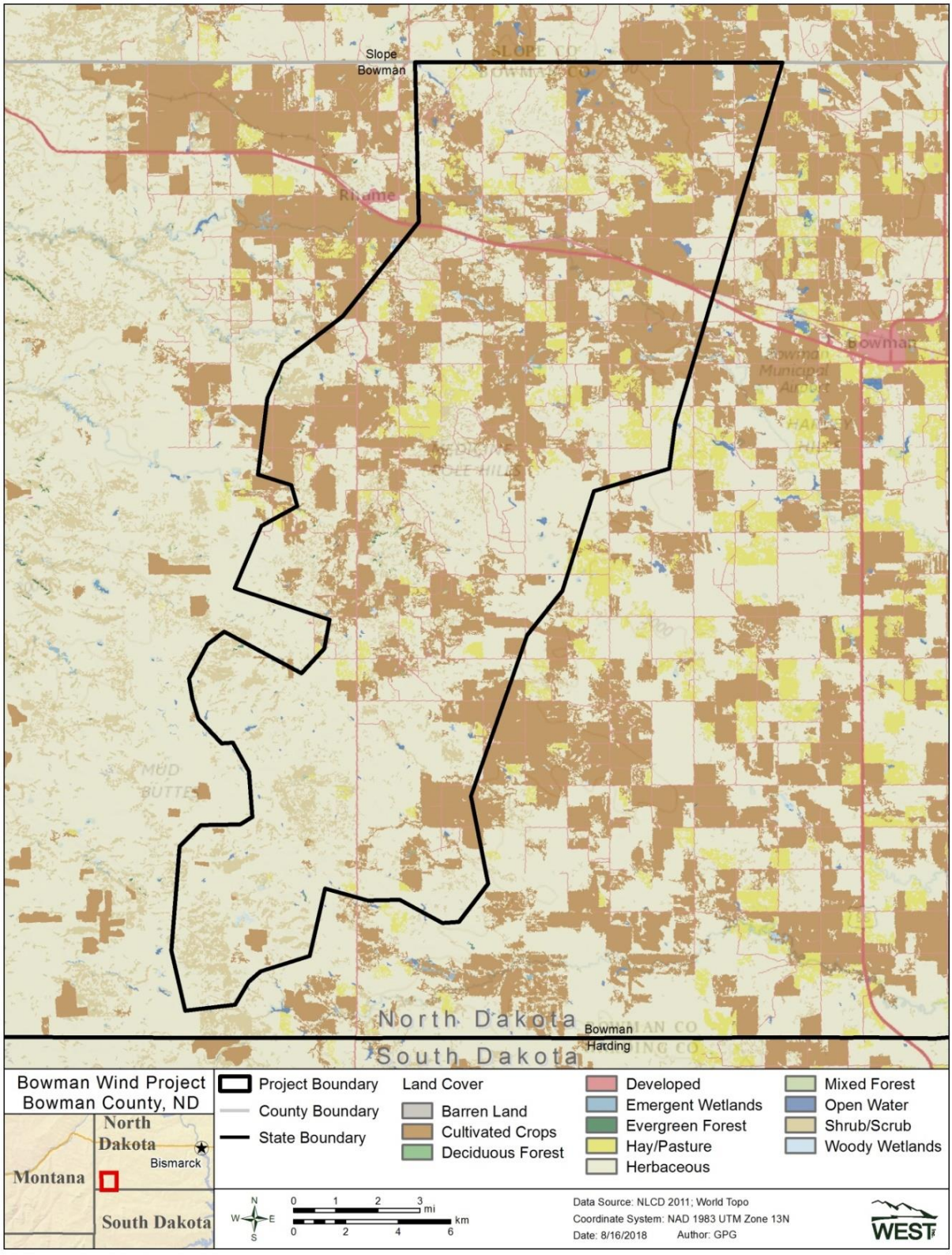

Figure 2. Land cover types and coverage in the proposed Bowman Wind Project, Bowman County, North Dakota.

16.0 METHODS

The desktop review of potentially suitable NLEB summer habitat within the Project area and 1,000-ft (305-m) Project boundary buffer (Assessment Area) was completed by reviewing the NLCD (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), delineating potential suitable habitat types (i.e., deciduous forest, evergreen forest, mixed forest, and woody wetlands) using ESRI Software (ArcGIS 10.3.1). This habitat delineation was then cross-checked and edited based on the most recent publicly available aerial imagery from the National Agriculture Imagery Program (US Department of Agriculture National Agriculture Imagery Program 2018).

Any forested woodlots or woody wetlands that were larger than 15 ac (6 ha; Foster and Kurta 1999; Henderson and Broders 2008), were considered NLEB summer habitat. In addition, linear forested features, including shelterbelts and other loose assemblages of trees within 1,000.0 ft (305 m; USFWS 2014) of these forested woodlots were also considered habitat (USFWS 2019). Isolated trees and isolated forest stands of less than 15 ac in size and greater than 1,000 ft away from potentially suitable forested areas were not considered suitable habitat for NLEB, as per supporting research (Foster and Kurta 1999, USFWS 2019, Henderson and Broders 2008).

17.0 RESULTS

A total of 171 ac (66.5 ha) of forested habitat were identified using NLCD within the Project area and Assessment area during the desktop review. However, the largest woodlot or forest patch was 9.3 ac (3.8 ha) and therefore determined to be unsuitable for NLEB summer habitat (Figure 3). Additionally, 754 ac (305 ha) of woody wetlands were identified by NLCD and four of these patches were determined to be greater than 15 ac (6 ha); however, upon review of the most updated aerial photography, two of the four woody wetlands were cropland and the other two were ditches with few unsuitable trees for NLEB. In summary, the Assessment Area contained limited isolated forested hedgerows, none of sufficient size to constitute suitable NLEB summer habitat (Figure°3). Pasturelands, cropland, and undeveloped land, which contained no forested habitat, were discernible on aerial photographs and dominated almost the entirety of the Assessment Area.

18.0 CONCLUSIONS

This assessment revealed that no potentially suitable summer NLEB habitat exists within the Project area or Assessment Area, therefore potential risk to this species in summer is considered minimal.

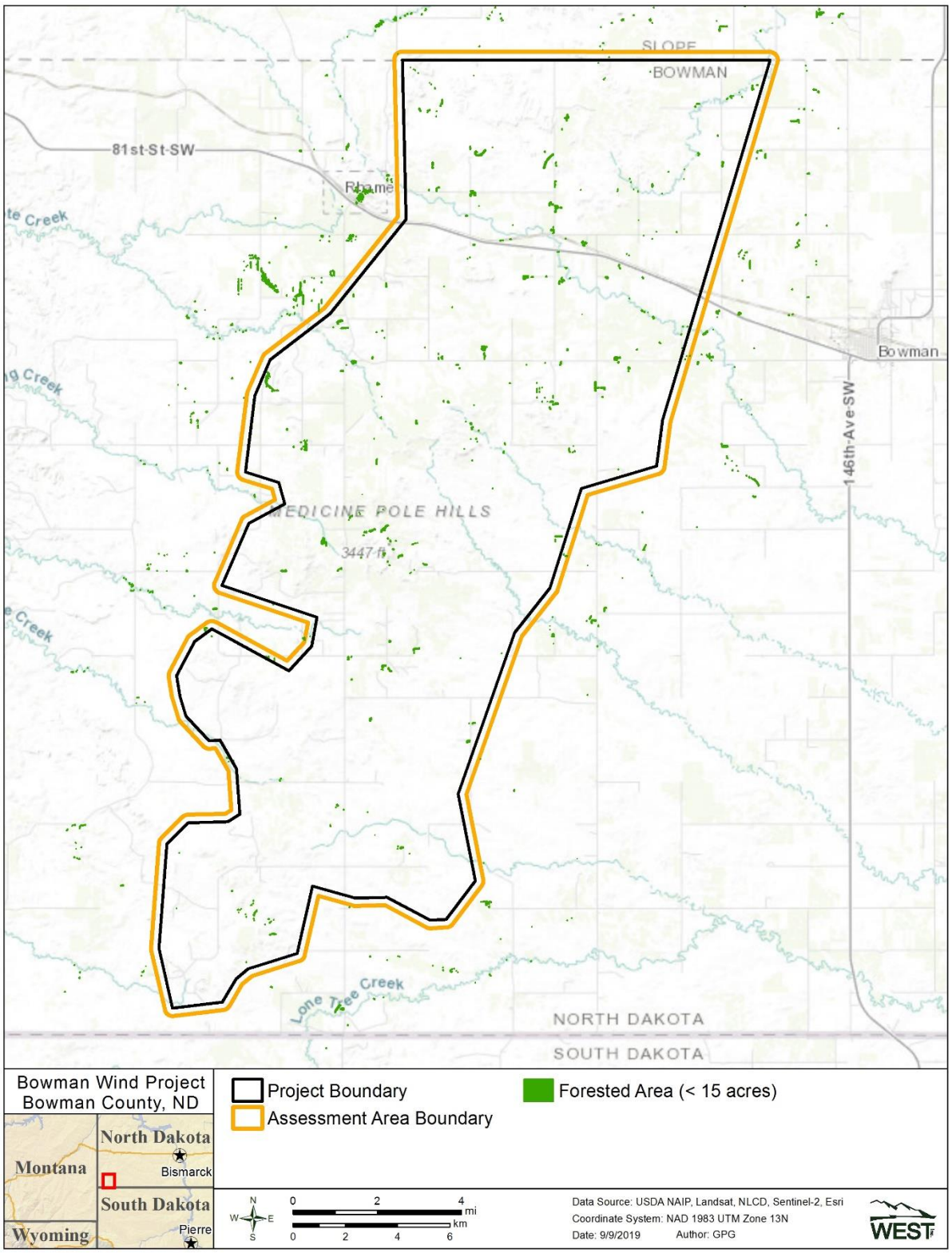

Figure 3. Forested habitat areas within the proposed Bowman Wind Project, Bowman County, North Dakota and a 1,000-foot (305-meter) project area buffer (Assessment Area Boundary).

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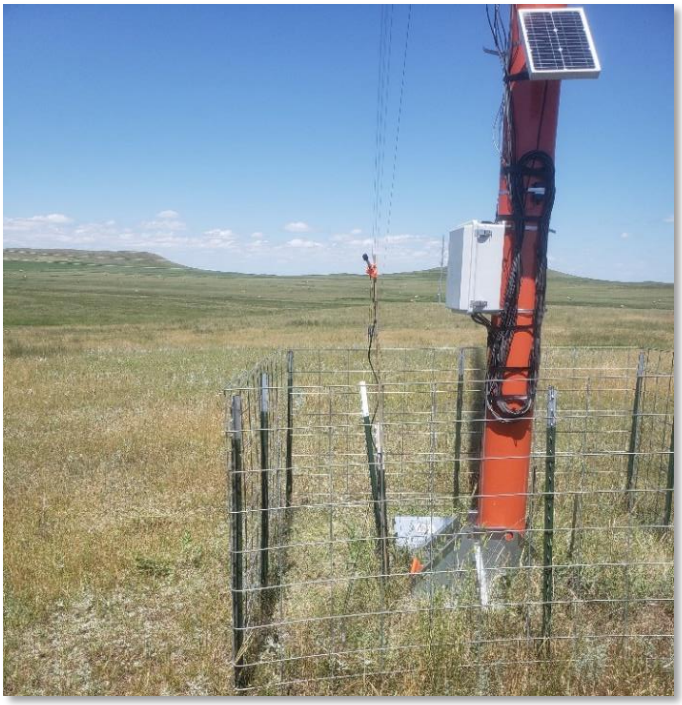
Bat Acoustic Activity Survey for the Proposed Bowman Wind Project Bowman County, North Dakota

July 8 – October 28, 2020



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20.0 EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. (WEST) completed a bat acoustic survey from July 8 – October 28, 2020, for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. The purpose of the survey was to evaluate bat activity during the late summer and fall period within the Project.

WEST biologists completed acoustic surveys at two meteorological (met) towers with two acoustic stations in grassland habitat representative of potential turbine locations. One ultrasonic microphone for Wildlife Acoustics SM3 detectors was placed at each met tower near the ground at 5.0 feet (1.5 meters). A total of 216 detector-nights were sampled across both stations.

A total of 976 bat passes were recorded during 216 detector-nights at both stations. The majority of the bat passes (66.6%) were classified as high frequency (HF) bat passes (calls 30 kilohertz [kHz] or greater; e.g., eastern red bat, little brown bat, and western small-footed bat). Low-frequency (LF) bat passes (calls ≤ 30 kHz; e.g., big brown bat, hoary bat, and silver-haired bat) composed 33.4% of the total bat passes. Kaleidoscope potentially detected calls from the federally threatened northern long-eared bat on three nights overall. Qualitative identification of these calls by a qualified biologist determined that these calls were not produced by this species.

The average bat activity rate (± the standard error) was 4.43 ± 0.62 bat passes per detector-night across all detectors, which is relatively low compared to other projects in the Midwest that have completed similar studies of bat activity. Overall, weekly bat activity increased from the beginning of the survey to a peak in late July and early August, largely driven by HF bat activity, with a secondary peak in late August driven by LF bat activity.

The nearest wind energy facility with publicly available fatality data is the Prairie Winds ND1 wind facility (PW ND1). It is located approximately 167 miles (268 kilometers) northeast of the Project and has a similar land cover dominated by cattle ranching and farming. PW ND1 reported a relatively low bat fatality rate (2.13 bat fatalities per megawatt (MW) per year). Due to a similarity in land cover and proximity in North Dakota, the Project may have similarly low bat fatality rates. However, the Project will have larger but fewer turbines than Prairie Winds per MW, which may influence fatality rates per turbine but will likely have similar rates per MW.

STUDY PARTICIPANTS

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Ann Dahl	Specialist
Sarah Martinson	Bat Acoustic Activity Project Tracking
Andrea Palochak	Technical Editor
Alex Brazeal	Field Technician

REPORT REFERENCE

Bishop-Boros, L. and K. Chodachek. 2020. Bat Acoustic Activity Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota: July 8 – October 28, 2020. Prepared for Bowman Wind LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. November 22, 2020.

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21.0 INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed a bat acoustic survey to assess bat activity at the proposed Bowman Wind Project (Project) in Bowman County, North Dakota (Figure 1). The survey was based on recommendations from the US Fish and Wildlife Service (USFWS) and is consistent with approaches recommended in the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012). The purpose of the survey was to determine bat activity during the late summer and fall migration periods, which are generally the periods of highest bat use at most Projects.

22.0 PROJECT AREA

The proposed Project encompasses 61,325 acres (24,817 hectares) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau Ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. Elevations within the Project range from approximately 2,940 feet ([ft; 896 meters [m]) to 3,448 ft (1,051 m; US Geological Survey 2019), with the greater topographic relief associated with the Medicine Pole Hills in the center of the Project.

According to the National Land Cover Database (NLCD; 2016), the dominant land cover type in the Project is shrub/scrub (43.8%), followed by herbaceous/grassland (31.9%), and cultivated crops (19.7%; Table 1, Figure 2). The remaining land cover types account for less than 3.0% of the Project, individually (Table 1, Figure 2).

Table 1. Land cover types, coverage, and percent (%) composition in the proposed Bowman Wind Project in Bowman County, North Dakota.

Land Cover Type	Coverage (Acres)*	Composition (%)*
Shrub/Scrub	26,877	43.8
Herbaceous/Grassland	19,589	31.9
Cultivated Crops	12,073	19.7
Developed	1,266	2.1
Hay/Pasture	1,118	1.8
Emergent Herbaceous Wetlands	164	0.3
Open Water	106	0.2
Woody Wetlands	46	<0.1
Evergreen Forest	45	<0.1
Deciduous Forest	31	<0.1
Mixed Forest	7	<0.1
Barren Land	2	<0.1
Total[1]	**61,325**	**100**

Data from National Land Cover Database (NLCD) 2016.
* [1] Sums can differ from values shown due to rounding.

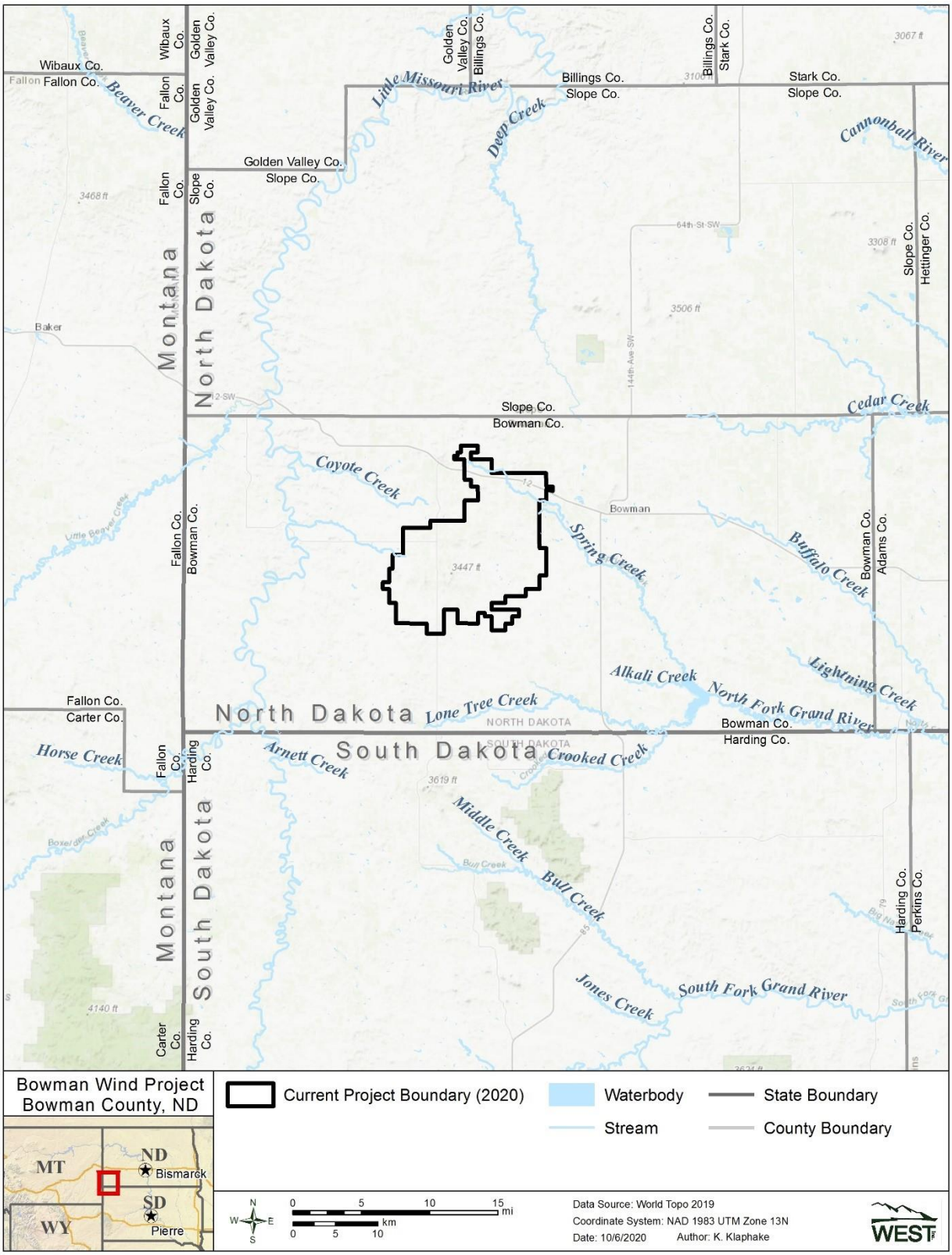

Figure 1. Location of the proposed Bowman Wind Project in Bowman County, North Dakota.

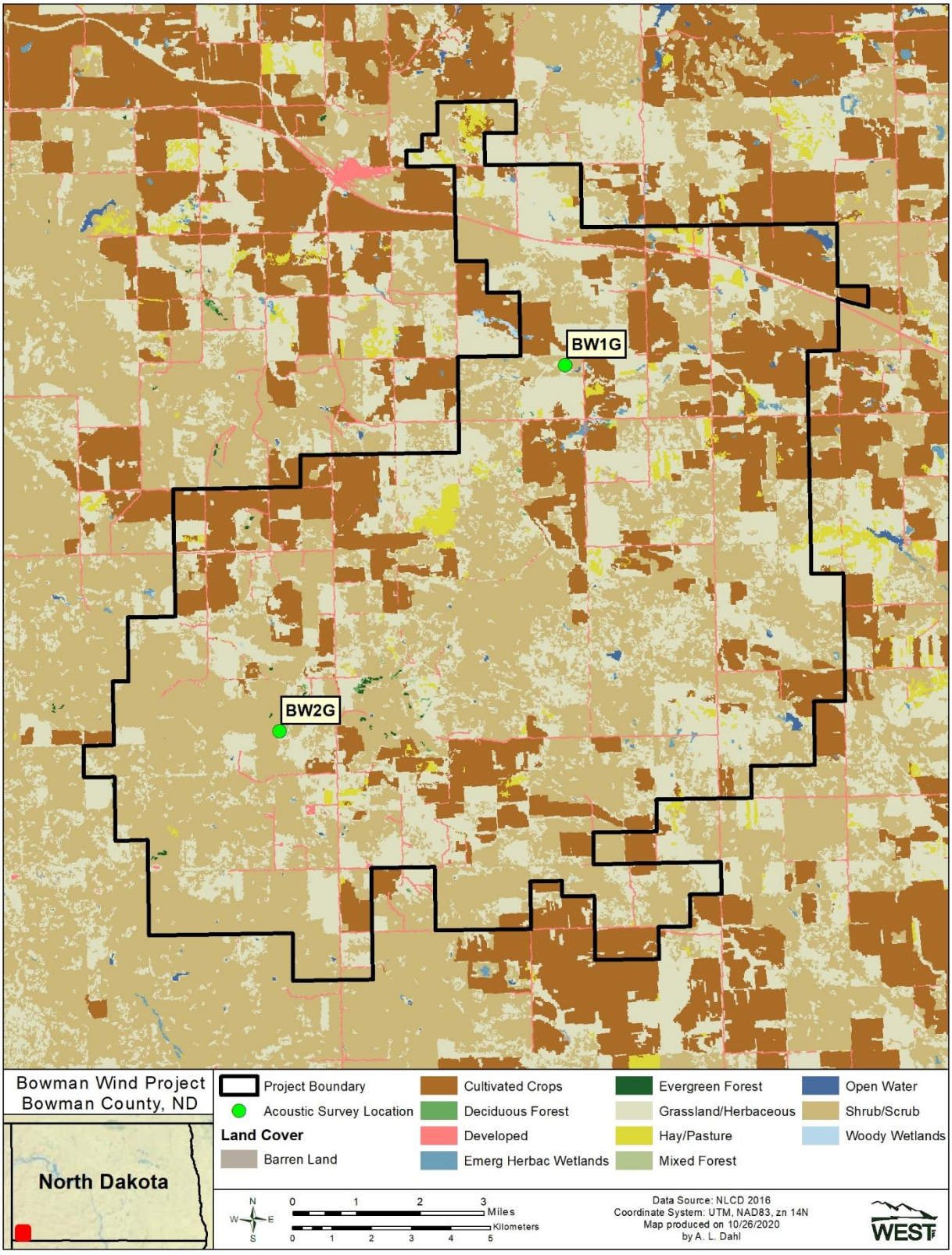

Figure 2. Land cover types and acoustic survey locations within the proposed Bowman Wind Project, in Bowman County, North Dakota.

22.1 Overview of Bat Diversity

Ten bat species have the potential to occur within the Project (Table 2; International Union for Conservation of Nature 2020, USFWS 2019). Nine of the 10 bat species have been documented as fatalities at operating wind energy facilities (Table 2). The northern long-eared bat (*Myotis septentrionalis*) is the only species listed as federally threatened with a 4D rule, which allows incidental take of this species for this region (USFWS 2015). The state of North Dakota does not have an endangered or threatened species list; however, North Dakota identifies and maintains a list of the 100 Species of Conservation Priority (SCP) in its State Wildlife Action Plan (SWAP) (Dyke et al. 2015). Big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), northern long-eared bat, and Townsend's big-eared bat (*Corynorhinus townsendii*) are listed as level I species. Level I species either have declining population and have a high conservation priority or North Dakota constitutes part of their core breeding range.

Table 2. Bat species with potential to occur within the proposed Bowman Wind Project in Bowman County, North Dakota, categorized by echolocation call frequency*.

Common Name	Scientific Name
High-Frequency (≥ 30 kHz)	
eastern red bat[1,2]	*Lasiurus borealis*
little brown bat[1, 4]	*Myotis lucifugus*
long-legged bat[1]	*Myotis volans*
northern long-eared bat[1,3, 4]	*Myotis septentrionalis*
western long-eared bat[1]	*Myotis evotis*
western small-footed bat[1]	*Myotis ciliolabrum*
Low-Frequency (≤ 30 kHz)	
big brown bat[1, 4]	*Eptesicus fuscus*
hoary bat[1,2]	*Lasiurus cinereus*
silver-haired bat[1,2]	*Lasionycteris noctivagans*
Townsend's big-eared bat[4]	*Corynorhinus townsendii*

[1] Species found as fatalities at operating wind energy facilities (reported by Anderson et al. 2004 and American Wind Wildlife Institute 2018)
[2] Long-distance migrant
[3] Federally threatened species
[4] Species listed as Level I Species of Conservation Priority by North Dakota Game and Fish Department (NDGFD)

kHz = kilohertz
* Sources: (International Union for Conservation of Nature 2020, US Fish and Wildlife Service 2019, Dyke et al. 2015)

23.0 METHODS

23.1 Bat Acoustic Surveys

23.1.1 Survey Stations

Two full-spectrum Song Meter SM3BAT (SM3) ultrasonic detectors (Wildlife Acoustics, Maynard, Massachusetts) were used during the survey. Each SM3 detector was placed at a meteorological (met) tower within the Project, with a single microphone detecting near the ground level ('ground station'; approximately 5.0 feet [ft; 1.5 meters (m)] above ground level; Figure 2). Microphones at

ground stations likely detect a more complete sample of the bat species present within the Project. Both stations were located in herbaceous/grassland habitat, which is one of the dominant land cover types (Table 1) and is representative of potential turbine locations within the Project area.

The SM3 microphones are weatherproof and were secured atop a wooden pole at ground stations with a metal grounding wire attached to both the microphone and external battery. Audio cables connected microphones to the SM3 detector at the base of the met tower. The SM3 microphones have a variable detection distance (approximately 98 ft [30 m]), which is influenced by atmospheric attenuation (e.g., changes with humidity, temperature, air pressure), surrounding vegetation, and wind, as well as the bat's call frequency, amplitude, and direction.

23.1.2 Survey Schedule

Acoustic surveys were conducted from July 8 – October 28, 2020. The detectors were programmed to record from approximately 30 minutes before sunset until 30 minutes after sunrise each night throughout the survey period.

23.2 Data Collection and Call Analysis

The SM3 is a full-spectrum bat detector that records complete acoustic waveforms by sampling sound waves at a rate of 256 kilohertz (kHz). This high sampling rate enables the detector to make high-resolution recordings of sound amplitude data at all frequencies up to 128 kHz. Full-spectrum data were transformed into zero-crossing data using the program Kaleidoscope Pro version 5.1.0 (Wildlife Acoustics), allowing data to be viewed in AnaLook software as digital sonograms that show changes in echolocation call frequency over time. Frequency versus time displays were used to separate bat calls from other types of ultrasonic noise (e.g., wind, rain, insects) and to determine the call frequency category.

For each survey location, bat passes were sorted into two groups based on their minimum call frequency. A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat with no pause between calls of more than one second (Fenton 1980, Gannon et al. 2003). High-frequency (HF) bats, such as eastern red bat (*Lasiurus borealis*) and *Myotis* species, generally have minimum frequencies equal to or greater than 30 kHz. Low-frequency (LF) bats, such as big brown bat, silver-haired bat (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*), typically emit echolocation calls with minimum frequencies equal to or below 30 kHz. The HF and LF species that potentially occur in the Project area are listed in Table 2.

Calls (zero cross) confirmed to be bat passes were then run through the automated identification feature in Kaleidoscope Pro using the Bats of North America classifier 5.1.0 (Wildlife Acoustics) at the neutral sensitivity setting to complete initial identification of potentially occurring species. These settings and versions are approved by the USFWS for acoustic analysis of sensitive species[1]. Despite the capabilities of Kaleidoscope Pro, many bat passes cannot be identified with

[1] This version of Kaleidoscope Pro is approved by the USFWS for the identification of the Indiana bat (*Myotis sodalis*) and northern long-eared bat in the eastern United States (USFWS 2020).

absolute certainty. This is because only call fragments were recorded due to the distance between the bat and microphone, or because many bat species produce similar calls with overlapping call characteristics, depending on the type of activity that the bat was doing and presence of other species, that are often indistinguishable between species. Therefore, automated call identification is imperfect, and each identification has an associated error rate (USFWS 2013, USFWS and US Geological Survey 2019). In addition, the error rates associated with Kaleidoscope Pro identifications of unknown bat calls have not been characterized. For these reasons, the results of the Kaleidoscope Pro analysis can be inaccurate or false positives and should be viewed with caution or verified by a qualified biologist. Only files confirmed as bat passes by a bat biologist were included in the Kaleidoscope. Additionally, a qualified bat biologist reviewed all calls identified as potential northern long-eared bat calls by Kaleidoscope.

23.3 Data Analysis

The number of bat passes per detector-night was used as an index of bat activity. The number of bat passes was determined by an experienced bat acoustic analyst using AnalookW software to view recorded call files. A detector-night was defined as one detector operating for one entire night (at least within one hour of sunrise). Bat passes per detector-night were calculated for all bats, HF bats, and LF bats. Using detector-nights as a metric for calculating bat activity controlled for differences in sampling effort among individual detectors and provided unbiased estimates for the deployed nights. Bat pass rates represent indices of bat activity and do not represent numbers of individuals. Mean bat activity was calculated for each station and overall (overall averages were calculated as an unweighted average of total activity at each individual detector).

The period of peak sustained bat activity was defined as the 7-day period with the highest average bat activity. If multiple 7-day periods equaled the peak sustained bat activity rate, all dates in these 7-day periods were reported. This and all multi-detector averages in this report were calculated as an unweighted average of total activity at each detector.

Mean bat activity was also calculated for a standardized Fall Migration Period (FMP), defined here as July 30 – October 14. WEST defined the FMP as a standard for comparison with activity from other wind projects. During the FMP, bats begin moving toward wintering areas, and many species of bats initiate reproductive behaviors (Cryan 2008). This period of increased landscape-scale movement and reproductive behavior is often associated with increased levels of bat fatalities at operational wind energy facilities (Arnett et al. 2008, Cryan 2008, Arnett and Baerwald 2013, Barclay et al. 2017).

24.0 RESULTS

24.1 Bat Acoustic Surveys

Stations were surveyed for a total of 216 detector-nights from July 8 – October 28, 2020. Overall, stations operated for 95.6% of the sampling period. The cause of lost data was detector malfunction at Station BW2g. Stations recorded a combined total of 976 bat passes[2], for a mean (± standard error) of 4.43 ± 0.62 bat passes per detector-night across all units during the study period (Table 3). At all stations, 66.6% of bat passes were classified as HF (e.g., eastern red bat, little brown bat, western small-footed bat [*Myotis ciliolabrum*]), and 33.4% of bat passes were classified as LF (e.g., big brown bat, hoary bat, and silver-haired bat; Table 3).

Table 3. Results of the acoustic bat surveys conducted at the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020.

	Bat Passes				
Station	**High Frequency**	**Low Frequency**	**Total**	**Detector-Nights**	**Mean Bat Passes/Night (± Standard Error)[1]**
BW1g	551	157	708	113	6.27±1.05
BW2g	99	169	268	103	2.60±0.30
Total (%)	**650 (66.6)**	**326 (33.4)**	**976**	**216**	**4.43±0.62**

[1] ± bootstrapped standard error.

24.1.1 Federally-listed Species

Kaleidoscope potentially detected calls from the federally threatened northern long-eared bat on three nights overall (Table 4). . It is important to note that Kaleidoscope Pro identifications may be viewed as evidence of potential presence for a particular bat species, and presence/ absence surveys in accordance with the USFWS guidelines were not conducted. However, species should not be considered present (or absent) at a station until a qualitative review is conducted to confirm the Kaleidoscope Pro results for each bat species. Qualitative identification of these calls by a qualified biologist determined that these calls were not produced by this species and therefore northern long-eared bat was not detected at the Project.

24.1.2 Spatial Variation

Overall, activity was highest at Station BW1g and lowest at Station BW2g. Activity at BW1g was predominantly comprised of HF bat passes (77.8%) and activity at BW2g was comprised of LF (63.1%) (Table 3, Figure 3).

[2] Between 30 minutes prior to sunset and 30 minutes after sunset during fully operational nights.

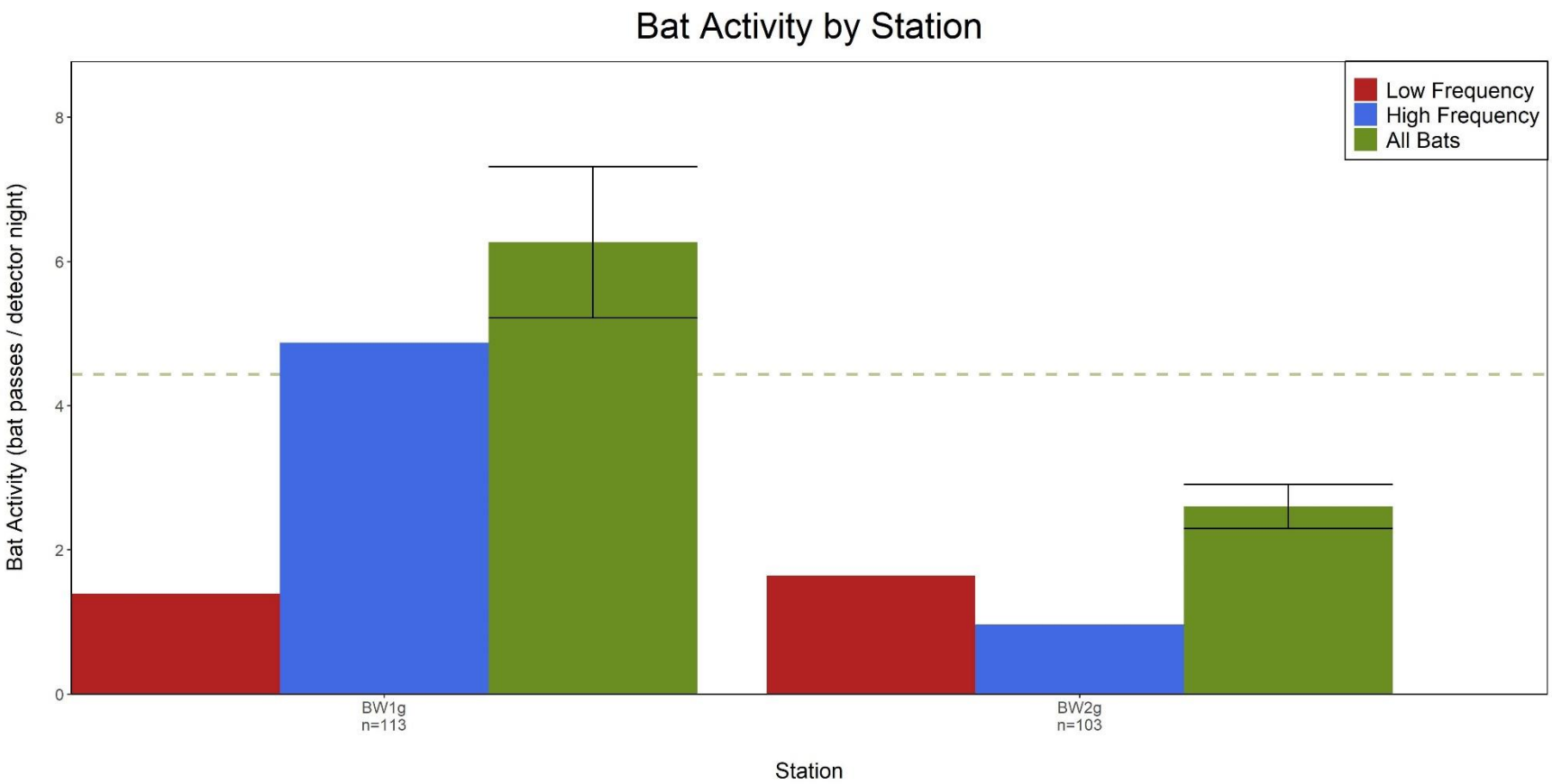

Figure 3. Number of high-frequency (HF) and low-frequency (LF) bat passes per detector-night recorded at acoustic monitoring stations within the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020. (The bootstrapped standard errors are represented by the black error bars on the "All Bats" columns.)

24.1.3 Seasonal Variation

Overall weekly bat activity increased from the beginning of the survey (Figure 4) to a peak (16.7 bat passes per detector-night) from July 27 – August 2, 2020, and rapidly decreased after the first week of August. The peak in activity which was mainly driven by HF bat activity or little brown activity at BW1g, but also other species such as (Table 5). LF bat activity peaked (5.4 bat passes per detector-night) one month later, from August 22 – 28, 2020, and was mainly comprised of species (Table 5, Figure 4). Overall bat activity decreased after August through the end of the study period. (Figure 4). Overall bat activity during the FMP was 4.42 ± 0.78 bat passes per detector-night.

Table 5. Periods of peak activity for high-frequency (HF), low-frequency (LF), and all bats at the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020.

Species Group	Start Date of Peak Activity	End Date of Peak Activity	Bat Passes per Detector-Night
HF	July 27	August 2	15.1
LF	August 22	August 28	5.4
All Bats	July 27	August 2	16.7

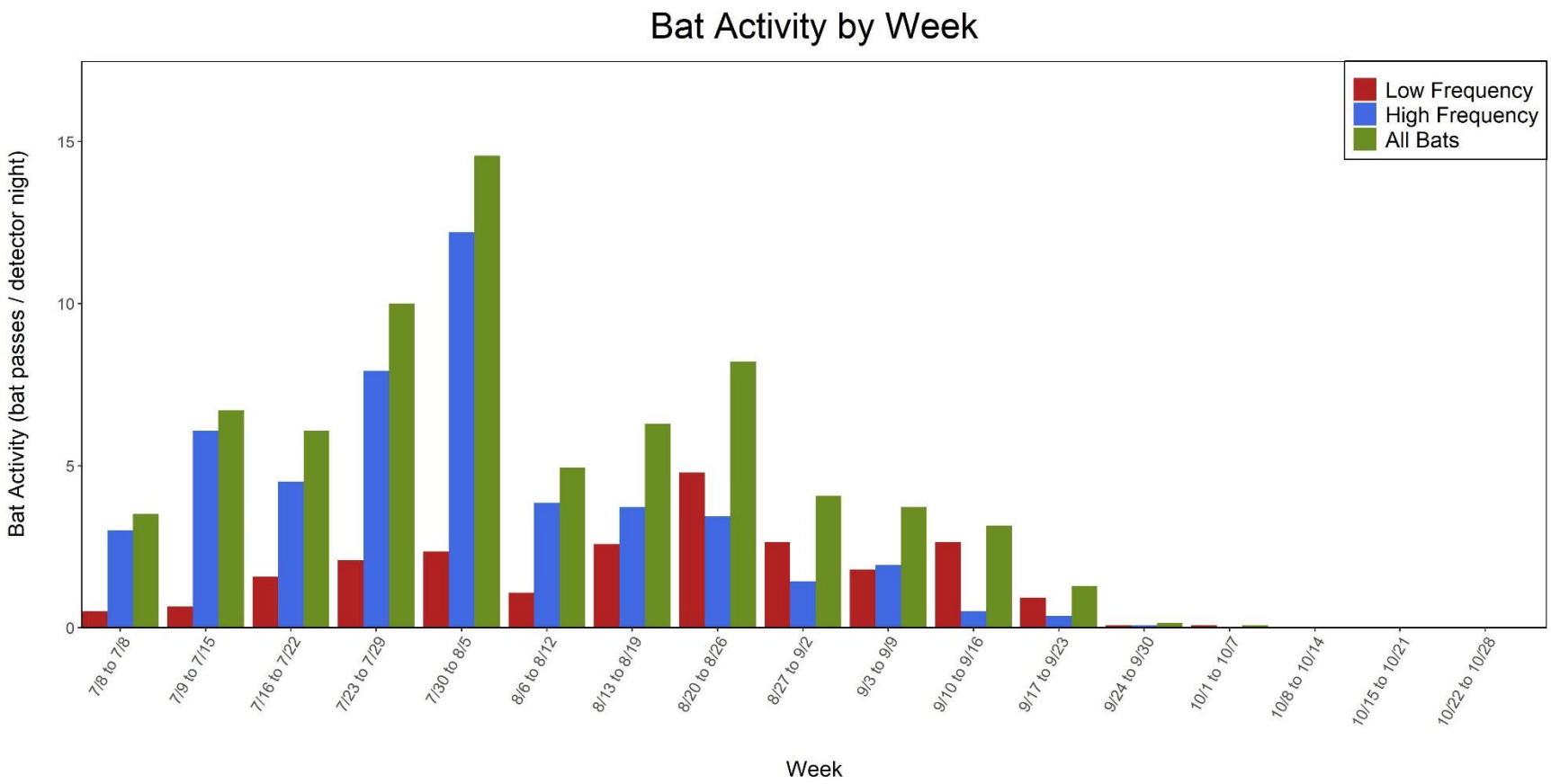

Figure 4. Weekly patterns of bat activity (average bat passes/detector-night/week) by high-frequency (HF), low-frequency (LF), and all bats at acoustic monitoring stations within the proposed Bowman Wind Project in Bowman County, North Dakota for the survey period July 8 – October 28, 2020.

25.0 DISCUSSION AND CONCLUSIONS

Acoustic monitoring stations were located in open herbaceous grassland and cropland habitat, which are representative of areas where turbines may be sited. Open habitat typically results in decreased bat activity relative to habitat near open water, forested, or riparian habitats that have the tendency to attract bats for foraging and roosting opportunities (Brooks and Ford 2005). Overall bat activity during the FMP (4.42 ± 0.78 bat passes per detector-night) was lower than other published pre-construction bat acoustic activity rates in the Midwest (WEST 2019, AWWI 2018). In addition, the rates recorded at the Project bySM3 detectors are likely higher because SM3 detectors typically record two to three times more bat passes per detector-night than AnaBat (Titley Scientific, Columbia, Missouri) detectors (Bishop-Boros et al. 2020) and the majority of published FMP activity estimates (WEST 2019) are based on AnaBat data. Acoustic surveys for bats were first recommended as a risk assessment tool soon after large-scale bat fatality events at wind facilities were first documented (Arnett et al. 2005). The timing of highest bat activity was consistent with peak fatality periods at operating wind energy facilities (Johnson et al. 2004, Arnett et al. 2008), and it was assumed the magnitude of pre-construction bat activity would similarly predict the magnitude of post-construction bat fatalities (Kunz et al. 2007). However, recent research has found pre-construction bat activity does not predict post-construction bat fatality rates (Hein et al. 2013, Solick et al. 2020). Although pre-construction bat activity rates are not strongly correlated with post-construction bat fatality rates (Solick et al. 2020), pre-construction acoustic surveys still provide useful information about spatial use in the development area, seasonal activity peaks, and potential species composition.

Kaleidoscope potentially detected calls from the federally threatened northern long-eared bat on three nights overall (Table 4). Qualitative identification of these calls by a qualified biologist determined that these calls were not produced by this species.

Bat activity was relatively low throughout the study period and peaked from late July through August which is consistent with the timing of peak fatalities for most wind energy facilities in the US (AWWI 2018). Fatality rates at the Project are more likely to be predicted by fatality rates from nearby wind projects, especially if habitat is similar. The nearest publicly available wind energy facility is the Prairie Winds ND1 wind facility (PW ND1), located approximately 167 miles (268 kilometers) northeast of the Project, which has similar land cover dominated by cattle ranching followed by farming. PW ND1 reported a relatively low bat fatality rate (2.13 bat fatalities/megawatt (MW)/study period; Derby et al. 2011). Due to similarity in land cover and the proximity in North Dakota, the Project may have similarly low bat fatality rates. However, the Project will have larger but fewer turbines per MW, which may influence fatality rates per MW and make the comparison to PW ND1 less meaningful (Electric Power Research Institute 2020).

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Appendix C. US Fish and Wildlife Service Information, Planning and Consultation System Resource List and Species of Habitat Fragmentation Concern

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Bowman County, North Dakota

Local office

North Dakota Ecological Services Field Office

- (701) 250-4481
- (701) 355-8513

3425 Miriam Avenue

Bismarck, ND 58501-7926

http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm

https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds 1/13

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species and their critical habitats are managed by the Ecological Services Program[1] of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries).[2]

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

NOT FOR CONSULTATION

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis — Threatened

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9045

Birds

NAME	STATUS
Whooping Crane Grus americana	Endangered

There is **final** critical habitat for this species. Your location is outside the critical habitat.

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

https://ecos.fws.gov/ecp/species/758

Additional information can be found using the following links:

Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
Measures for avoiding and minimizing impacts to birds
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
Nationwide conservation measures for birds
http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on

this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Baird's Sparrow *Ammodramus bairdii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5113	Breeds Dec 1 to Aug 31
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds May 15 to Aug 10
Brewer's Sparrow *Spizella breweri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	

NOT FOR CONSULTATION

Burrowing Owl Athene cunicularia

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

Breeds Mar 15 to Aug 31

Breeds May 1 to Aug 10

Chestnut-collared Longspur Calcarius ornatus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
Breeds Jan 1 to Dec 31

Clark's Grebe Aechmophorus clarkii
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
Breeds Mar 15 to Aug 15

Ferruginous Hawk Buteo regalis
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/6038
Breeds Jan 1 to Aug 31

Golden Eagle Aquila chrysaetos
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/1680
Breeds May 10 to Aug 15

Lark Bunting Calamospiza melanocorys
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
Breeds elsewhere

Lesser Yellowlegs Tringa flavipes
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679
Breeds Apr 1 to Jul 31

Long-billed Curlew Numenius americanus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511
Breeds May 1 to Jul 31

Marbled Godwit Limosa fedoa
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481
Breeds May 1 to Aug 15

Mccown's Longspur Calcarius mccownii
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9292

NOT FOR CONSULTATION

Red-headed Woodpecker Melanerpes erythrocephalus

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 10 to Sep 10

Sprague's Pipit Anthus spragueii — Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8964

Willet Tringa semipalmata — Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ( )

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

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Survey Effort ( )

https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds 6/13

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data ( )
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Burrowing Owl BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

DRAFT FOR CONSULTATION

NOT FOR CONSULTATION

NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

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What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
Des Lacs National Wildlife Refuge	0 acres

- (701) 385-4046
- (701) 385-3214

42000 520th St Nw
Kenmare, ND 58746

https://www.fws.gov/refuges/profiles/index.cfm?id=62570

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1Fh
- PEM1Ah
- PEM1Ch
- PEM1C
- PEM1Cx

FRESHWATER POND

- PABFh
- PABKx
- PABF
- PUSC
- PUSAh
- PUBFx
- PABFx
- PUSA
- PUSCh
- PUSCx

LAKE

- L2ABFh
- L1UBGh
- L2USAh

RIVERINE

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R2USA
R4SBC
R5UBH
R2USC

A full description for each wetland code can be found at the National Wetlands Inventory website **Data**

limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds 13/13

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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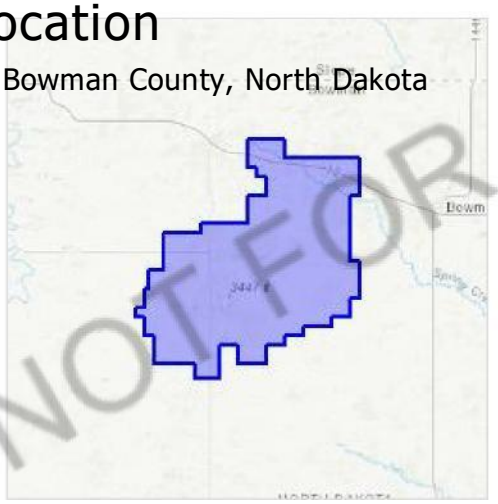
Location

Bowman County, North Dakota



Local office

North Dakota Ecological Services Field Office

- (701) 250-4481
- (701) 355-8513

3425 Miriam Avenue

Bismarck, ND 58501-7926

http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm

https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds 1/10

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species and their critical habitats are managed by the Ecological Services Program[1] of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries).[2]

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

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Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis — Threatened

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9045

Birds

NAME	STATUS
Whooping Crane Grus americana	Endangered

There is **final** critical habitat for this species. Your location is outside the critical habitat.

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

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Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

https://ecos.fws.gov/ecp/species/758

Additional information can be found using the following links:

Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
Measures for avoiding and minimizing impacts to birds
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
Nationwide conservation measures for birds
http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on

this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Chestnut-collared Longspur Calcarius ornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Lark Bunting Calamospiza melanocorys This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 15
Long-billed Curlew Numenius americanus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Marbled Godwit Limosa fedoa This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31

NOT FOR CONSULTATION

https://ecos.fws.gov/ecp/species/9481

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ( )

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ( )

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data ( )

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

NOT FOR CONSULTATION

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

probability of presence breeding season survey effort no

9/11/2020 IPaC: Explore Location

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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that

area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

NOT FOR CONSULTATION

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

NOT FOR CONSULTATION

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1C
- PEM1Ch
- PEM1Fh
- PEM1Ah
- PEM1Cx
- PEM1Ax
- PEM1Ad

FRESHWATER POND

- PABFh
- PUSA
- PUBFx
- PUSC
- PUSCh
- PABF
- PUSAh

LAKE

- L2ABFh
- L2USAh
- L2USCh

RIVERINE

- R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website **Data limitations**

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

NOT FOR CONSULTATION

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds 10/10

North Dakota Field Office

Mountain-Prairie Region

SPECIES OF HABITAT FRAGMENTATION CONCERN

Baird's Sparrow (pdf) (93kb)

Bobolink (pdf) (52 kb)

Chestnut-collard Longspur (pdf) (98 kb)

Grasshopper Sparrow (pdf) (48 kb)

Greater Prairie Chicken (pdf) (64 kb)

Greater Sage Grouse (pdf) (48 kb)

Harrier (pdf) (73 kb)

Sedge Wren (pdf) (74 kb)

Sharp-tailed Grouse (pdf) (99 kb)

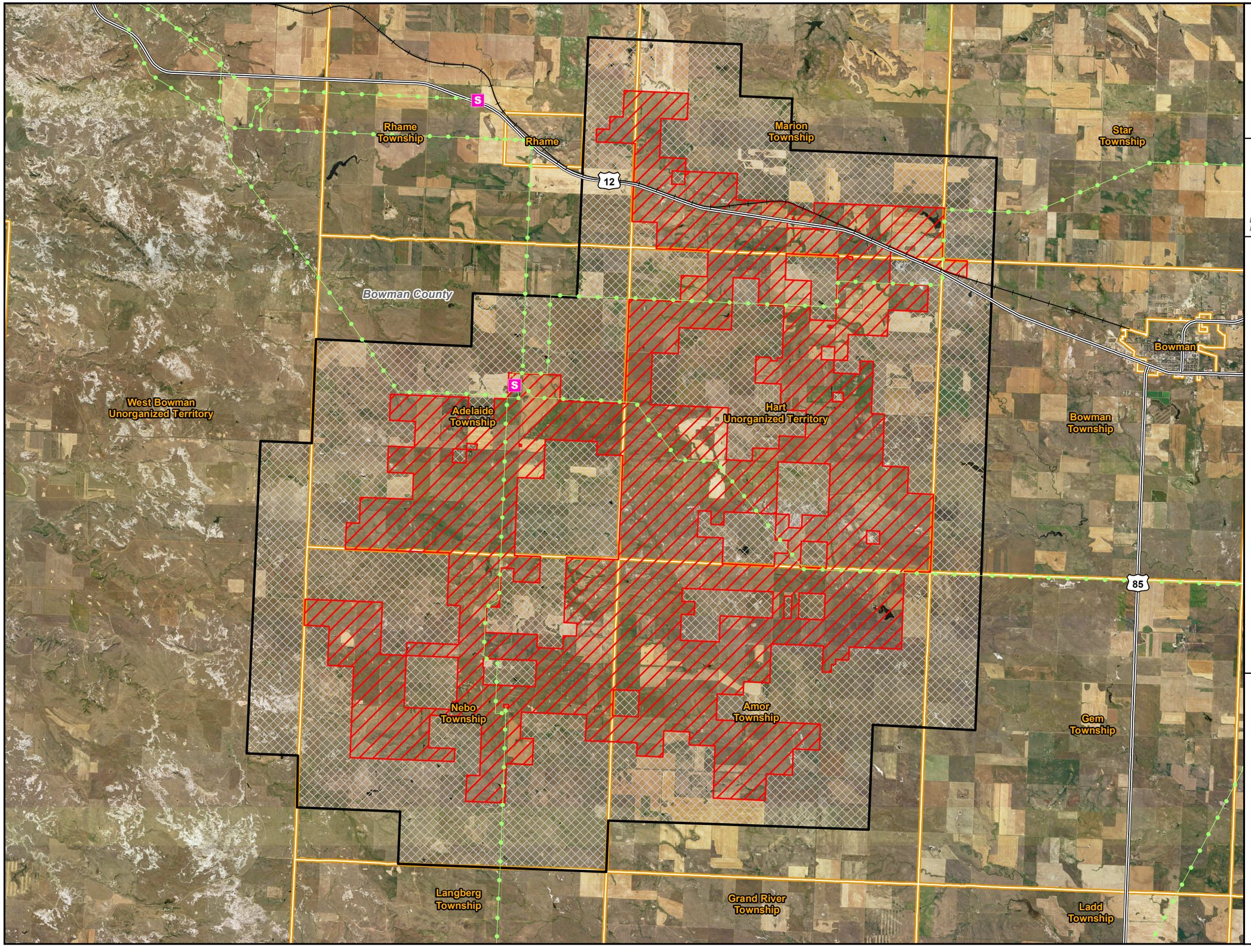
Sprague's Pipit (pdf) (105 kb)

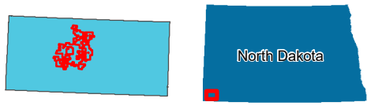
Upland Sandpiper (pdf) (94kb)

Last updated: February 19, 2013

http://www.fws.gov/northdakotafieldoffice/species_of_habitat_fragmentation.htm 1/1

Figures





0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ND GIS Hub, ESRI
Imagery: NAIP 2018

- Existing Substation
- Existing Transmission Line
- City/Township
- Project Boundary
- Study Area
- Non-Participating Landowner Parcel

Figure 1
Preliminary Project Area

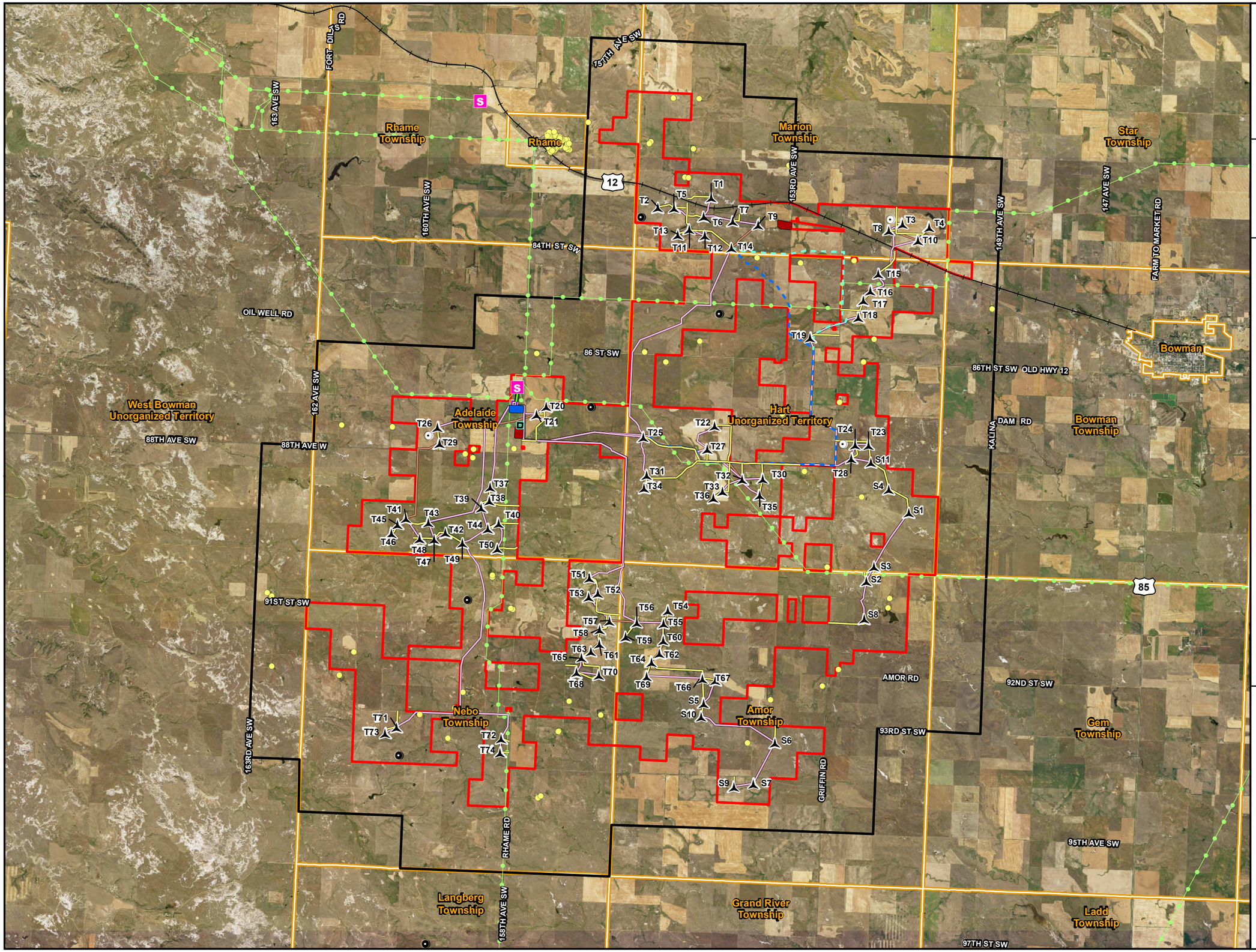
Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig01_Bowman_Project_Location.mxd
Date: (3/25/2021)



*Turbines Not to Scale

Figure 2
Facilities Layout

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\PermittingSite_PermitMapping\Fig02_Bowman_Facilities_Layout.mxd
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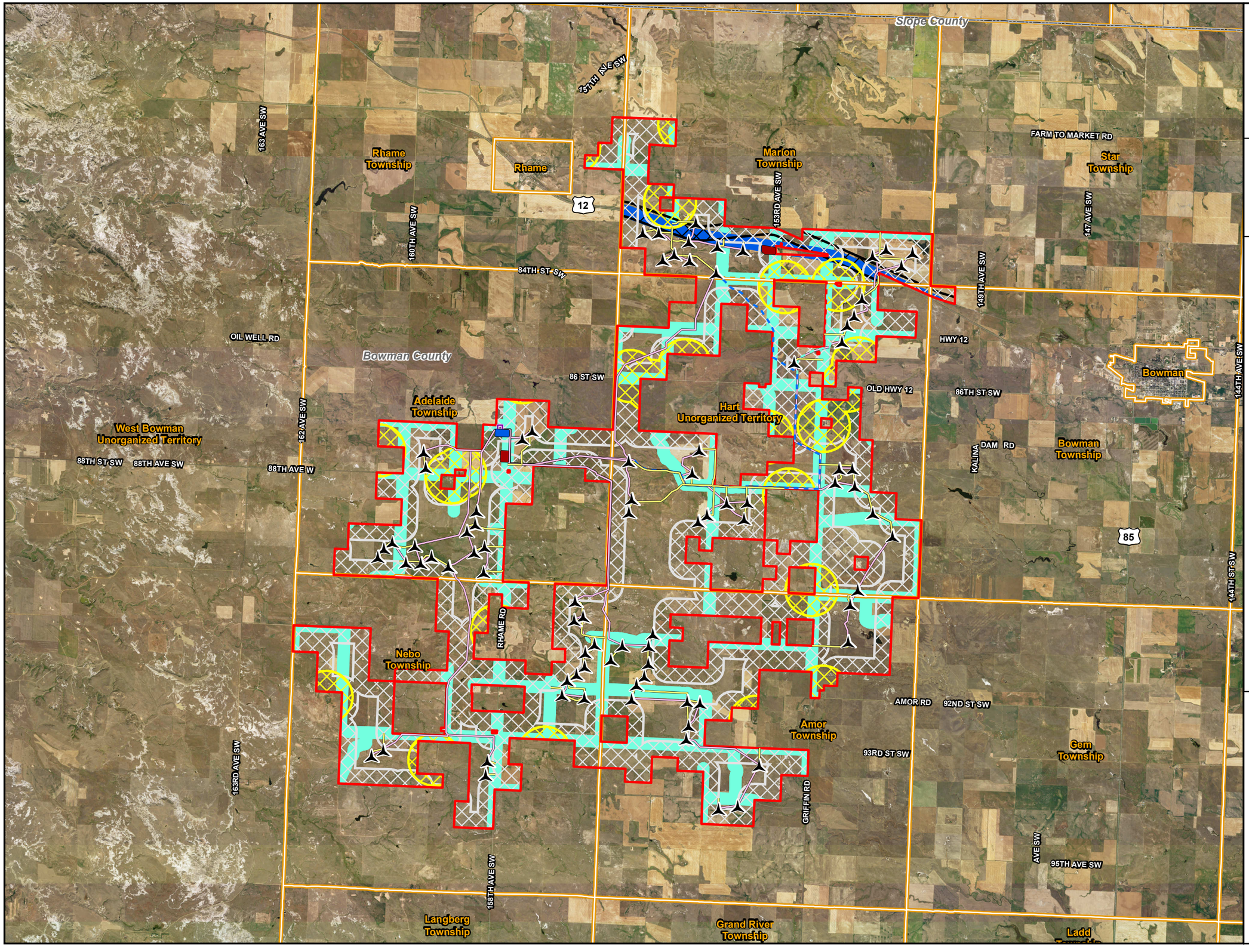

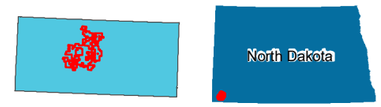

0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ND GIS Hub, ESRI
Imagery: ND GIS 2018

- Proposed Turbine
- Access Road
- Underground Collection Line
- Underground Collection Line - Alternate 1
- Underground Collection Line - Alternate 2
- Project Substation
- Laydown Yard
- Battery Storage
- Project Boundary
- City/Township

Exclusion Area

- County and Maintained Road
- Interstate and State Roadway
- Non-Participating Residence
- Nonparticipating Landowner Parcel Line
- Railroad

*Turbines Not to Scale

Figure 3
Exclusion Areas

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig03_Bowman_Exclusion_Areas.mxd
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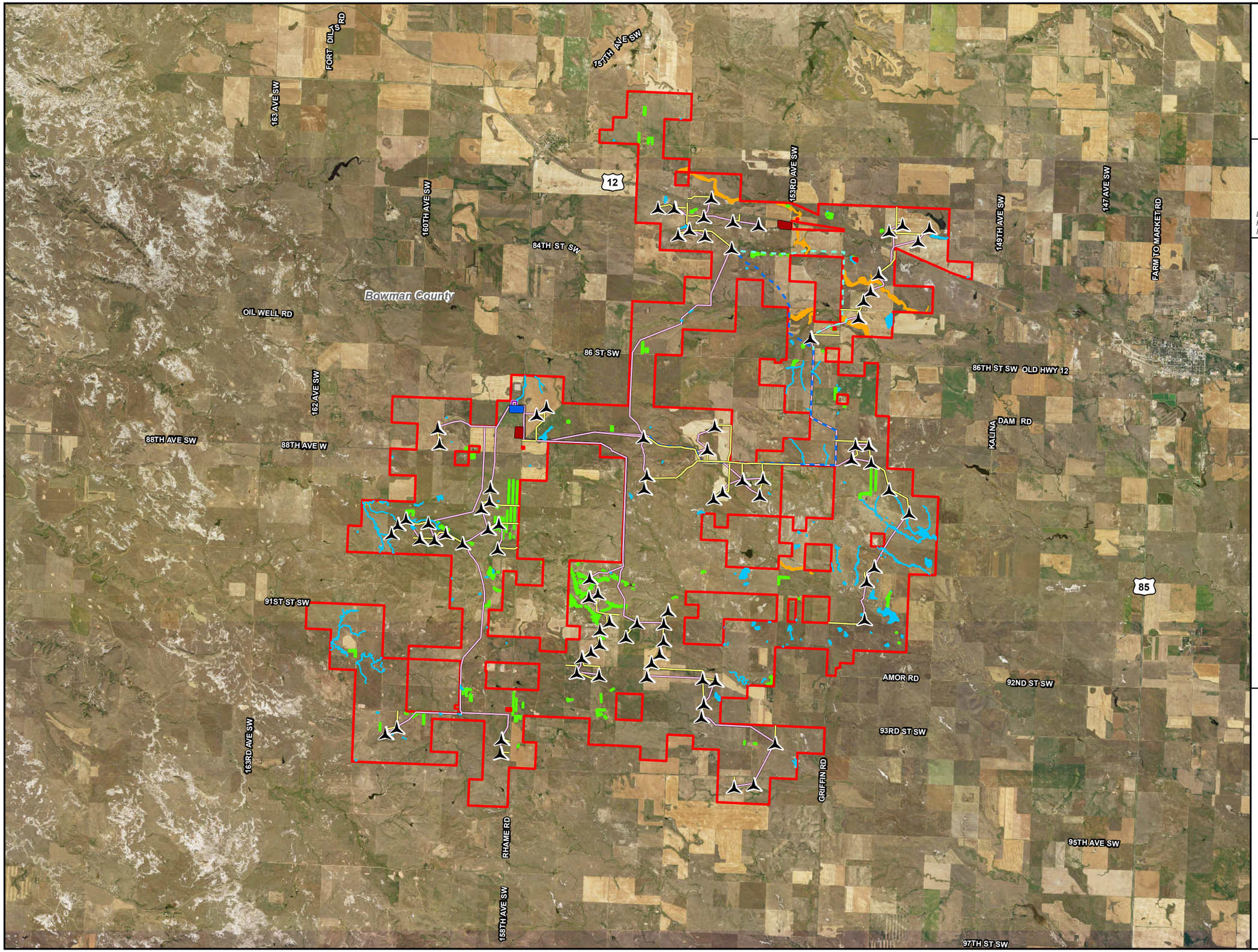

0 1 2 Miles

1:110,000

Data Source: Apex, US Census, ND GIS Hub, ESRI FEMA
Imagery: ND GIS 2018

N

- Proposed Turbine
- Access Road
- Underground Collection Line
- Underground Collection Line - Alternate 1
- Underground Collection Line - Alternate 2
- Project Substation
- Battery Storage
- Laydown Yard
- Project Boundary

Avoidance Areas

- Delineated Wetland
- Woodland (Desktop Delineated)
- 100-year Floodplain

*Turbines Not to Scale

Figure 4
Avoidance Areas

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig04_Bowman_Avoidance_Areas.mxd

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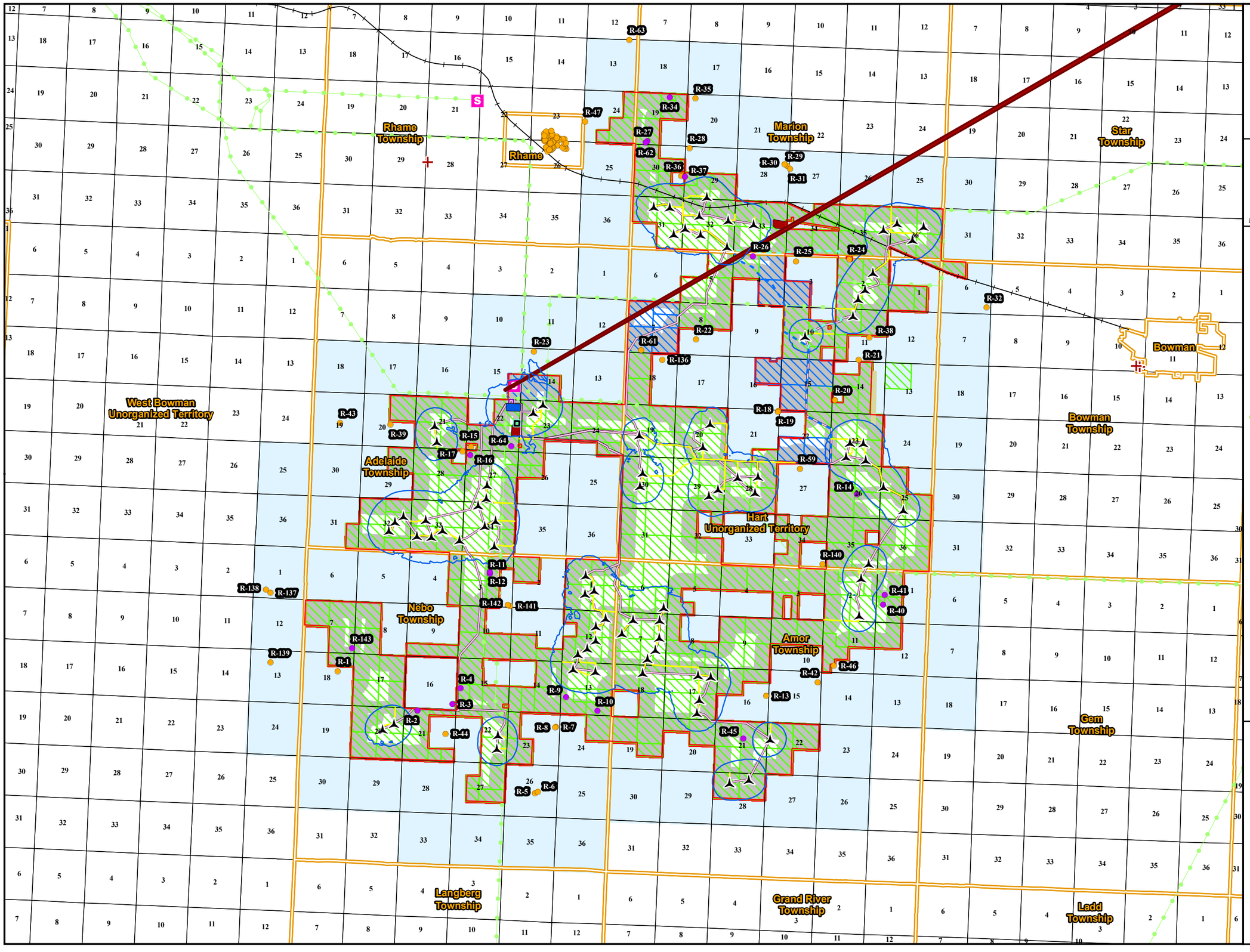
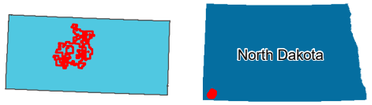




0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ND GIS Hub, ESRI

- Proposed Turbine
- Non-Participant (within one mile of Project Area)
- Participant (within one mile of Project Area)
- Access Road
- Underground Collection Line
- Underground Collection Line - Alternate
- Underground Collection Line - Alternate
- Existing Substation
- Cemetery
- Existing Transmission Line
- Sound Level Isoline - 45dBA
- Project Substation
- O&M Facility
- Laydown Yard
- Battery Storage
- Project Boundary
- Study Area
- Setback
- Shooting Range
- Microwave Beam Path
- Participant
- Pending Participant
- City/Township
- Section Boundary

*Turbines Not to Scale
** Residence IDs are provided for residences outside the Town of Rhame

Figure 5
Constraints Map

Bowman Wind Project

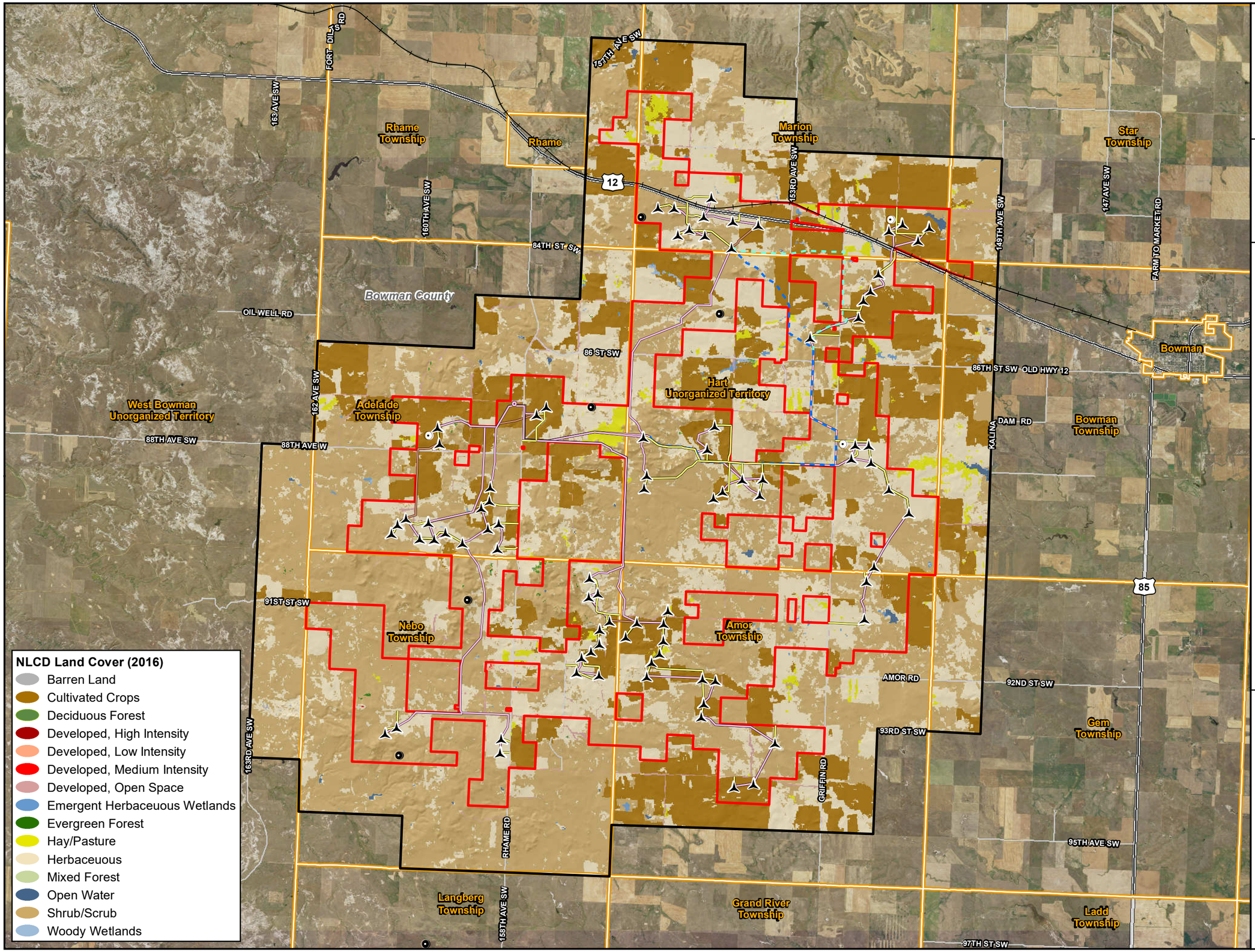
Bowman County, North Dakota

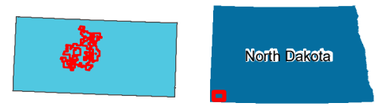
BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig05_Bowman_Constraints.mxd

Date: (3/25/2021)





0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ESRI, NLCD
Imagery: USGS NED 10M

- Proposed Turbine
- Permanent Met Tower
- Temporary Met Tower
- Access Road
- Underground Collection Line
- Underground Collection Line - Alternate 1
- Underground Collection Line - Alternate 2
- Crane Path
- City/Township
- Project Boundary
- Study Area

*Turbines Not to Scale

Figure 6
Land Use

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig06_Bowman_Landuse.mxd
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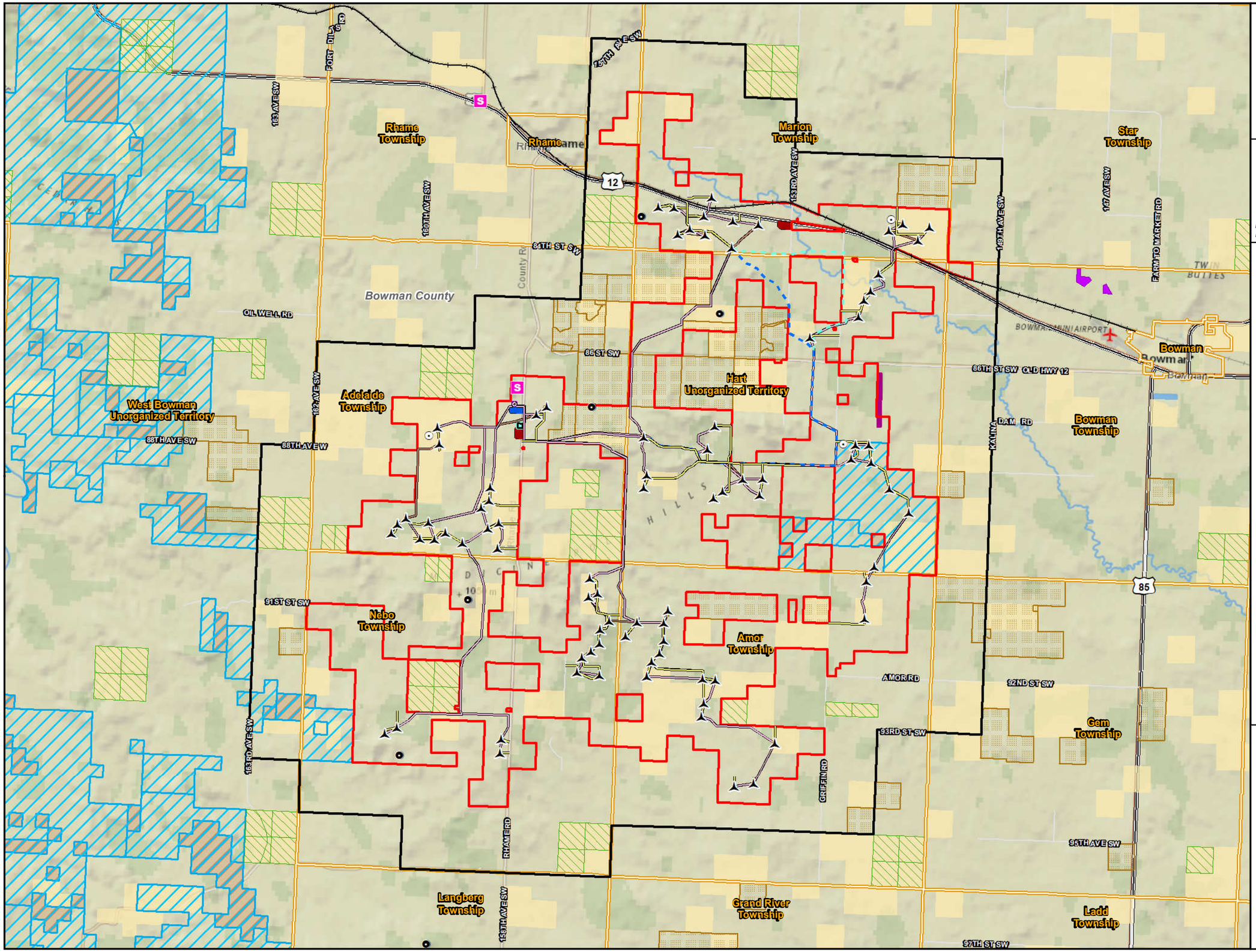

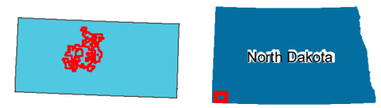

0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ESRI, NCED, NDHUB
Imagery: National Geographic

- Proposed Turbine
- Permanent Met Tower
- Temporary Met Tower
- Existing Substation
- Access Road
- Crane Path
- Underground Collection Line
- Underground Collection Line - Alternate 1
- Underground Collection Line - Alternate 2
- Project Substation
- Battery Storage
- O&M Facility
- Laydown Yard
- Project Boundary
- Study Area
- PLOTS Land
- Shooting Range
- NCED Conservation Easement
- BLM Owned Lands
- North Dakota Trust Lands – Surface
- North Dakota Trust Lands – Mineral
- BLM Grazing Allotments (Private Land in Project Area)
- City/Township

*Turbines Not to Scale

Figure 7
Public Lands and Easements

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig07_Bowman_Public_Lands_Easements.mxd
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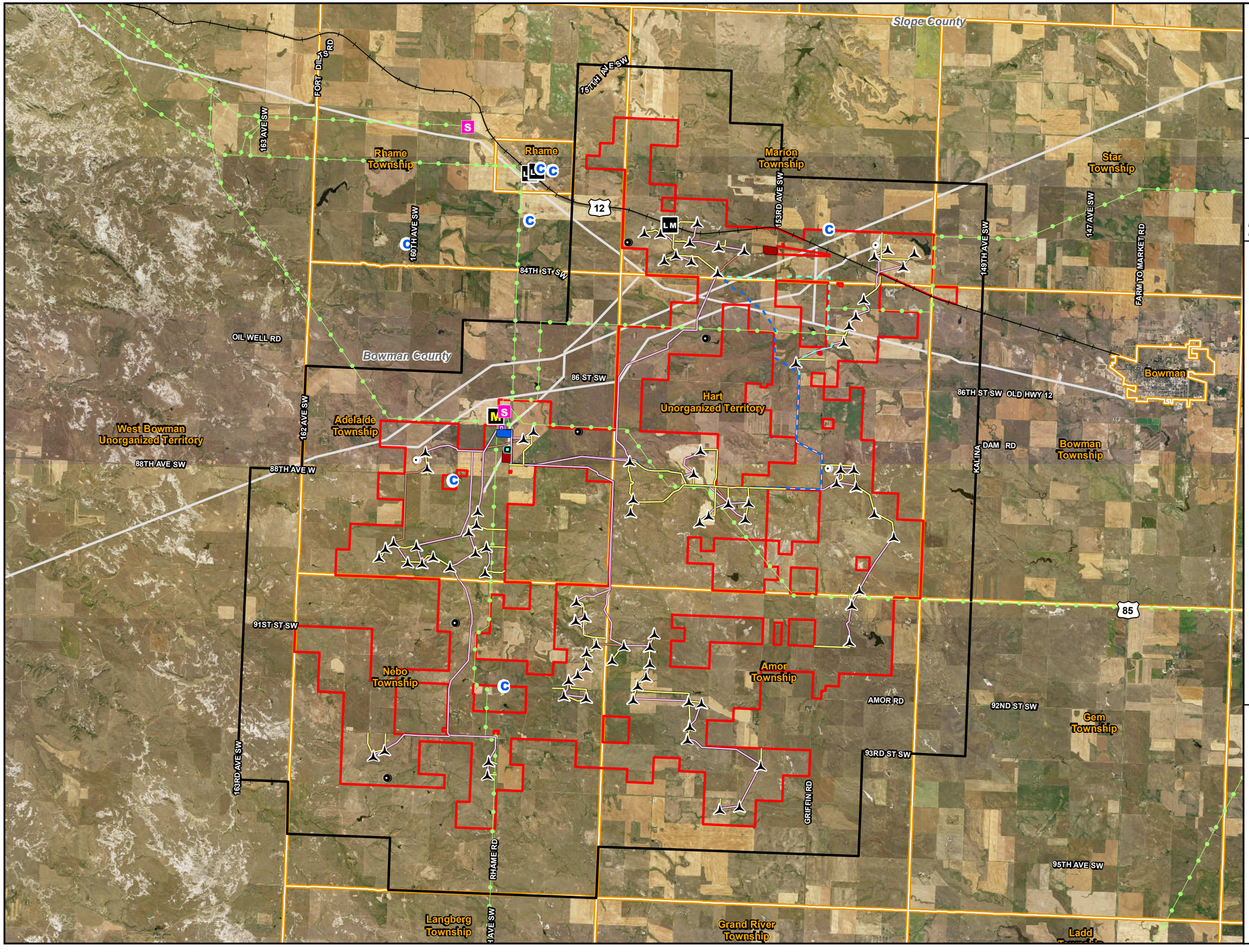

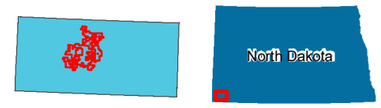

0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ESRI, NCED
Imagery: NAIP 2018

- Proposed Turbine
- Communication Tower
- Land Mobile
- Microwave Tower
- Permanent Met Tower
- Temporary Met Tower
- Existing Substation
- Access Road
- Crane Path
- Underground Collection Line
- Underground Collection Line - Alternate 1
- Underground Collection Line - Alternate 2
- Existing Pipeline
- Existing Transmission Line
- Project Boundary
- Study Area
- Project Substation
- O&M Facility
- Laydown Yard
- Battery Storage
- City/Township

*Turbines Not to Scale

Figure 8
Infrastructure

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\fig08_Bowman_Infrastructure.mxd
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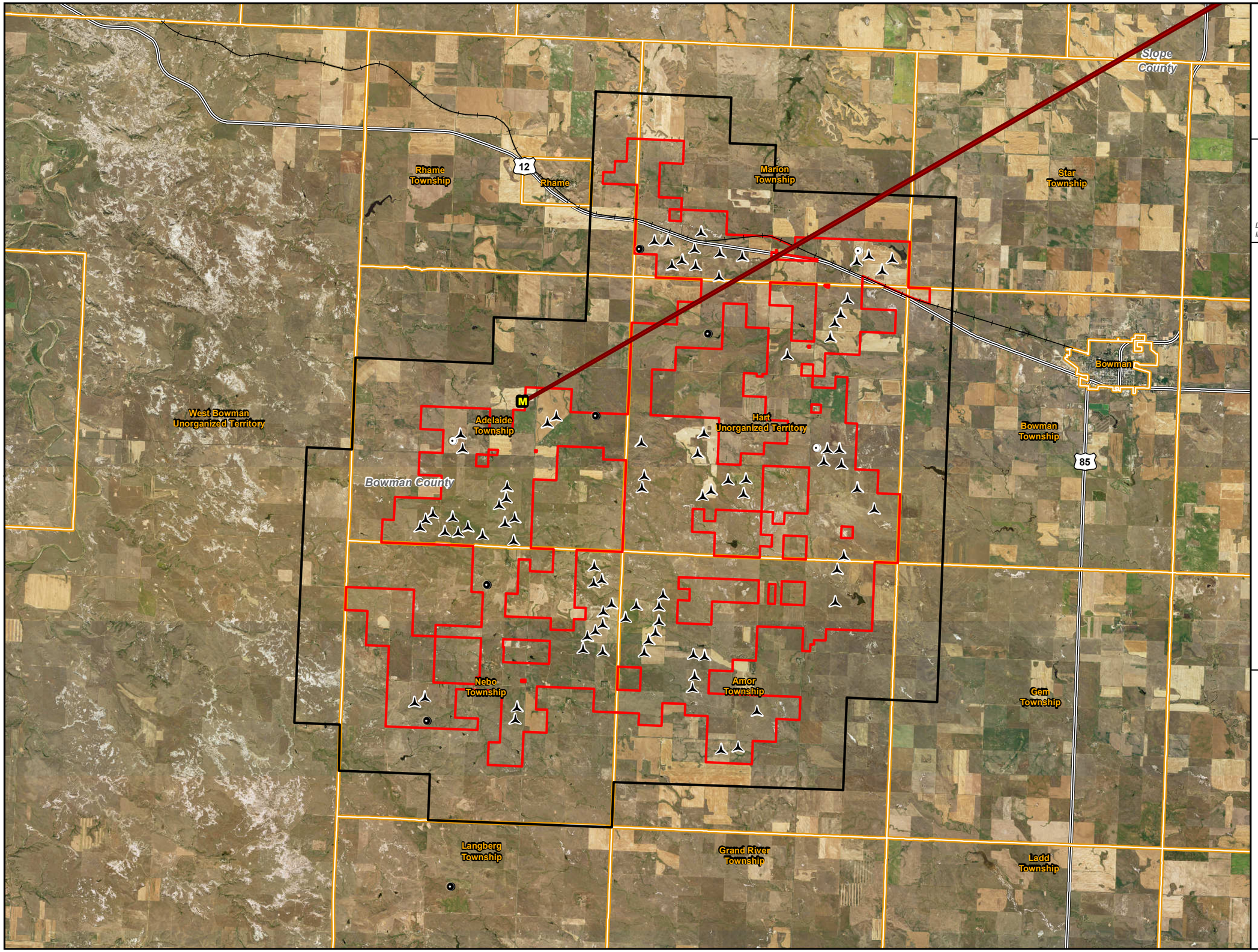

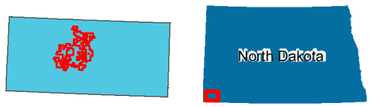

0 1 2 Miles

1:125,373

N

Data Source: Apex, US Census, ND GIS Hub, ESRI
Imagery: NAIP 2018

- Proposed Turbine
- Permanent Met Tower
- Temporary Met Tower
- Microwave Tower
- Microwave Beam Path
- City/Township
- Project Boundary
- Study Area

*Turbines Not to Scale

Figure 9
Microwave Beam Path Fresnel Zones

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig09_Bowman_Microwave_Beam_Path.mxd
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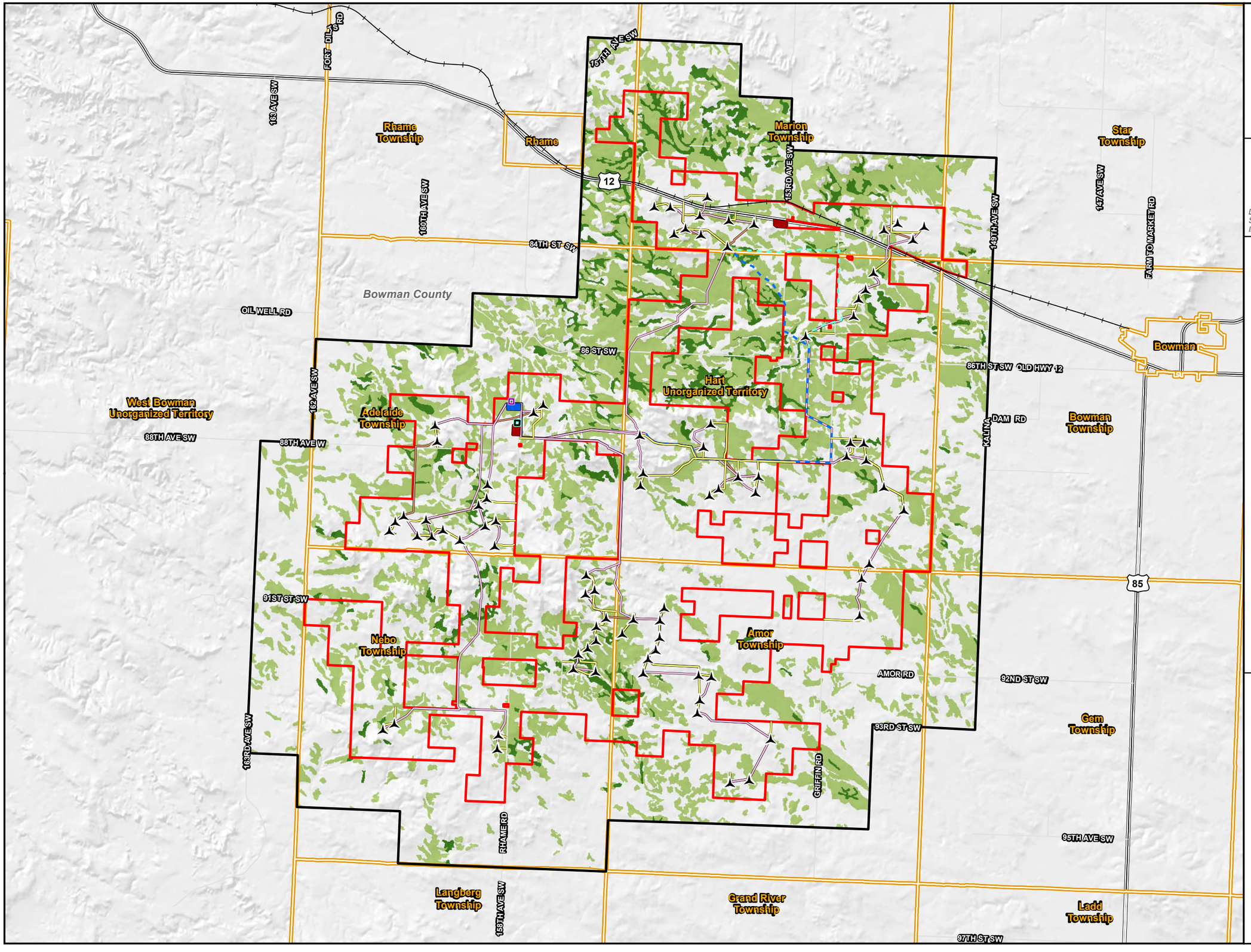

*Turbines Not to Scale

Figure 10
Prime and Unique Farmland

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig10_Bowman_Unique_Prime_Farmland.mxd
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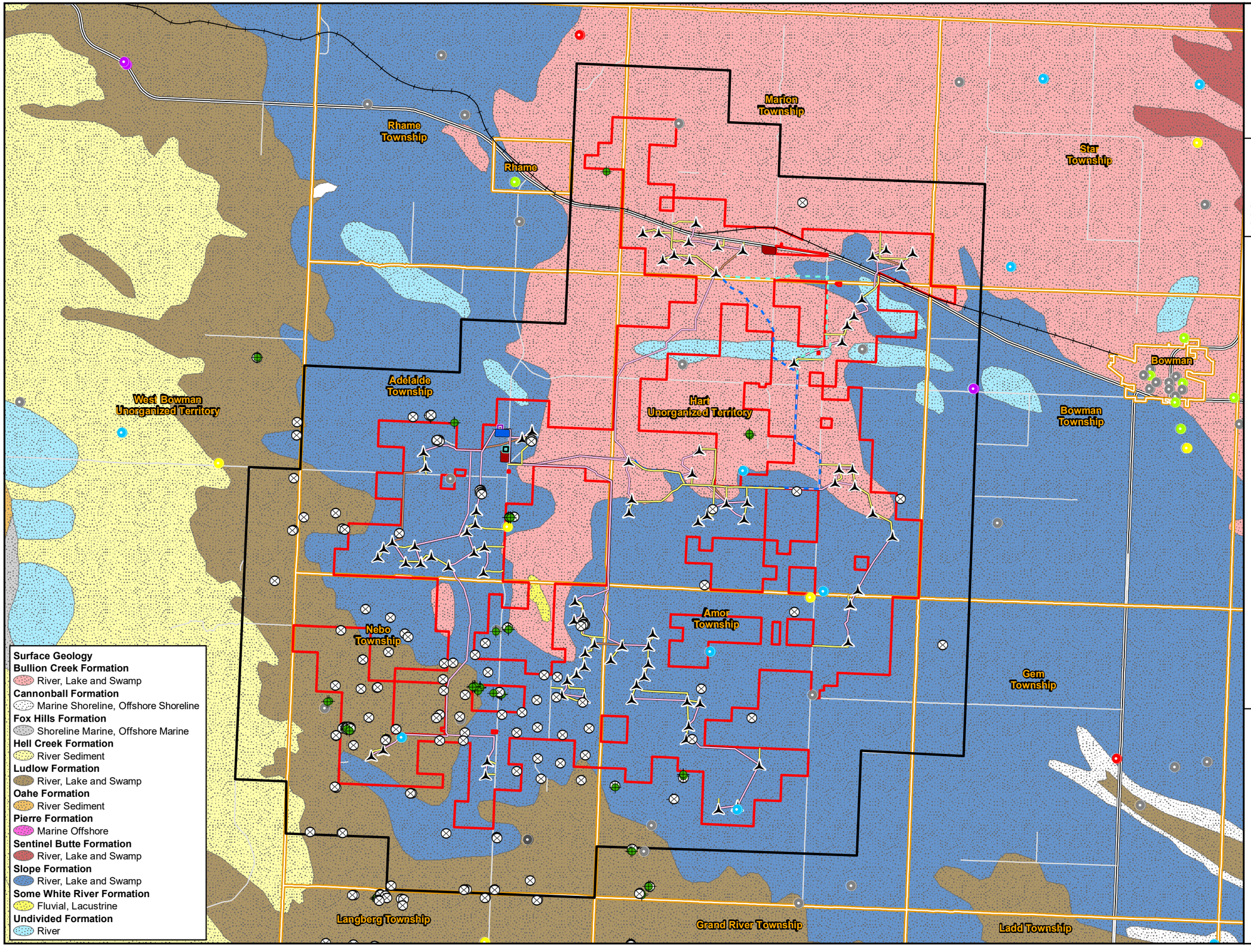

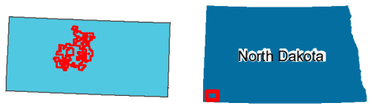

0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ND GIS Hub, NDSWC, NDGS, ESRI Imagery: USGS NED 10M

- Proposed Turbine
- Access Road
- Crane Path
- Underground Collection Line
- Underground Collection Line - Alternate 1
- Underground Collection Line - Alternate 2
- Project Substation
- Battery Storage
- O&M Facility
- Laydown Yard
- Project Boundary
- Study Area
- City/Township
- Oil - Gas
- Storage Tank

SWC Well

- Domestic Well
- Observation Well
- Observation Well - Destroyed
- Observation Well - Plugged
- Production Well
- Stock Well
- Unknown

*Turbines Not to Scale

Figure 11
Geologic and Groundwater Resources

Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig11_Bowman_Geologic_Groundwater_Resources.mxd

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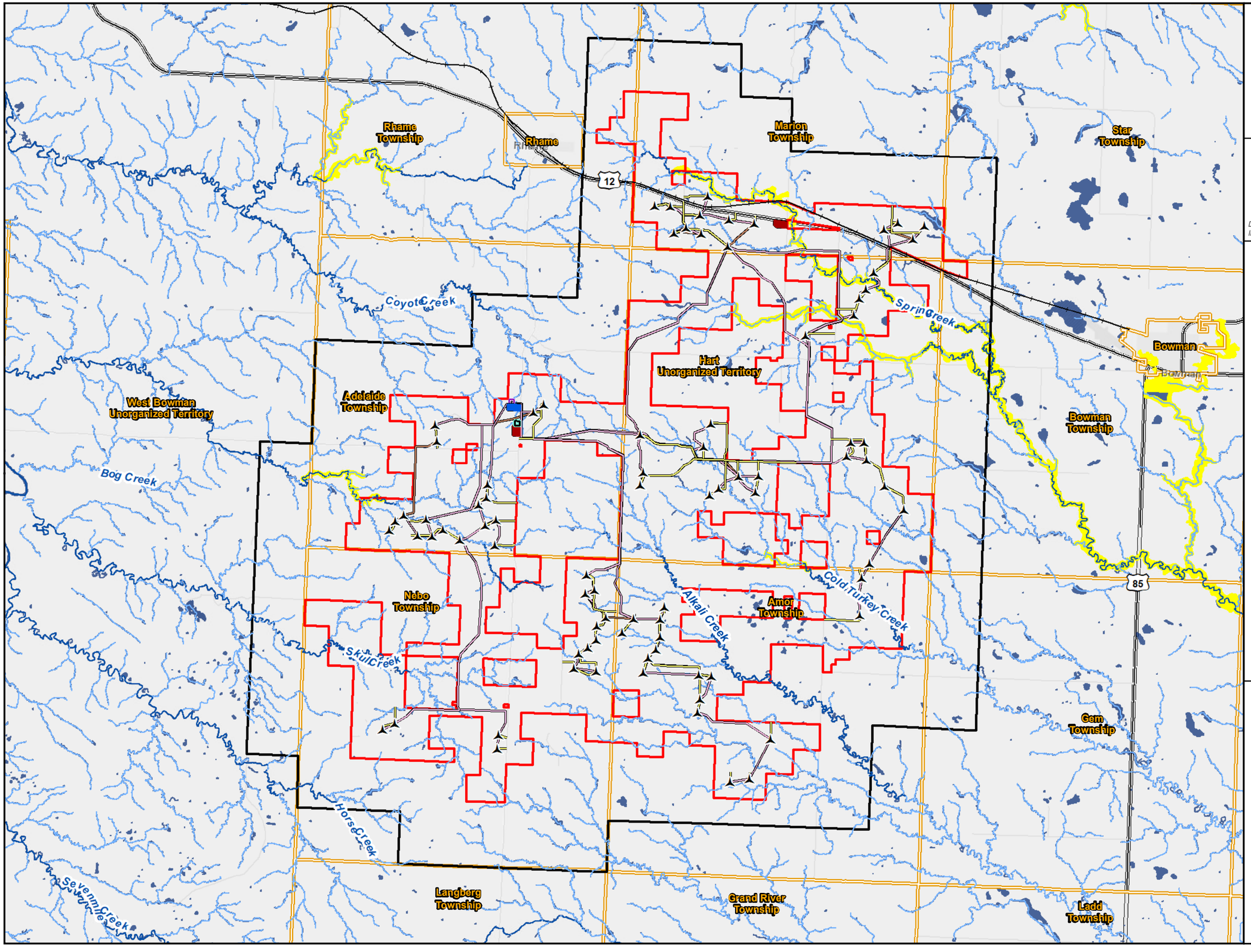
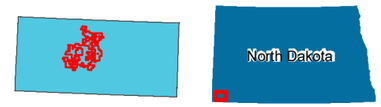




0 1 2 Miles

1:110,000

N

Data Source: Apex, US Census, ESRI, USGS, USFWS
Imagery: USGS The National Map 3DEP

- Proposed Turbine
- Existing Substation
- Access Road
- Crane Path
- Underground Collection Line
- Existing Transmission Line
- Project Substation
- O&M Facility
- Laydown Yard
- Project Boundary
- Study Area
- Battery Storage
- City/Township
- Stream/River - Perennial
- Stream/River - Intermittent/ Other
- NWI Wetland
- 100-year Floodplain

*Turbines Not to Scale

Figure 12
Surface Water and NWI Wetlands

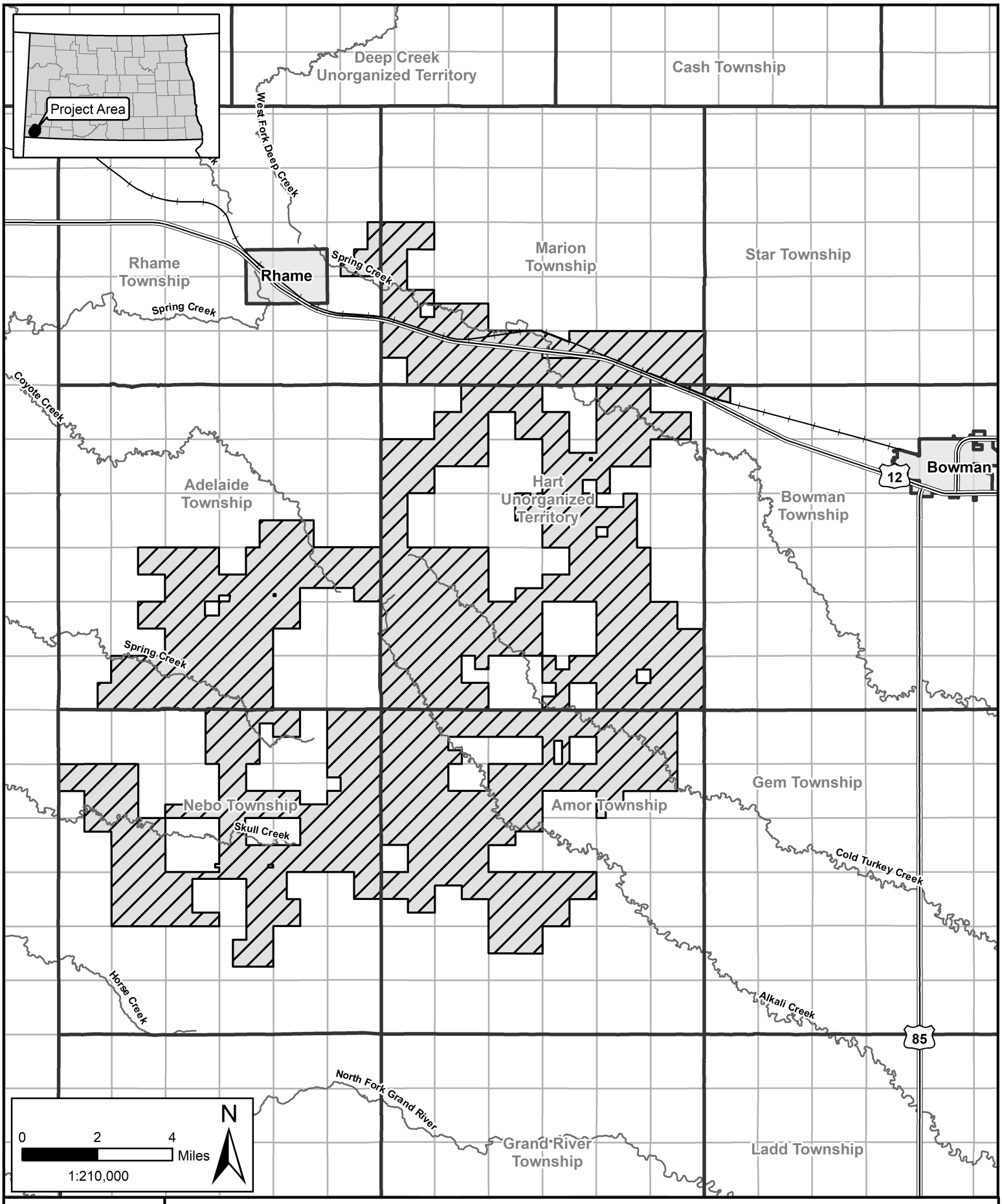
Bowman Wind Project

Bowman County, North Dakota

BOWMAN WIND

For Environmental Review Purposes Only

Source: Z:\Clients\A_D\Apex\Bowman\Permitting\Site_Permit\Mapping\Fig12_Bowman_Water_Features.mxd
Date: (3/25/2021)



BOWMAN WIND

Figure 13
Bowman Wind Project
Bowman County, North Dakota