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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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.

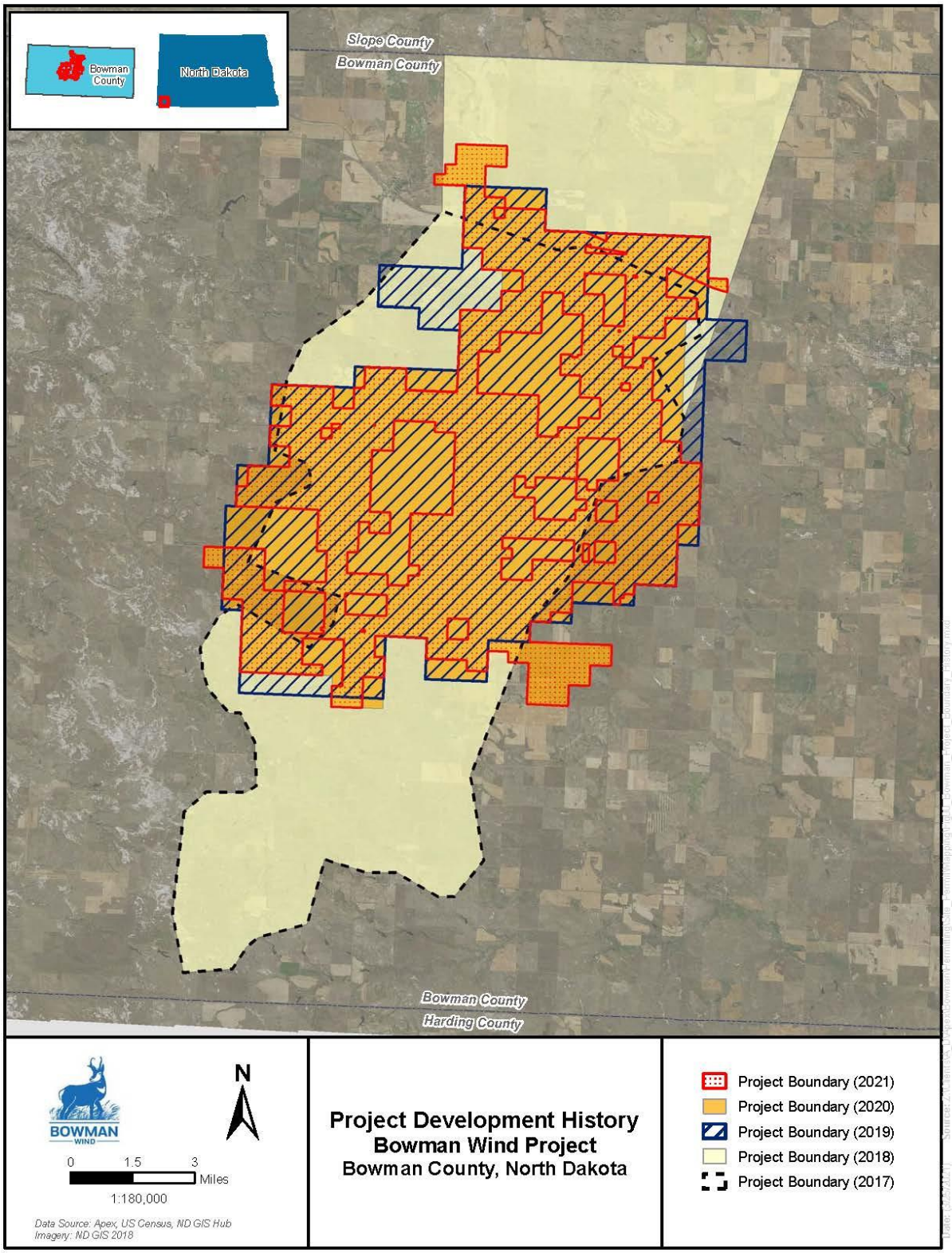
2020

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.

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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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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.

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