BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

March 3, 2025

Mr. Steve Kahl, Executive Director
North Dakota Public Service Commission
600 E. Boulevard Avenue, Dept. 408
Bismarck, ND 58505-0480

Re: Basin Electric Power Cooperative, Bison Generation Station facility siting application

Dear Mr. Kahl:

Enclosed please find an original and seven (7) copies of Basin Electric Power Cooperative's Application for a Certificate of Site Compatibility for the proposed Bison Generation Station. A check for the application filing and administrative fees is enclosed. A USB flash drive containing the application in electronic format and corresponding GIS shapefiles are also enclosed.

For inquiries regarding the application, please contact Ms. Erin Fox Dukart, Director of Environmental Services at edukart@bepc.com or at (701) 557-5557 with copy to Ms. Maggie Olson, Senior Staff Counsel at molson@bepc.com or (701) 557-5719. If preferable, correspondence can be sent to their physical address of 1717 East Interstate Avenue, Bismarck, ND 58503.

Sincerely,

Todd Brickhouse
CEO & General Manager

Enclosures

cc: Erin Fox Dukart
Chris Bauer
Ryan King
Maggie Olson
Beth Innis, Williams County Auditor

37 PU-25-86 Filed 07/03/2025 Pages: 345
Exhibit 10 - Application (Dkt #1)

Basin Electric Power Cooperative

1 PU-25-86 Filed 03/05/2025 Pages: 345
Application for Certificate of Site Compatibility

Basin Electric Power Cooperative
Todd Brickhouse, CEO & General Manager

BASIN ELECTRIC POWER COOPERATIVE

Application to North Dakota Public Service Commission for Certificate of Site Compatibility

BISON GENERATION STATION

WILLIAMS COUNTY, NORTH DAKOTA

MARCH 2025

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

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List of Abbreviations

Abbreviation	Term/Phrase/Name
AADT	Annual Average Daily Traffic
ACS	American Community Survey
ACC	air-cooled condenser
ANSI	American National Standards Institute
APWR	Nuclear Advanced Pressurized Water Reactor
BACT	best available control technologies
Basin Electric	Basin Electric Power Cooperative
BGEPA	Bald and Golden Eagle Protection Act
BGS	Bison Generation Station
BLM	Bureau of Land Management
BMPs	Best Management Practices
Btu/kWh LHV	British Thermal Unit/kilowatt hour Lower Heating Value
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CAA	Clean Air Act
Certificate	Certificate of Site Compatibility
CCGTs	Combined-Cycle Gas Turbines
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	Carbon dioxide equivalent
CTG	Combustion turbine generator
dB	decibels
dBA	A-weighted decibels
dBC	C-weighted decibel
DSM	Demand Side Management
DOE	Department of Energy
ELCC	effective load carrying capability
EMF	electromagnetic fields
EMS	Emergency Medical Services
EPA	United States Environmental Protection Agency
E&S	Erosion and sediment

ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FID	Flame-Ionization Detector
FIRM	Flood Insurance Rate Map
G&T	generation and transmission
GHG	Greenhouse gas
gpm	gallons per minutes
HAPs	Hazardous Air Pollutants
HP	high-pressure
HRSGs	heat recovery steam generators
H2SO4	Sulfuric acid
Hz	hertz
H&S Plan	Health and Safety Plan
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICBM	intercontinental ballistic missile
IFC	International Fire Code
IP	intermediate-pressure
IPaC	Information for Planning and Consultation
IS	Integrated System
kV	kilovolt
kV/m	Kilovolt per meter
kW	kilowatt
Ldn	day-night level
Leq	equivalent sound level
Lp	sound pressure
LP	low-pressure
Lw	sound power level
m	meter
Metcalf	Metcalf Archaeological Consultants, Inc.
MDU	Montana-Dakota Utilities
MISO	Midcontinent Independent System Operator
mG	milligauss
MMBtu/hr	million British thermal units per hour
MW	Megawatt

MWEC	Mountrail-Williams Electric Cooperative
NAAQS	National Ambient Air Quality Standards
NREL	National Renewable Energy Laboratory
ND AAQS	North Dakota Ambient Air Quality Standards
NDAC	North Dakota Administrative Code
NDDEQ	North Dakota Department of Environmental Quality
NDDOT	North Dakota Department of Transportation
NDGF	North Dakota Game and Fish Department
NDGS	North Dakota Geological Survey
NDHP	North Dakota Highway Patrol
NDMR	North Dakota Department of Mineral Resources
NDPRD	North Dakota Parks and Recreation Department
NDPSC	North Dakota Public Service Commission
NESC	National Electrical Safety Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
New ERA	Empowering Rural America
NFIP	National Flood Insurance Program
NLCD	National Land Cover Dataset
NOI	Notice of Intent
NO_x	nitrogen oxide
NO2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Parks Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NSPS	New Source Performance Standards
NW	northwest
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWRWD	Northwest Rural Water Supply District
O&M	operations and maintenance
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
Pb	lead
PC	Pulverized Coal
PCN	preconstruction notice

PEMA	palustrine emergent, temporarily flooded
PV	Photovoltaic
PLOTS	North Dakota Private Land Open to Sportsman
PM2.5	particulate matter 2.5 microns or less
PM10	particulate matter 10 microns or less
ppb	parts per billion
PSD	Prevention of Significant Deterioration
psia	pounds per square inch absolute
RFPs	Request for Proposals
RMP	Risk Management Plan
RUS	Rural Utilities Service
SCGT	Simple-cycle combustion turbine
SCR	selective catalytic reduction
SER	significant emission rate
SHPO	State Historic Preservation Office
SIL	significance level
SMR	small modular reactor
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SPP	Southwest Power Pool
STG	Steam turbine generator
SWPPP	Stormwater Pollution Prevention Plan
tpy	tons per year
TSCA	Toxic Substances Control Act
V	volts
V/m	Volts per meter
VOC	Volatile organic compounds
WQC	Water Quality Certification
µg/m3	micrograms per cubic meter
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WBI Energy	WBI Energy Transmission, Inc.
WEST	Western EcoSystems Technology, Inc.

1.0 Introduction

Basin Electric Power Cooperative (Basin Electric) submits this application for a Certificate of Site Compatibility (Certificate or CSC) to the North Dakota Public Service Commission (NDPSC) for the Bison Generation Station (BGS), a new greenfield generation facility (Project) in Wheelock Township, Williams County, North Dakota (Figure 1.1). Basin Electric is proposing the construction and operation of the new generation facility as presented in this application.

Basin Electric is a regional wholesale electric generation and transmission (G&T) cooperative owned and controlled by the 139 member cooperatives it serves. It was created in May 1961 as a result of regional efforts by electric distribution cooperatives. Basin Electric serves approximately three million customers in 550,000 square miles covering portions of nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. Basin Electric currently operates within the Southwest Power Pool (SPP), Midcontinent Independent System Operator (MISO), and the Western Interconnect, the Regional Transmission Organizations that administer bulk transmission system reliability upgrades and generation interconnections.

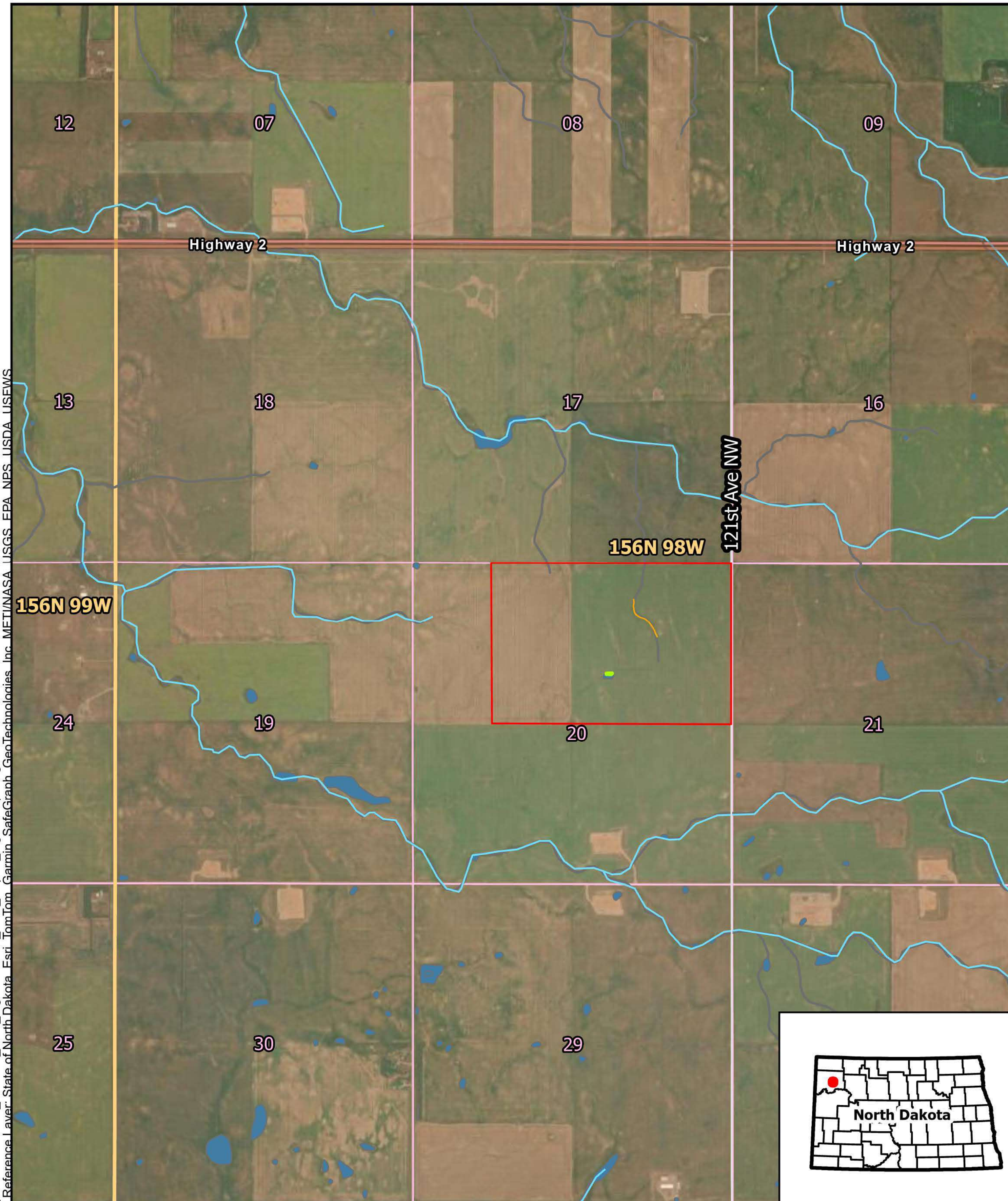
Basin Electric's service area in northwest North Dakota is experiencing a rapid increase in development for loads from various sectors as well as residential, commercial, and continued oil and gas development. The development that has already occurred and additional development planned for the future requires numerous infrastructure upgrades throughout the region, including increased electrical generation capacity and reliability.

The BGS Project would be a greenfield development, including two combined-cycle gas turbines (CCGTs), two heat recovery steam generators (HRSGs), and two steam turbine generators (STGs) creating approximately 1,490 megawatts (MW), net. These facilities would be constructed on land northeast of Williston, North Dakota, in Wheelock Township, Williams County. The CCGTs will be fired solely on natural gas. The Project will also utilize selective catalytic reduction (SCR) and an oxidation catalyst for nitrogen oxide (NO_X), carbon monoxide (CO), and volatile organic compound (VOC) control. The use of SCR will also require on-site storage of anhydrous ammonia.

In addition to the power generation and emissions control equipment, an electrical substation, natural gas interconnection facility, stormwater detention pond, wastewater evaporation/retention pond, temporary laydown areas, temporary construction and permanent operations parking, and auxiliary equipment are included as part of the Project. WBI Energy Transmission Inc. (WBI Energy) will construct a new natural gas pipeline to supply the new station. The water supply needs for the Project will be provided to the site by the Northwest Rural Water Supply District (NWRWD). The Project will interconnect to new high-voltage electrical transmission lines that will be located in the eastern portion of the Project site, allowing for interconnection of the Project to the electric grid. The gas pipeline and new high-voltage electrical transmission lines will be addressed in separate applications.

In accordance with the North Dakota Energy Conversion and Transmission Facility Siting Act, Basin Electric has considered exclusion areas, avoidance areas, selection criteria, and the policy criteria in the Project's design. In addition, sufficient generation design and technical information allowed for a thorough evaluation of the reasonableness of the Project at the proposed site. See section 3.1 for additional information related to Site Selection.

Table 1-1 outlines the information required to fulfill the requirements to obtain a Certificate from the NDPSC using the NDPSC's Guidelines and identifies where these requirements are addressed in this application.



Project Site Boundary
Township
Sections
Local Roads
NWI
Delineated Wetlands
Delineated Ephemeral Drain
Streams

NORTH

0 0.1 0.3 0.6 Miles

BURNS McDONNELL

Figure 1.1
Project Location
Basin Electric Power Cooperative
Combined Cycle Plant
Williams County, ND

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Service Layer Credits: Hybrid Reference Layer: State of North Dakota, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Source: ESRI, TIGER Line, NHD, WEST Inc., PLSS, Basin EPC, Burns & McDonnell

Issued: 2/28/2025

Table 1-1: Certificate of Site Compatibility Completion Checklist

Chapter	Description	Application Section
1	Form. An application must be reproduced and bound to an eight-and-one-half inch by eleven-inch size. Accompanying maps must be folded to eight and one-half inches by eleven inches with the title block appearing in the lower right-hand corner.	Application
2	**Contents.** The application must contain:	
2a	A description of: (1) The type of energy conversion facility proposed (2) The gross design capacity (3) The net design capacity (4) The estimated thermal efficiency of the energy conversion process and the assumptions upon which the estimate is based (5) The number of acres that the proposed facility will occupy (6) The anticipated time schedule for: (a) Obtaining the Certificate of Site Compatibility (b) Completing land acquisition (c) Starting construction (d) Completing construction (e) Testing operations (f) Commencing commercial production (g) Beginning any expansions or additions	1.1, 1.3, 1.4
2b	Copies of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state, or local agency.	Appendices
2c	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.	2.0
2d	A description of any feasible alternative methods of serving the need.	2.4
2e	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.	1.1.3, 3.1
2f	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.	1.6
2g	A map identifying the criteria that provide the basis for the specific location of the proposed facility within the study area.	Figures 3.1, 3.2
2h	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
2i	A discussion of the mitigative measures that the applicant will take to minimize adverse impacts which result from the location, construction, and operation of the proposed facility.	4.0
2j	The qualifications of each person involved in the facility site location study.	8.0
2k	A map of the study area showing the location of the Proposed facility, and the criteria evaluated.	Figures 1.1, 1.2, 1.3, 3.1, 3.2
2l	An eight-and-one-half-inch by eleven-inch black and white map suitable for newspaper publication depicting the site area.	Appendix L
2m	A discussion of present and future natural resource development in the area.	4.11

Chapter	Description	Application Section
2n	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. The information must provide the location of the proposed facilities, the proposed site, and the criteria evaluated.	Figures and File Geodatabase

1.1 Project Description

The following section describes the proposed Project, including the equipment to be installed and operated and the location of the Project site (Figure 1.1). The primary generation equipment at the plant will include two combustion turbine generators (CTGs), two HRSGs, and two STGs. The Project is an approximately 1,490 MW combined-cycle power plant that is a highly efficient electric generation facility.

The basic principle of the CCGT plant is to utilize natural gas to produce power in a combustion turbine which can be converted to electric power by a coupled generator, and to also use the hot exhaust gases from the combustion turbine to produce steam in a HRSG. This steam is then used to drive a steam turbine and generator to produce electric power. The use of both gas and steam turbine cycles in a single plant to produce electricity results in high conversion efficiencies and low emissions. Additionally, natural gas can be fired in the HRSG to produce additional steam and associated output for peaking load, a process commonly referred to as duct firing. A CCGT plant produces more electricity from the same amount of fuel compared to a simple-cycle gas turbine plant alone.

1.1.1 Type, Size, and Design

The BGS Project is a natural gas fired combined cycle power plant with a net capacity of approximately 1,490 MWs. The estimated thermal efficiency of the energy conversion process is anticipated to have a net plant heat rate of 5,999 British Thermal Units/kilowatt hour lower heating value (Btu/kWh LHV). The primary facilities to be constructed as part of the Project that will remain permanent are included in the following list. See Appendix A for General Arrangement drawings of the proposed Project.

Primary generation equipment includes:

- Two CTGs
- Two HRSG's
- Two STGs

Ancillary equipment or facilities include:

- One natural gas-fired auxiliary boiler (249.0 million British thermal units per hour (MMBtu/hr))
- Emission control equipment
- Two 58,000–gallon anhydrous ammonia storage tanks
- One 1,000,000-gallon service water tank with 300,000 gallons reserved for firewater tank
- One 750,000-gallon demineralized water storage tank
- Operations and maintenance buildings
- 230/345-kilovolt (kV) electrical substation
- 100-foot-tall communication/microwave tower
- Natural gas interconnection facility
- Up to three 500-gallon gas/diesel storage tanks
- 2 diesel generator tanks up to approximately 1,260 gallons combined
- One approximately 2-acre stormwater detention pond

- One approximately 3-acre stormwater detention pond
- Evaporation pond approximately 55 acres
- Permanent driveway and staff parking areas
- Three natural gas-fired dew point heaters

Permanent emergency equipment includes:

- Two emergency diesel generators (2,000 kilowatts (kW), each)
- One emergency diesel-fired fire pump (350 horsepower)

Temporary work areas needed to support construction include:

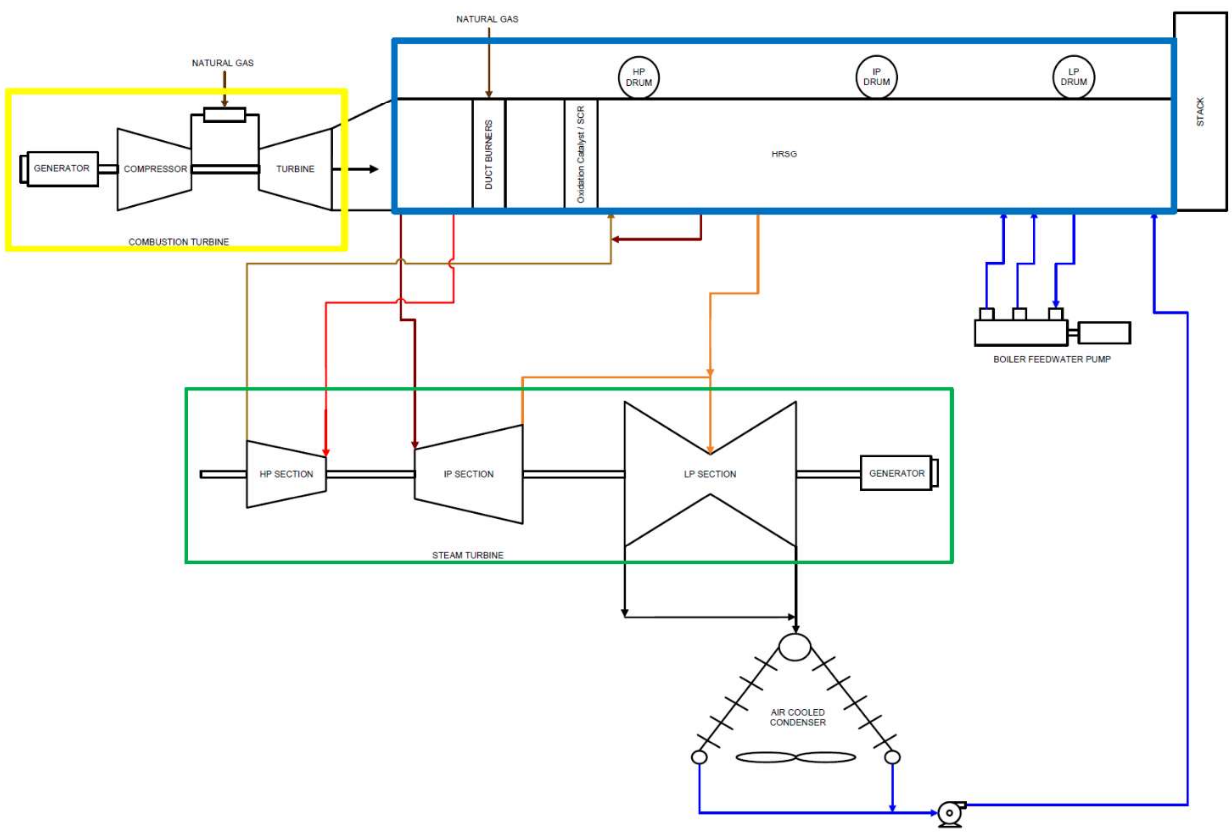
- On-site material laydown areas
- Construction parking
- Construction administration area

Additionally, the following facilities would be constructed to the site and operated and maintained separately from the Project:

- Water supply pipeline (NWRWD)
- Natural gas pipeline (WBI Energy)
- High-voltage electric transmission line (Basin Electric)

Figure 1.2 provides a generalized schematic of the overall combined cycle-generating process.

Figure 1.2: Overall Plant Process



Source: Burns & McDonnell

1.1.1.1 Major Energy Generation Equipment

A general description of the three primary energy generation components is provided below.

1.1.1.1.1 Combustion Turbine Generator (Yellow Box in diagram)

The CTG consists of a compressor section that compresses the inlet air and conveys it to the combustion section of the turbine where natural gas is introduced and ignited. Dry low-NO_x combustors are used to minimize NO_x formation. The high-temperature combustion gases expand through a multi-stage power turbine, driving both the compressor and the generator. An evaporative cooling system is included to enhance combustion turbine performance during high ambient air temperatures. Generated electricity is then transmitted to a step-up transformer and interconnected into the electrical grid through an on-site electrical substation.

1.1.1.1.2 Heat Recovery Steam Generator (Blue Box in diagram)

To support additional generation, each CTG is equipped with a HRSG which utilizes exhaust heat from the CTG to produce steam for additional power generation. The HRSG generates high-pressure (HP), intermediate pressure (IP), and low-pressure (LP) steam. The HP and LP steam are admitted directly to the steam turbine generator while the IP steam is mixed with the steam exhausted from the HP turbine, reheated in the HRSG, and admitted back to the IP section of the steam turbine generator. Duct burners are utilized in the HRSG to enhance steam production. To meet air quality standards, the HRSG is equipped with SCR system and an oxidation catalyst for NO_x, CO, and VOC control. In addition to providing steam for direct power generation, the HRSG also is utilized to preheat natural gas and feedwater, improving overall plant efficiency.

1.1.1.1.3 Steam Turbine Generator (Green Box in diagram)

The Project includes two tandem compound, reheat, condensing steam turbine generators (STG) designed to operate with steam generated by the HRSGs. The HP steam generated in the HRSG enters the STG, expands through the HP turbine, and is then reheated as described above before admission to the IP turbine. This steam is then mixed with LP steam generated in the HRSG and the final expansion occurs in the LP section of the STG, after which the steam is exhausted into the condenser. Electricity generated from the steam turbine generators is routed through on-site step-up transformers then to the substation for grid transmission.

1.1.1.2 Other Major Systems

The following sections provide a description of other major systems associated with the Project.

1.1.1.2.1 Natural Gas

The plant will receive natural gas via a new pipeline to be installed and permitted separately by WBI. The facility includes a gas metering station and three gas dew point heaters to regulate and maintain fuel gas temperature. To optimize efficiency, the performance heater utilizes IP feedwater to preheat fuel gas prior to entering the CTG.

1.1.1.2.2 Emission Control Systems

The facility incorporates multiple emissions control measures. The CTG employs dry low-NO_x burners to minimize NO_x formation during combustion. Additionally, an SCR system, installed within the HRSG, further reduces NO_x emissions by injecting ammonia into the exhaust stream, where it reacts with NO_x on a catalyst surface to convert it into nitrogen and water. An oxidation catalyst is also utilized to mitigate CO and VOC emissions by facilitating their conversion into carbon dioxide and water through a catalytic oxidation process. Anhydrous ammonia, used as the reducing agent in the SCR system, will be stored on-site in two 58,000-gallon tanks.

1.1.1.2.3 Auxiliary Boiler

The Project will also include an auxiliary boiler (rated at (249.0 MMBtu/hr.) which is a smaller boiler used to provide steam for starting up the main power generation system, performing safety checks, and maintaining necessary temperature and pressure during plant start-up and shutdown processes. It is acting as a backup boiler to support the primary boiler operations, as it is not used for generating large amounts of electricity itself.

1.1.1.2.4 Air-Cooled Condenser System

The Project incorporates an Air-Cooled Condenser (ACC) system, which utilizes air to cool and condense the steam exiting the steam turbine. Unlike traditional cooling towers, which rely on a continuous water supply and release water vapor into the atmosphere through evaporation, the ACC system operates without requiring an additional water source.

1.1.1.2.5 Electrical Substation

A new 230/345 kV substation will be constructed on the east portion of the site to facilitate electricity transmission. The substation will interconnect with new 230 kV and 345 kV transmission lines that traverse north-south along the eastern portion of the site, which will be constructed by Basin Electric under a separate application.

1.1.1.2.6 Plant Water Systems

Primary water uses include steam cycle losses, wastewater from water treatment processes, evaporative cooling water, and service water. The plant is designed for water reuse and minimal consumption. Water will be sourced from a NWRWD pipeline and stored on-site in a 1,000,000-gallon service water tank, with a separate 750,000-gallon demineralized water tank.

1.1.1.2.7 Wastewater Systems

Process wastewater, including water treatment process reject, evaporative cooling wastewater, and HRSG blowdown, will be directed to a 55-acre lined evaporation pond. Combustion turbine maintenance wash water will be collected and transported off-site for disposal by licensed contractors. Sanitary wastewater will be managed via an on-site leach field. Stormwater will be conveyed to two detention ponds through a drainage system and eventually flow offsite.

1.1.2 Product

Energy would be generated and distributed to the electrical grid system, which would serve the rapidly increasing electrical load requirements in northwestern North Dakota. The Project would improve the reliability of electrical service in the region.

1.1.3 Location

A study area was identified in Williams County, where the proposed site is located. The BGS Project is located on an approximate 240-acre parcel; located in Section 20, Township 156 North, Range 98 West; approximately 2.7 miles northwest of the town of Wheelock and 2.75 miles northeast of Epping. The proposed Project site is located approximately 17 miles northeast of the City of Williston. Figure 1.2 and Figure 1.3 show the layout of the site on the property where the Project would be constructed with aerial imagery and topographic backgrounds, respectively.

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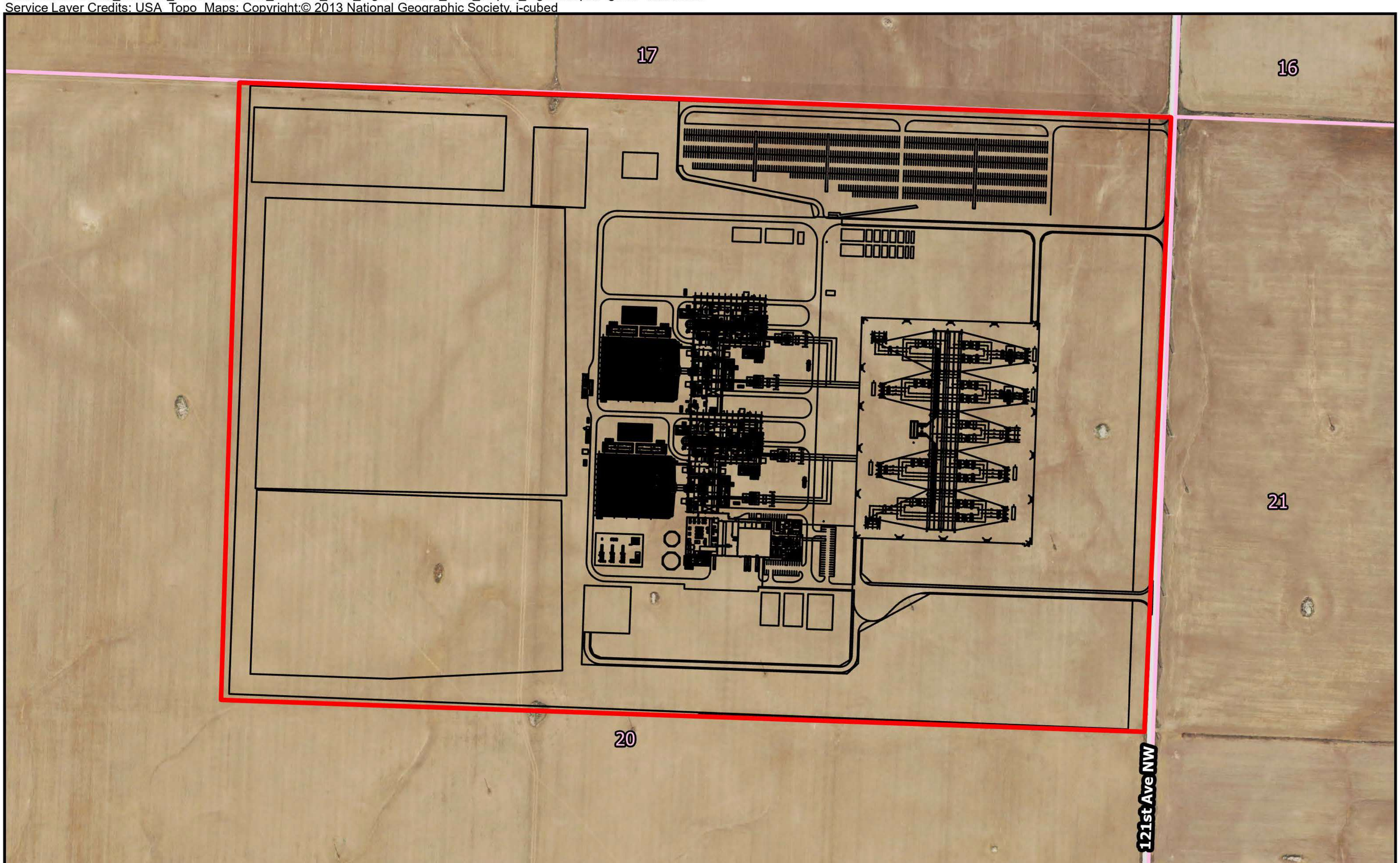
Service Layer Credits: USA_Topo_Maps: Copyright:© 2013 National Geographic Society, i-cubed



Project Site Boundary
Site Layout
Sections
Local Roads

NORTH

0 250 500 1,000
Feet

BURNS McDONNELL

Figure 1.3
Site Layout Aerial
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, NAIP, TIGER Line, PLSS, Basin EPC, Burns & McDonnell

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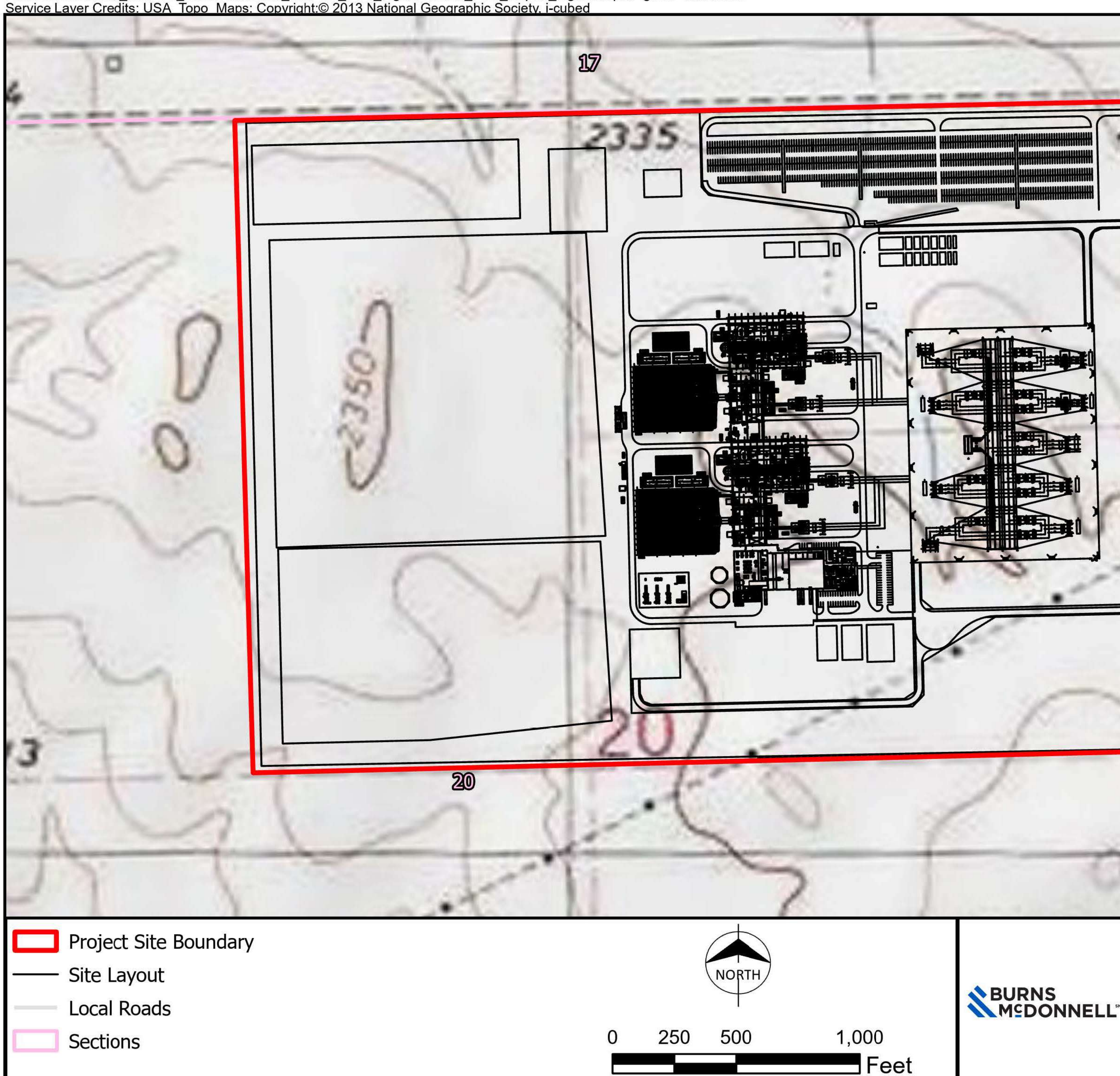


Figure 1.4
Site Layout Topography
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, USGS, PLSS, TIGER Line, Basin EPC, Burns & McDonnell

Issued: 2/27/2025

1.1.4 Geographical Service Area

The general geographical service area served by the Project is Basin Electric's service territory, specifically the area in northwestern North Dakota within the Williston Basin.

1.2 Cost

The construction cost for the Project is estimated to be approximately $3.8 billion.

1.3 Project Schedule

The anticipated schedule for the Project is below:

- Submit Site Compatibility Application: March 2025
- Obtain Certificate of Site Compatibility: May 2025
- Completing Land Acquisition: April 2025
- Start Construction: June 2025
- Testing and Commissioning Unit 1: October 2028
- Testing and Commissioning Unit 2: November 2029
- Commence Commercial Operation Unit 1: February 2029
- Commence Commercial Operation Unit 2: March 2030

Should all approvals be received ahead of schedule, the schedule would attempt to be advanced accordingly.

1.4 Future Plans

At the time of this application, Basin Electric has no additional plans to expand or increase the generation capacity at the proposed site.

1.5 Restoration Plans

Throughout construction, crews would limit ground disturbance to the extent practicable. Temporary disturbance areas outside of permanent facilities, including stoned/graveled areas for material laydown, construction parking, and administration that would need to be restored, would have stone/gravel removed, and the stockpiled topsoil replaced/re-spread, and would be seeded to establish vegetative cover. Reclamation activities include removing and disposing of debris, dismantling all temporary facilities (including staging, administration/construction management, and temporary material storage areas), and leveling or filling tire ruts. Erosion control measures and conveyance systems would be implemented during construction to direct stormwater into the stormwater detention pond and to minimize stormwater runoff from the site. Erosion control measures such as silt fence, filter sock, rock checks, flow diverters, mulching, seeding, or mesh fabric overlay or similar measures would be installed when and where appropriate.

Project-specific mitigation measures are described in greater detail in Chapter 4.0 (Environmental Analysis) for each resource evaluated. Table 4-13 provides a summary of site impacts and mitigation proposed.

1.6 Basin Electric Corporate Commitments to Environmental Quality

Basin Electric has a long history of working to protect the quality of the natural and human environment. Some of these beliefs include:

- That an adequate, universally available, and safe supply of affordable electricity is vital to the economy and maintaining people's standard of living

- A clean and healthy environment must be maintained
- That Basin Electric is dedicated to supporting a healthy agricultural economy, which is essential to the greater development of rural areas and the nation's general welfare.

In keeping with these beliefs, Basin Electric's Resolution Committee has passed and adopted a number of continuing and current resolutions, many directed at minimizing environmental impacts and improving environmental stewardship. The resolutions applicable to this Project have been excerpted and are provided in Appendix B.

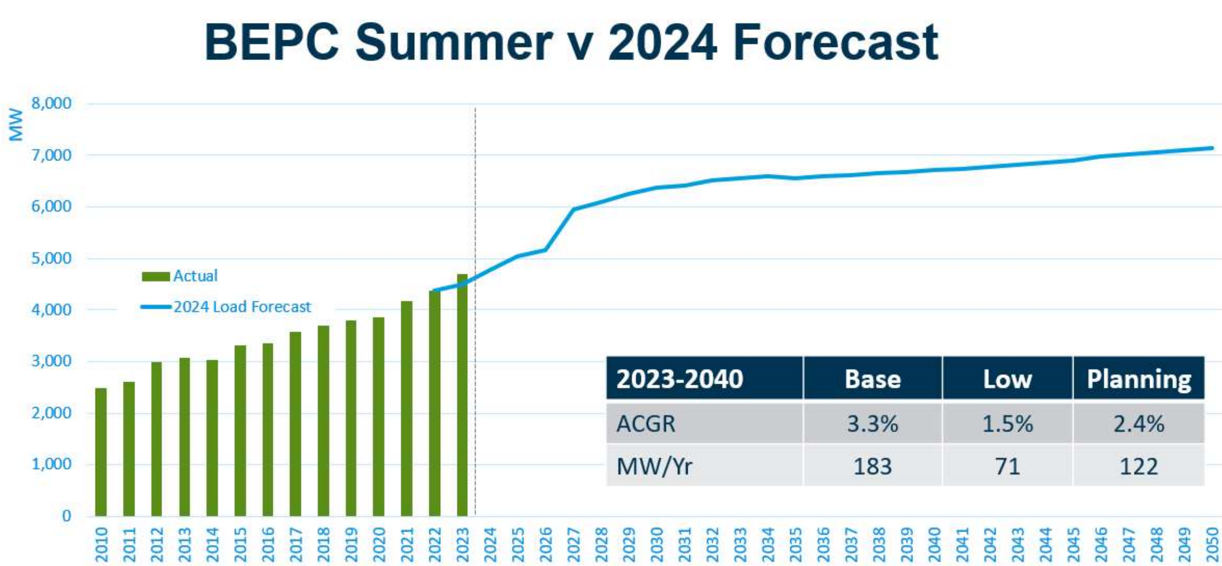
2.0 Need Determination and Alternatives

Basin Electric has identified the need for additional electric generation in northwestern North Dakota as a result of increased demand in the region. This need is determined through the load forecast process developed as a partnership effort between the distribution cooperatives, G&T cooperatives, and Basin Electric for its entire service area. Both distribution cooperatives and G&T cooperatives are considered Basin Electric member cooperatives. Subsequent to the completion of the historical database development, regression analysis software is used to identify economic, demographic, and meteorological factors that have affected the members' power requirements. These factors are called explanatory variables as they explain why the electric requirements change. Explanatory variables are first used to develop the econometric models based on historic relationships and are then used to develop the actual forecasts, incorporating historical and forecasted values. Based on the results of Basin Electric's forecasting process, a number of alternatives were considered to meet the identified need. These are discussed later in this section.

2.1 Basin Electric Load Forecast Sectors

Basin Electric's 2024 Load Forecast was approved by the Basin Electric Board of Directors in February 2024. The 2024 Load Forecast is underpinned by strong oil and gas related growth and reflects significant interest in large loads across Basin Electric's service territory. Basin Electric has members interested in serving a number of new and emerging sectors including carbon dioxide (CO_2) compression, direct-air capture, liquid fuels production, cryptocurrency mining, data centers, and other large commercial manufacturing applications. Figure 2.1 depicts the expected summer season demands for Basin Electric.

Figure 2.1: Basin Electric 2024 Load Forecast



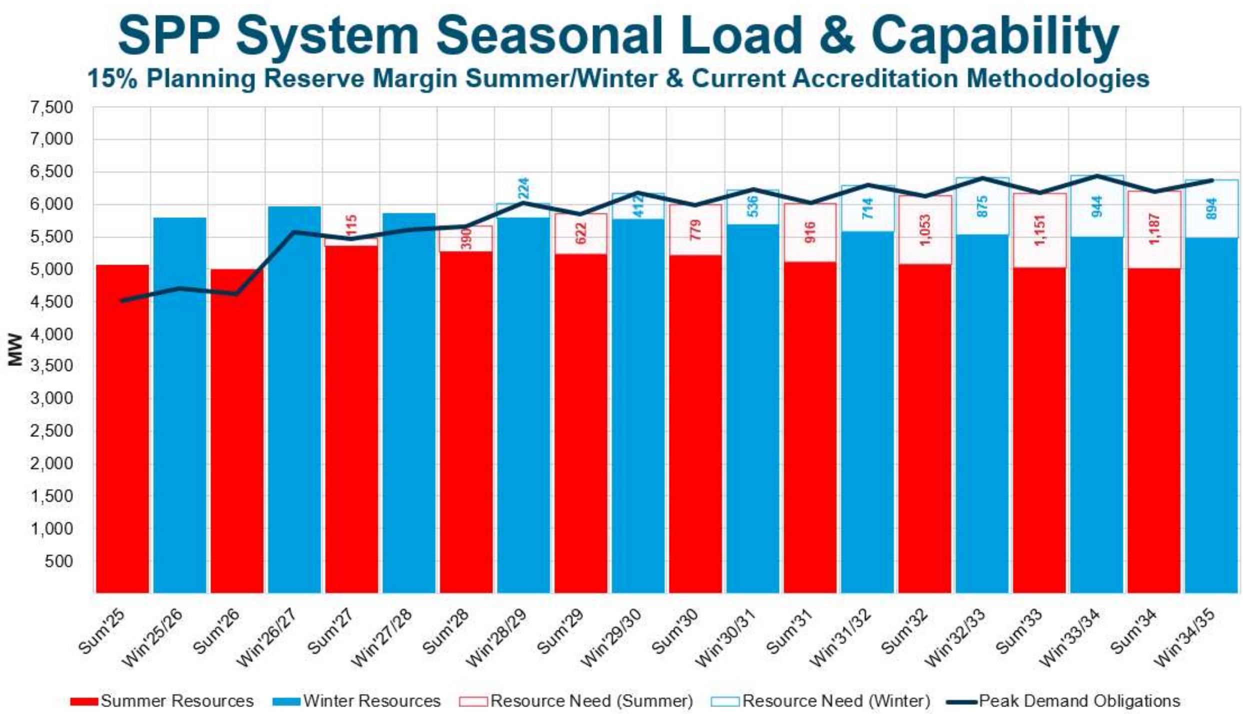
***Annual compound growth rate (ACGR)**

2.2 Determination of Need

Basin Electric identified the need for the BGS through its power supply planning process. This process compared the resources required to satisfy the 2024 Load Forecast to the existing generation fleet and current purchase agreements. The difference in the load forecast plus other obligations (such as non-member sales, losses, and reserves, less Basin Electric's system-wide load management) and existing and committed generating resources along with purchases, define the load and capability of the Basin Electric system. Basin Electric participates in SPP's Resource Adequacy program as defined in SPP's Open Access Transmission Tarriff Attachment AA. Capacity deficiency or surplus on Basin Electric's system has been determined on this basis.

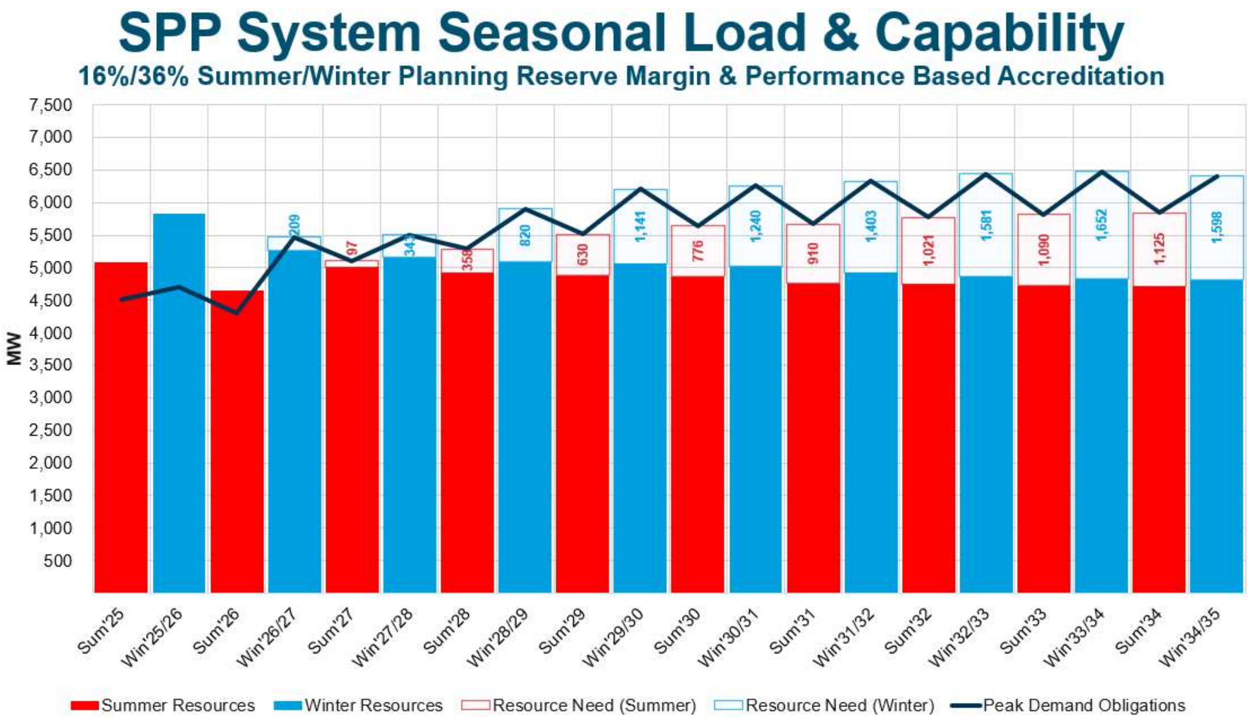
The following graph (Figure 2.2) displays Basin Electric's SPP system load and capability based on the Resource Adequacy ruleset that was in effect in 2024, without the BGS. This chart highlights the need for significant volumes of capacity beginning in the late 2020s driven by the increased load observed in the 2024 Load Forecast Planning Case.

Figure 2.2: SPP System Seasonal Load and Capability



SPP is in the process of implementing a series of resource adequacy reforms. These reforms will include a performance-based accreditation methodology for thermal resources including an additional Fuel Assurance Policy for these resources in the winter season, an effective load carrying capability accreditation methodology for renewable resources, and increases to the summer and winter planning reserve margins. Using the latest guidance from SPP, the expected impacts to Basin Electric's load and capability is provided in Figure 2.3. The seasonal impacts to Basin Electric (as a winter peaking load serving entity) significantly reduce Basin Electric's winter load serving capability and further highlight the need for a large resource addition.

Figure 2.3: SPP Seasonal Load and Capability with Anticipated Resource Adequacy Reforms



2.3 Resource Alternatives Considered

Basin Electric considers a spectrum of supply side and demand side resources in its planning process and its resource selection recommendations. Basin Electric recurringly purchases updated cost, performance, and lead time information to guide its capacity expansion and production cost modeling practices. Specifically, the alternatives evaluated under Basin Electric's 2023 Technology Assessment included:

- Renewable Energy Sources
- Wind Generation
- Solar Photovoltaic (PV) Generation
- Battery Storage
- Fossil Fuel Generation
- Simple Cycle Gas Turbine Technologies
- Combined Cycle Gas Turbine Technologies
- Reciprocating Engine Technologies
- Coal Technologies
- Nuclear Technologies
- Fuel Conversion of Existing Generating Units
- Demand Side Resources/Demand Response Resources
- Market Purchases & Requests for Proposals
- Transmission Alternatives

Below is a brief description of each alternative taken from the most recent Technology Assessment that Basin Electric has procured for the purpose of alternative analysis and capacity expansion modeling assumptions. Each of these resource alternatives are briefly discussed below and discussed in more detail in the Technology Assessment document in Appendix C.

2.3.1 Renewable Energy Sources

2.3.1.1 Wind Generation

Wind turbines convert the kinetic energy of wind into mechanical energy, which can be used to generate electrical energy that is supplied to the grid. Wind turbine energy conversion is a mature technology and is generally grouped into two types of configurations:

- Vertical-axis wind turbines, with the axis of rotation perpendicular to the ground.
- Horizontal-axis wind turbines, with the axis of rotation parallel to the ground.

Over 95 percent of turbines over 100 kW in operation are horizontal-axis. Subsystems for either configuration typically include the following: a blade/rotor assembly to convert the energy in the wind to rotational shaft energy; a drive train, usually including a gearbox and a generator; a tower that supports the rotor and drive train; and other equipment, including controls, electrical cables, ground support equipment and interconnection equipment.

Wind turbine capacity is directly related to wind speed and equipment size, particularly to the rotor/blade diameter. The power generated by a turbine is proportional to the cube of the prevailing wind, that is, if the wind speed doubles, the available power will increase by a factor of eight. Because of this relationship, proper siting of turbines at locations with the highest possible average wind speeds is vital.

According to the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL), Class 3 wind areas (wind speeds of 14.5 mph) are generally considered to have suitable wind resources for wind generation development.

2.3.1.2 Solar Photovoltaic Generation

The conversion of solar radiation to useful energy in the form of electricity is a mature concept with extensive commercial experience that is continually developing into a diverse mix of technological designs. PV cells consist of a base material (most commonly silicon), which is manufactured into thin slices and then layered with positively (i.e. phosphorus) and negatively (i.e. boron) charged materials. At the junction of these oppositely charged materials, a "depletion" layer forms. When sunlight strikes the cell, the separation of charged particles generates an electric field that forces current to flow from the negative material to the positive material. This flow of current is captured via wiring connected to an electrode array on one side of the cell and an aluminum back-plate on the other. Approximately 15% of the solar energy incident on the solar cell can be converted to electrical energy by a typical silicon solar cell. As the cell ages, the conversion efficiency degrades at a rate of approximately 2% in the first year and 0.5% per year thereafter. At the end of a typical 30-year period, the conversion efficiency of the cell will still be approximately 80% of its initial efficiency.

2.3.2 Battery Storage

Electrochemical energy storage systems utilize chemical reactions within a battery cell to facilitate electron flow, converting electrical energy to chemical energy when charging and generating an electric current when discharged. Electrochemical technology is continually developing as one of the leading energy storage and load following technologies due to its modularity, ease of installation and operation, and relative design maturity.

As renewable penetration increases, the variability of wind and solar resources will make energy storage pairings more attractive to utilities, developers, and customers with one or more renewable resources. Lithium-ion has been the leading technology for hybrid projects due to relative capital cost advantages. Original Equipment Manufacturers (OEMs) providing non-lithium technologies are continuously performing research and development activities to reduce costs through increased manufacturing scale, improved supply chain, and streamlined designs. As non-lithium costs decline, there will be more opportunities for technologies such as redox flow batteries, hybrid flow batteries, molten salt batteries, and zinc-based batteries to compete directly with lithium-ion technologies. Applications that may be most competitive for non-lithium technologies may be those that require durations beyond 4-hours, or potentially 2‑4-hour duration projects that call for higher cycling. For longer duration applications (> 4 hours), current lithium-ion technologies do not exhibit significant improvements in incremental capital cost ($/kWh) compared to 4-hour applications. However, technologies like flow batteries generally have considerable reductions in incremental cost efficiency for longer durations. Also, non-lithium technologies with low/minimal capacity fade will not require augmentation to maintain annual capacity guarantees, and the lower annual costs could result in lower life cycle costs compared to lithium-ion. Owners should be careful to observe capital cost, operations and maintenance (O&M) cost, and the impacts of round-trip efficiency on charging costs when considering the lifetime comparisons of various technologies.

2.3.3 Fossil Fuel Generation

2.3.3.1 Simple Cycle Gas Turbine Technologies

Simple cycle gas turbines are typically used for peaking power due to their fast load ramp rates and relatively low capital costs. However, the units have high heat rates compared to combined cycle technologies. Simple cycle gas turbine generation is a widely used, mature technology.

Low load or part load capability may be an important characteristic depending on the expected operational profile of the plant. Low load operation allows SCGT's to remain online and generate a small amount of power while having the ability to quickly ramp to full load without going through the full start sequence. Most turbines can sustain stable operation at synchronous idle when the SCGT generator is synced with the grid but there is virtually no load on the turbine. At synchronous idle, a turbine runs on minimal fuel input and generates minimal power.

2.3.3.2 Combined Cycle Gas Turbine Technologies

The basic principle of the CCGT plant is to utilize natural gas to produce power in a gas turbine which can be converted to electric power by a coupled generator, and to also use the hot exhaust gases from the gas turbine to produce steam in a HRSG. This steam is then used to drive a steam turbine and generator to produce electric power. The use of both gas and steam turbine cycles (Brayton and Rankine) in a single plant to produce electricity results in high conversion efficiencies and low emissions. Additionally, natural gas can be fired in the HRSG to produce additional steam and associated output for peaking load, a process commonly referred to as duct firing. The heat rate will increase during duct fired operation, though this incremental duct fired heat rate is generally less than the resultant heat rate from a similarly sized SCGT peaking plant.

2.3.3.3 Reciprocating Engine Technologies

The internal combustion, reciprocating engine operates on a four-stroke cycle for the conversion of pressure into rotational energy. Utility scale engines are commonly compression-ignition models, but some are spark-ignition engines. By design, cooling systems are typically closed-loop radiators, minimizing water consumption.

Reciprocating engines are generally less impacted by altitude and ambient temperature differences than gas turbines. With site conditions below 3,000 feet and 95°F, altitude and ambient temperature have minimal impact on the electrical output of reciprocating engines, though the efficiency may be slightly affected.

Reciprocating engines can start up and ramp load more quickly than most gas turbines, but it should be noted that the engine jacket temperature must be kept warm to accommodate start times under 10 minutes. However, it is common to keep water jacket heaters energized during all hours that the engines may be expected to run (associated costs have been included within the fixed O&M costs).

Many different vendors, such as Wärtsilä, Fairbanks Morse (MAN Engines), Caterpillar, Hyundai, GE (Jenbacher), Rolls Royce, etc. offer reciprocating engines. They are a popular option to pair with wind turbine generation with their quick start times and operational flexibility. There are slight differences between manufacturers in engine sizes and other characteristics, but all largely share the common characteristics of quick ramp rates and quick start up when compared to gas turbines.

2.3.3.4 Coal Technologies

Pulverized Coal (PC) steam generators are characterized by the fine processing of coal for combustion in a suspended fireball. Coal is supplied to the boiler from bunkers that direct coal into pulverizers, which crush and grind the coal into fine particles. The primary air system transfers the pulverized coal from the pulverizers to the steam generator's low NO_x burners for combustion. Two types of burner arrangements for pulverized coal units are wall fired and tangentially fired (T-fired). Wall fired burners are more common and involve multiple burners arranged in rows up the side of a boiler wall. In T-fired burner arrangements, rows of burners are located in the corners of a boiler. Each type of arrangement burns the coal in the middle elevation of the boiler in suspension. This is also referred to as a suspended fireball and, along with the fine coal particle size, is characteristic of pulverized coal combustion. PC technology is a mature and reliable energy production technology used around the world.

The steam generator produces high-pressure steam that expands in the steam turbine generator to produce electricity. A portion of the steam exits the turbine through extractions and flows to the feedwater heaters and may feed boiler feedwater pump turbines.

2.3.4 Nuclear Technologies

2.3.4.1 Nuclear Advanced Pressurized Water Reactor

In a Nuclear Advanced Pressurized Water Reactor (APWR), water is heated by the nuclear fuel but the water is kept under pressure to prevent it from boiling. Instead, the hot water is pumped from the reactor pressure vessel to a steam generator. There the heat of the water is transferred to a second, separate supply of water, which boils to produce steam. The coolant in the APWR is contained in the pressurized primary loop and does not pass through the steam turbine. The plant will utilize a dual, spherical design containment building with larger maintenance areas. Also, redundancy and diversity will exist in the electrical distribution and support systems

2.3.4.2 Nuclear SMR Technology Description

Manufacturers are designing small modular reactors (SMR) to create a smaller scale, completely modular nuclear reactor. The conceptual technologies are similar to APWR and the entire process and steam generation is contained in one, modular vessel. Energy from the nuclear reaction heats the primary reactor fluid, which then creates steam via an integral heat exchanger, so the steam is isolated from possible contamination. The steam generated in this vessel drives a turbine for electric generation, and the design is based on one turbine per reactor.

According to these manufacturers, the primary benefits of SMR units are as follows: the smaller unit size will allow more resource generation flexibility and the modular design will reduce overall project costs while providing increased benefits in the areas of safety, waste management, and the utilization of resources. Modular designs allow increased levels of factory fabrication when compared to larger scale reactors. The goal is to reduce field labor and construction schedule.

Currently, SMRs are considered conceptual in design and are developmental in nature. Several manufacturers, most notably NuScale and X-Energy, have completed conceptual design of these modular units to target lower output and costs and are in various stages of permitting applications with the DOE. NuScale expects to have an operational SMR unit by 2029 as part of the Western Initiative for Nuclear, a collaborative program that includes the DOE Idaho National Laboratory and stakeholders in several western U.S. states. However, there is currently no industry experience outside of product development and testing.

2.3.5 Fuel Conversion of Existing Generating Units

As coal fired steam generators get older and emissions control regulations become tighter, converting the boilers to burn natural gas is a potential way to utilize the asset as a peaking power source. Most coal fired boilers can be converted to burn natural gas with few modifications. However, each boiler is unique and may present different challenges. Typically, the main components that need to be replaced or modified are the burners. Depending on the boiler type and the specific burner, the existing boilers maybe convertible using gas guns or new burners. A new burner management system will control the boilers and needs to be retrofitted into the existing control system.

Natural gas must also be supplied to the site. Depending on the site location and its proximity to an existing gas pipeline, this can be a costly addition. The gas will be brought onsite into the gas yard where it will be metered and regulated. It is then piped to the boiler house and undergoes additional stages of regulation. From there it is piped to each burner.

The boiler combustion and thermodynamic characteristics will change when compared to burning coal. Depending on the original fuel design and the type of boiler, firing natural gas will have different impacts.

2.3.6 Demand Side Resources/Demand Response Resources

Demand Side Management (DSM) is the process of managing the consumption of energy, generally to optimize available and planned generation resources. DSM refers to actions taken on the customer’s side of the meter to change the amount or timing of energy consumption. DSM programs offer a variety of measures that can reduce energy consumption and consumer energy expenses. DSM strategies have the goal of maximizing end use efficiency to avoid or postpone the construction of new generating plants.

DSM programs aim to achieve three broad objectives: energy conservation, energy efficiency, and load management. Energy conservation can reduce the overall consumption of electricity by reducing the energy required for heating; lighting, cooling, cooking and other energy dependent functions. Energy efficiency encourages consumers to use energy more efficiently, thus more effectively. Load management allows generation companies to better manage the timing of their consumers’ energy use and helps reduce the large discrepancy between on peak and off- peak demand.

Basin Electric and its members use a variety of conservation and energy efficiency programs. The programs and activities were developed to promote, support, and market such technologies as efficient dual heat, water heaters, heat pumps, air conditioning, storage heating, grain drying, and irrigation. Other examples of programs are solar photovoltaic generation and energy audits. A number of Basin Electric's members have developed DSM programs. These vary depending on the cooperative; some elect to utilize rebates, others use energy resource conservation loans, variable rates, a combination, or elect not to adopt any of the programs.

Energy conservation and efficiency programs can lessen the demand for electricity; therefore, reducing the capacity needed from additional future generation facilities. However, energy savings through DSM are not enough to alleviate the need for additional capacity and energy resources.

2.3.7 Market Purchases & Requests for Proposals

Basin Electric utilizes Request for Proposals (RFPs) periodically to help evaluate Basin Electric's options of existing or new resources that might be available from neighboring utilities or developers to be able to assess those alternative options to Basin Electric's self-build options.

2.3.8 Transmission Alternatives

Along with all the supply side and demand side options that Basin Electric takes into consideration for meeting their member's power supply needs, Basin Electric also assesses transmission options for more cost-effective means to serve its member loads. Basin Electric, through its rights to the DC ties, can optimize resources between the SPP and its Western Planning areas. Generator pseudo-ties between SPP and MISO are also evaluated on an as-needed basis. Additionally, Basin Electric will consider new transmission service reservations as alternatives to new supply-side resources.

2.4 New Resource Recommendation

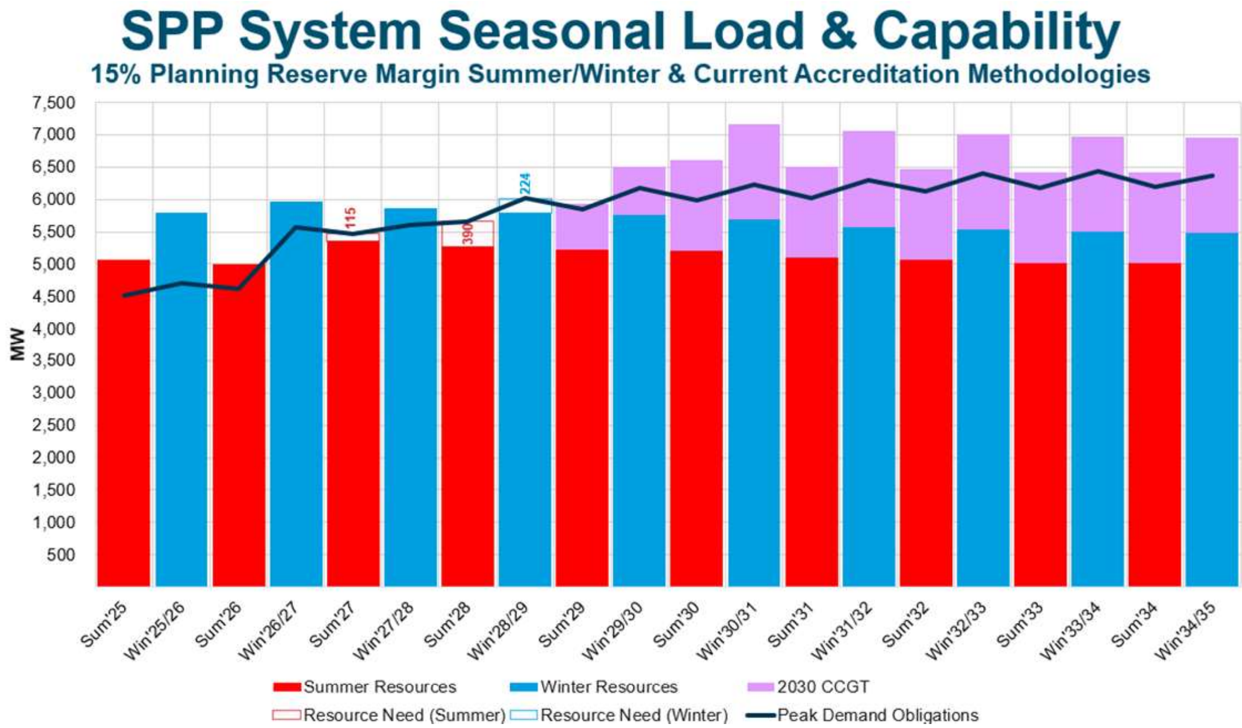
With the load growth identified in the load forecast, it is apparent there is a need to secure additional capacity in the SPP region to meet the growing demand and provide an adequate supply of electrical power for the Basin Electric membership. Through Basin Electric's power supply planning process, including capacity expansion modeling using the Aurora modeling software developed by Energy Exemplar, Basin Electric inputs its system's needs and constraints along with the resource options identified in the Technology Assessment into the model. The model then runs a number of iterations until it arrives at the lowest cost option for the system that is capable of meeting the capacity requirements established by the Transmission Operator. In this instance, the model determined that the best fit, least cost resource option to meet Basin Electric's power supply needs was the largest advanced class combined cycle unit technology available, which was a single 2x1 J-Class generating unit.

Basin Electric's project team, along with its consultant, performed further qualitative analyses to assess all resource configurations and preferred locations, and it was determined that this large of a single electric generating unit was too great of a risk for a single event to cause the entire plant's generating capacity to trip offline. This risk could be mitigated by building two 1x1 J-Class combined cycle units instead of a single 2x1 unit. The reduced risk of a significant loss of generating capacity in the transmission system as well as the increased flexibility to operate and perform maintenance at the facility justified the minimal additional capital costs associated with including a second steam turbine generator and associated generator step up and auxiliary transformers to accommodate the two-unit configuration.

It was also determined that one of the two units could be brought online a year sooner than if Basin Electric proceeded with the construction of a single 2x1 combined cycle facility, which more optimally met Basin Electric's need for power supply.

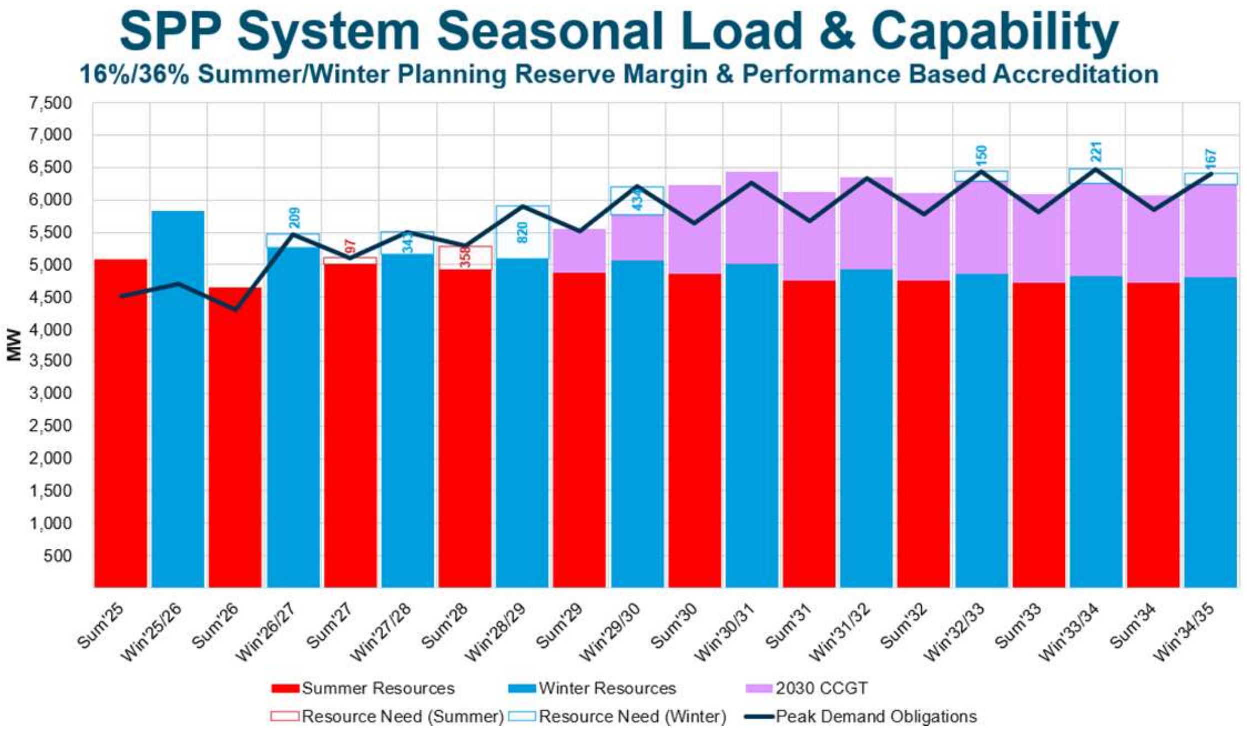
The final configuration consisting of two J-Class combined cycle resources along with the 2024 Load Forecast were used to create the updated system load and capability graph, Figure 2.4.

Figure 2.4: SPP System Seasonal Load and Capability with Recommended Resource



The seasonal impacts to Basin Electric resulting from the anticipated Resource Adequacy reform inclusive of the recommended resource is provided in Figure 2.5. The anticipated reform will likely consume a majority of the excess winter reserve capacity that Basin Electric was anticipating to establish as a result of the recommended resource.

Figure 2.5: SPP System Seasonal Load and Capability with Expected Resource Adequacy Reform and Recommended Resource



Basin Electric has also been named as an awarded recipient of the United States Department of Agriculture (USDA) /Rural Utilities Service (RUS) Empowering Rural America (New ERA) program and has executed SPP Power Purchase Agreements for 100 MW of battery storage and 250 MW of wind resources. Basin Electric may add additional renewable resources to align with this program. Basin Electric will also continue to encourage participation in demand response programs, as well as pursue reserve capacity to address potential capacity shortfalls.

Basin Electric will continue to monitor load growth on an annual basis and continue to evaluate the need for additional dispatchable resources beyond the recommended resource to meet future member forecasted demand growth.

2.5 Ten-Year Plan

Basin Electric filed a Ten-Year Plan with the NDPSC in June 2024. The Ten-Year Plan stated, "Basin Electric is currently siting up to a 1,400 MW natural gas generation facility in northwestern North Dakota in response to sustained load growth in the region," and, "…is also evaluating renewable project opportunities under the RUS New ERA program." The BGS is consistent with the Ten-Year Plan on file with the NDPSC.

3.0 Site Compatibility Criteria

Basin Electric determined that additional generation was required in the Williston region to meet load growth requirements. Basin Electric conducted a site selection investigation focused on identifying a site, in compliance with North Dakota Administrative Code (NDAC) Section 69-06-08-01 while still meeting the Project needs. This investigation started with 68 potential sites throughout the Williston region, which were then screened and reduced to 15 potential sites that were further evaluated. From these evaluations, the proposed Project site was selected and then further reviewed for compliance with NDAC Section 69-06-08-01, including:

- Exclusion areas
- Avoidance areas
- Selection criteria that relate to minimizing potential land use and environmental impacts
- Policy criteria that relate to maximizing public benefits
- Design and construction limitations
- Economic consideration as part of the analysis

3.1 Site Selection

Recognizing that additional generation was required in the Williston area, Basin Electric contracted 1898 & Co., a part of Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to conduct a siting study to identify the location for the new generation facility. Twenty criteria were developed to score the potential site locations; the six environmental criteria considered are listed below.

- Nearest Inhabited Residence
- Environmental Justice
- Wetlands
- Floodplains
- Archeological/Cultural Resources Risk
- Sensitive Species Risk

The 20 criteria are grouped into five categories: electrical transmission, fuel supply delivery, site development, environmental, and permitting. The siting study identified 68 potential sites, which then were reduced to 15 representative site areas to apply the 20 criteria. Based on the five criteria categories, the current Project site was selected as the proposed Project site.

3.2 Exclusion Areas

Per NDAC Section 69-06-08-01 (1), the geographic areas listed in Table 3-1 are exclusion areas that shall be excluded in consideration of an energy conversion facility and shall include a buffer zone of reasonable width to protect the integrity of the area. No exclusion areas were identified within the Project site (Figure 3.1).

Table 3-1: Exclusion Areas

Geographic Area	Present within Project Site	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.	Not Present	4.9, 4.10
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.	Not Present	4.9, 4.10
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	Not Present	4.4, 4.10
Areas critical to the life stages of threatened or endangered animal or plant species.	Not Present	4.18
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	Not Present	4.18
Areas within one thousand two hundred feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility.	Not Present	4.3
Areas within thirty feet [9.14 meters] on either side of a direct line between an 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.	Not Present	4.3

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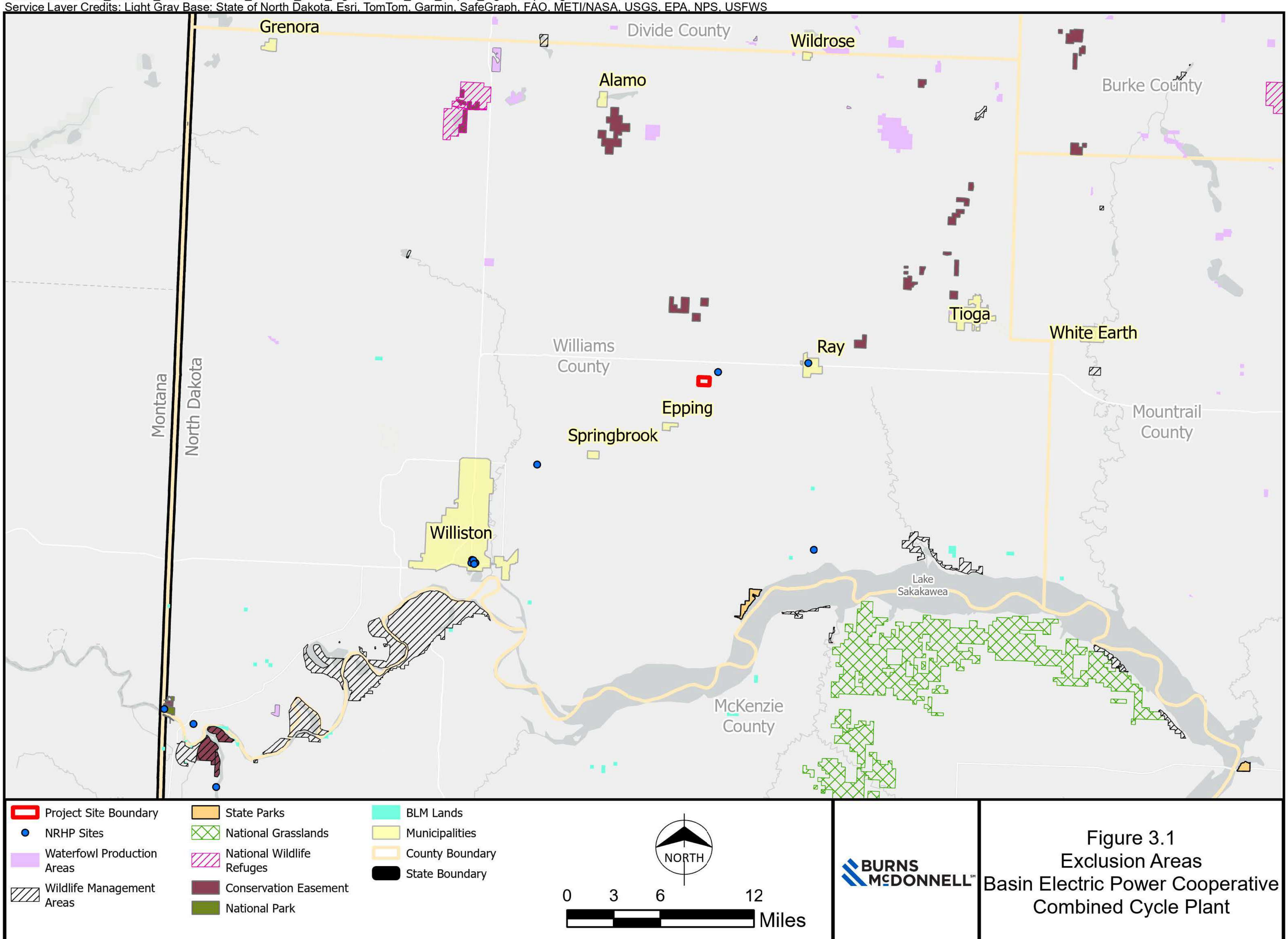

Figure 3.1
Exclusion Areas
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, US Census Tiger, ND GIS Hub, ND Parks and Rec, PADUS, NHRP, USGS, NPS, Basin EPC, Burn & McDonnell

Issued: 3/3/2025

3.3 Avoidance Areas

The geographic areas listed in NDAC Section 69-06-08-01 (3) shall not be considered in the siting of an energy conversion facility unless the applicant shows that, under the circumstances, there is no reasonable alternative (Table 3-2). In determining whether an avoidance area should be designated for a facility, the NDPSC 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 routes. Economic considerations alone shall not justify the approval of these areas. A buffer zone of a reasonable width to protect the integrity of the area shall be included unless a distance is specified in the criteria. Natural screening may be considered in determining the width of the buffer zone. See Figure 3.2 for mapped avoidance areas.

Table 3-2: Avoidance Areas

Avoidance Area	Present within Project Site	Section Addressed
Historical resources that are not designated as exclusion areas.	Three cultural resource sites were identified within the Project site boundary. These three sites are not recommended eligible for the National Register of Historic Places.	4.9
Areas within the city limits of a city or the boundaries of a military installation.	Not Present	4.3
Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood.	The Project area is not FEMA mapped, so no National Flood Insurance Program (NFIP) permits are likely required. Floodplains were identified in the North Dakota Risk Assessment Map service and Base Level Engineering datasets. Basin Electric will work with the local zoning authority to determine if any NFIP permits are required.	4.14
Areas that are geologically unstable.	Not Present	4.13
Woodlands and wetlands.	Woodlands not present. Small 0.15-acre wetland present, impacts will be permitted through US Army Corps of Engineers.	4.11, 4.15
Areas of recreational significance that are not designated as exclusion areas.	Not Present	4.10

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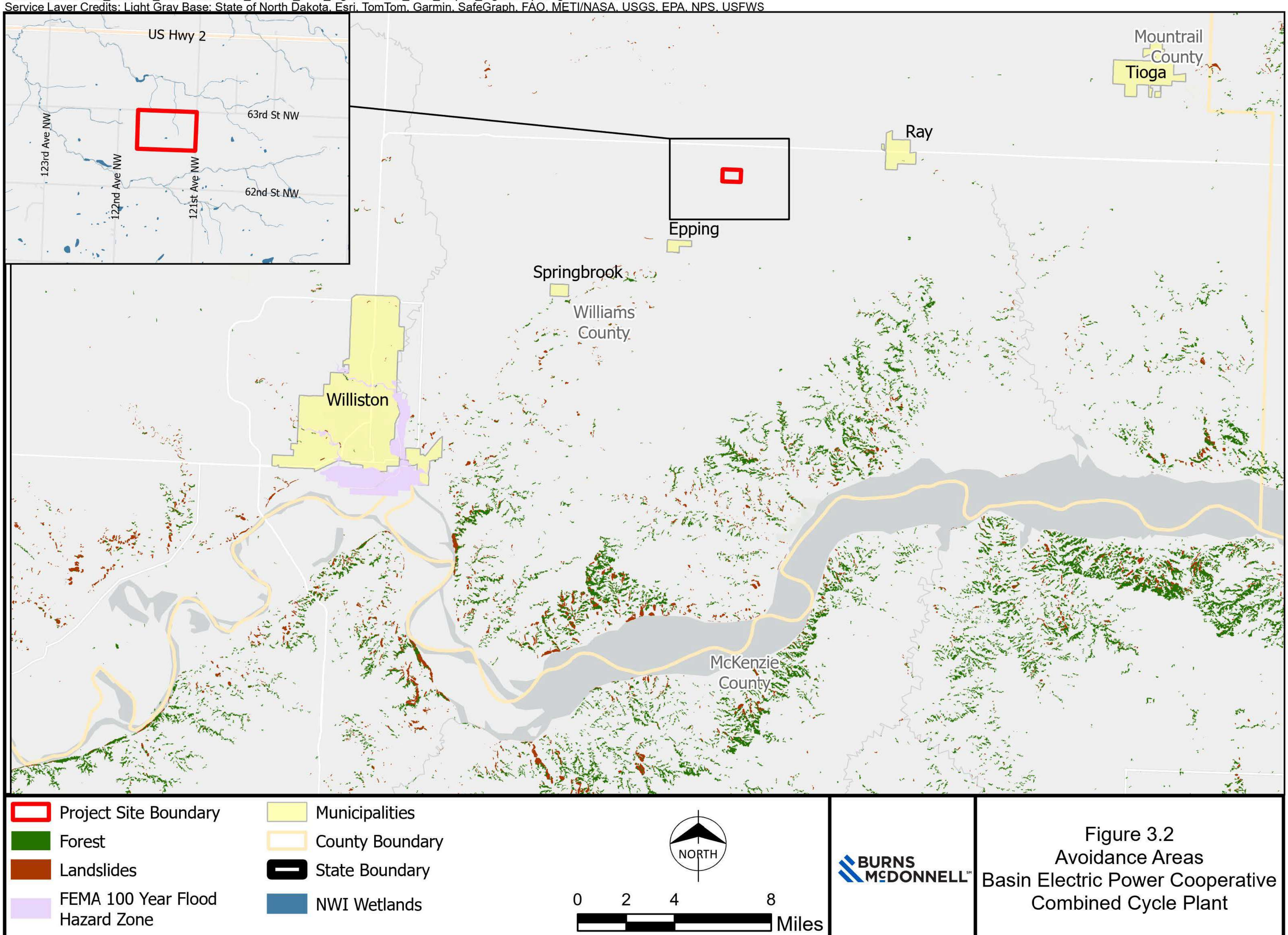

BURNS McDONNELL

Figure 3.2
Avoidance Areas
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, US Census TIGER, ND GIS Hub, USGS, FEMA, NCLD, ND Geological Survey, Basin EPC, Burn & McDonnell

Issued: 1/7/2025

3.4 Selection Criteria

Per NDAC section 69-06-08-01 (5), a site shall be designated only when it is demonstrated to the NDPSC by the applicant that, for select criteria, any significant adverse effects resulting from the location, construction, and maintenance of the facility would be at an acceptable minimum, or that those effects would be managed and maintained at an acceptable minimum (Table 3-3).

Table 3-3: Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
Agricultural production	The proposed Project is anticipated to permanently impact 240 acres of farmland.	4.3, 4.11
Family farms and ranches	See Agricultural Production	4.11
Land that the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation.	See Agricultural Production	4.11, 4.12
Surface drainage patterns and ground water flow patterns	See Agricultural Production	4.12, 4.13, 4.14
The agricultural quality of the cropland	See Agricultural Production	4.3, 4.11
Availability and adequacy of law enforcement	No adverse impacts to local services are anticipated.	4.4
Availability and adequacy of school systems and education programs	No adverse impacts to local services are anticipated.	4.4
Availability and adequacy of Governmental services and facilities	No adverse impacts to local services are anticipated.	4.4
Availability and adequacy of General and mental health care facilities.	No adverse impacts to local services are anticipated.	4.4
Availability and adequacy of Recreational programs and facilities.	There would be no impacts to city, county, state, or national recreation programs or facilities.	4.4, 4.10
Availability and adequacy of Transportation facilities and networks	As applicable, Basin Electric will consult with the appropriate governing bodies concerning the condition of the roads and develop plans for maintenance as needed, due to the use by the construction workforce to transport labor and supplies to the site.	4.4
Availability and adequacy of retail service facilities.	During peak construction, some of the surrounding cities might experience more traffic to retail facilities, but overall, this increase should be positive by stimulating the local economy.	4.4
Availability and adequacy of utility services.	No impacts are anticipated to the availability and adequacy of utility services.	4.4
Local institutions	No impacts are anticipated to local institutions.	4.4
Noise-sensitive land uses	No impacts are anticipated to noise-sensitive land uses.	4.7

Selection Criteria	Potential Adverse Effects	Section Addressed
Light-sensitive land uses	No impacts are anticipated to light-sensitive land uses.	4.8
Rural residences and businesses	There is limited impact on rural residences. Largely these would be visual due to the height of structures such as the stacks, which are approximately 250 feet tall and may be visible from some residences.	4.3
Aquifers	No impacts are anticipated for aquifers.	4.13
Human health and safety	No anticipated impacts to human health and safety. A spill prevention, control, and countermeasures plan, risk management plan, and SWPPP will be prepared for the Project to mitigate any spills, releases, and stormwater runoff.	4.5
Animal health and safety	No anticipated impacts. Much of the surrounding land is farmed, with no critical habitats near the Project site.	4.17, 4.18
Plant life	The Project would result in 240 acres of cropland being permanently removed from production, and approximately 70 acres of the 240 acres would be re-vegetated.	4.16
Temporary and permanent housing	The surrounding cities of Williston, Tioga, and Minot can be used to accommodate laborers throughout peak construction. Where possible, Basin Electric will use local labor.	4.2
Temporary and permanent skilled and unskilled labor	Throughout the different phases of construction, skilled and unskilled labor will be required. Where possible, Basin Electric will use local labor.	4.2
The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development.	The facility is in proximity to an existing electrical substation and multiple transmission lines.	4.3, 4.11, 4.19, 7.4, 7.5
The impact upon military installations, assets, and operations.	No impacts are anticipated to military installations, assets, or operations.	4.3, Figure 3.1

3.5 Policy Criteria

Per NDAC Section 69-06-08-01 (6), the NDPSC may give preference to an applicant that would maximize benefits that result from the adoption of certain policies and practices, and in a proper case, may require the adoption of such policies and practices (Table 3-4). The NDPSC may also give preference to an applicant that would maximize interstate benefits.

Table 3-4: Policy Criteria

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Recycling of the conversion byproducts and effluents	No byproducts or effluents would be created by this facility that would be recycled.	1.0
Energy conservation through location, process, and design	Basin Electric's policy is to locate and design to minimize environmental impacts.	1.6, Appendix B
Training and utilization of available labor in this state for the general and specialized skills required	Basin Electric would use local labor to the extent practicable.	4.2.2
Use of a primary energy source or raw material located within the state	Basin Electric would use natural gas and construction material from within the state to the extent practicable.	1.0
Not relocating residents	No residents would be relocated for the Project.	4.2
The dedication of an area adjacent to the facility for land uses such as recreation, agriculture, or wildlife management	Areas outside of the Project would continue to be used for agricultural purposes.	4.11
Economies of construction and operation	The Project creates economies of construction and operation by constructing the Project in a location with the existing infrastructure, such as highways and transmission lines.	4.2, 4.4
Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife.	The Project does not include associated facilities that would be appropriate for recreation or wildlife enhancement. Where possible, areas of the property not part of permanent facilities would be re-vegetated. These vegetated areas could continue to provide habitat for a variety of wildlife species in this region.	4.17
Use of citizen coordinating committees	The use of citizen coordinating committees is not expected for this Project.	N/A
A commitment of a portion of the energy produced for use in this state	The general area to be served by the Project is Basin Electric's service territory, specifically the area in northwestern North Dakota within the Williston Basin.	1.1.4
Labor relations	Labor relations would not be negatively affected by the Project.	4.2
The coordination of facilities	New right-of-way corridors for associated facilities would be coordinated with the owning utilities (electric transmission, natural gas, and water supply) for connection to the Project. Where applicable, the associated projects would undergo NDPSC approval through separate applications.	1.1

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Monitoring of impacts	Basin Electric would use Best Management Practices (BMPs) during construction to minimize environmental impacts and would monitor construction compliance with the commitments made in this application and in accordance with any applicable permit conditions.	Addressed where applicable in mitigation sections for each section in chapter 4
A commitment to install lighting mitigation technology for wind energy conversion facilities subject to commercial availability and federal aviation administration approval.	This is not a wind energy conversion Project. Basin Electric would use lighting appropriate for the safety and security of the facility and appropriate for the site and surrounding area.	N/A

3.6 Design and Construction Limitations

Project construction and design would meet the requirements of the National Electrical Safety Code (NESC), Basin Electric design criteria, International Fire Codes (IFC), and other applicable local, state, or national building codes.

3.7 Economic Considerations

There are many economic considerations in the design and siting of a power generation facility. Basin Electric has designed the Project to take advantage of the proximity to existing necessary infrastructure (electrical transmission, water, and natural gas). Additionally, the relative proximity to complementary facilities (fuel supply, water supply, and energy distribution) creates efficiency and condenses the development into a compact area.

4.0 Environmental Analysis

4.1 Overview

The following sections detail the resources and environmental settings identified on the Project site. When applicable to specific resources, the larger 240-acre parcel and the surrounding vicinity are also discussed. For each resource, a general environmental setting description is provided, followed by a discussion of potential impacts and potential mitigation measures proposed to address the impacts.

The description subsection gives details and an overview of each analysis criteria. The impact subsections describe the potential effects on each resource from the construction and operation of the Project. The mitigation discussion subsections provide potential measures to reduce or eliminate anticipated impacts identified for each resource. Mitigation measures are not discussed for potential effects that are either not anticipated to occur during the construction or operation of the Project or are anticipated to result in a beneficial effect.

Standard mitigation measures have been incorporated into the development and construction of the proposed Project. These mitigation measures are designed to reduce or eliminate anticipated impacts resulting from construction or operation. They include BMPs and technologies, such as the use of stormwater detention ponds and stormwater controls, re-vegetation, best available control technologies (BACT), placing primary generating equipment within buildings, etc.

4.2 Demographics and Socioeconomics

4.2.1 Description of Resources

The Project is located within an area of northwestern North Dakota with a relatively low population density. Population data for this section was retrieved from the U.S. Census Bureau 2019-2023 American Community Survey (ACS) 5-Year Estimates.

The 2022 population of Williams County is 39,076 (Table 4-1). The county seat is the City of Williston, which is approximately 17 miles southwest of the proposed Project site and has a population of 27,783. The closest community to the Project is Wheelock, approximately 2.5 miles southeast of the Project.

Table 4-1: 2022 Population and Economic Characteristics

Location	Population	Median Income	Below Poverty Level	Unemployment Rate
United States	331,097,593	$75,149	8.8%	5.3%
North Dakota	776,874	$73,959	6.1%	2.9%
Williams County	39,076	$86,139	4.7%	2.5%
City of Minot	48,038	$73,959	6.4%	2.0%
City of Williston	27,783	$80,352	4.8%	2.9%

Source: U.S. Census Bureau 2022 ACS 5-Year Estimates Data Profiles

According to the 2022 ACS 5-Year Estimates, the largest industry category is agriculture, forestry, fishing and hunting, and mining (including oil and gas extraction), followed by educational services, health care, and social assistance.

4.2.2 Impacts

The Project could temporarily stimulate additional jobs in the construction trades, such as electricians, laborers, and carpenters. Basin Electric would use local labor to the extent practicable, and no labor relation would be negatively affected by the Project. The peak construction labor force for the Project would be approximately 1,000 workers. The length of employment would range from a few weeks to several months or years, depending on the skill and/or specialty. Some construction workers would temporarily relocate near the Project to provide the necessary specialized workforce to complete the Project. According to a housing study conducted by HDR, Inc. on behalf of Basin Electric, over 200 temporary housing options, most being hotels and motels, are within a 100-mile radius of the Project location. Additionally, over 7,000 vacant homes for rent and 400 units for migrant workers are within a 100-mile radius of the Project. See Appendix D for the full housing study report. More general activities like grading and earthwork could be distributed to local construction workers. However, given the low unemployment rate and a tight labor market in the region, it is anticipated that most of the construction workforce would come from outside the region. Increases in business to gas stations, grocery stores, and restaurants in communities may occur in nearby cities such as Williston and Minot, and places in between.

With an anticipated majority of the workforce coming from outside the region, local housing would experience a short-term impact. As discussed above, individual roles will have varying time requirements, requiring employees to seek temporary housing. Generally, construction crews utilize local hotels, existing crew camps, or RV camps for temporary housing options. Arrangements for longer-term housing may be established by the construction contractor, with crews rotating in and out as their assignments begin and are completed. It is anticipated that an adequate supply of temporary housing units would be available in Williams County and surrounding counties for use by construction workers temporarily relocating to the area.

The proposed Project would require only 50 to 60 full-time employees to operate and maintain the facility, having a minimal permanent impact to the general area.

4.2.3 Mitigation

Based on the Labor Study (Appendix D), there is a current labor surplus for the examined occupations. The socioeconomic impacts anticipated from Project construction to operation are expected to be positive. Basin Electric will continue to monitor the labor market within the region.

4.3 Land Use

4.3.1 Description of Resources

The Project site is approximately 240 acres located in a cultivated field. The area surrounding the Project is largely agricultural, with some industrial areas in proximity, including electrical substations, oil and gas extraction facilities, electric transmission lines, utility lines, and cell phone towers. Additionally, a few residential areas are in the vicinity of the Project. The closest residences are over one mile away from the site. Three transmission lines are within one mile of the Project site, one being a 115 kV transmission line that crosses the southeast corner of the Project site. The land along 62nd St Northwest (NW) has been heavily developed for oil and gas wells and other associated energy development infrastructure (Figure 4.1). The Project site will not be within city limits or an area of military installation and will not displace any residences or existing/planned industrial facilities.

4.3.2 Impacts

According to the National Land Cover Dataset (NLCD, Figure 4.1, 4.2, and 4.3) and site visits, the Project site is located on cultivated cropland. It is anticipated that all 240 acres of cropland will be permanently removed from agricultural production due to the Project construction and operation. After construction and where possible, it is anticipated that approximately 30 acres of unused land will be re-vegetated.

Approximately 2,400 feet of the existing 115 kV transmission line will be re-located by MDU within the southeast corner of the Project site to accommodate the Project.

As required by Williams County, Basin Electric has applied for and obtained industrial zoning approval for the construction of the new Project. Zoning approval was requested from Williams County in November 2024 and approved in January 2025 (Letter of Approval in Appendix E).

This Project would have no impact on any military lands or facilities, including ICBM facilities. The closest military site is over 32 miles east of the Project site.

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Service Layer Credits: Hybrid Reference Layer: State of North Dakota, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

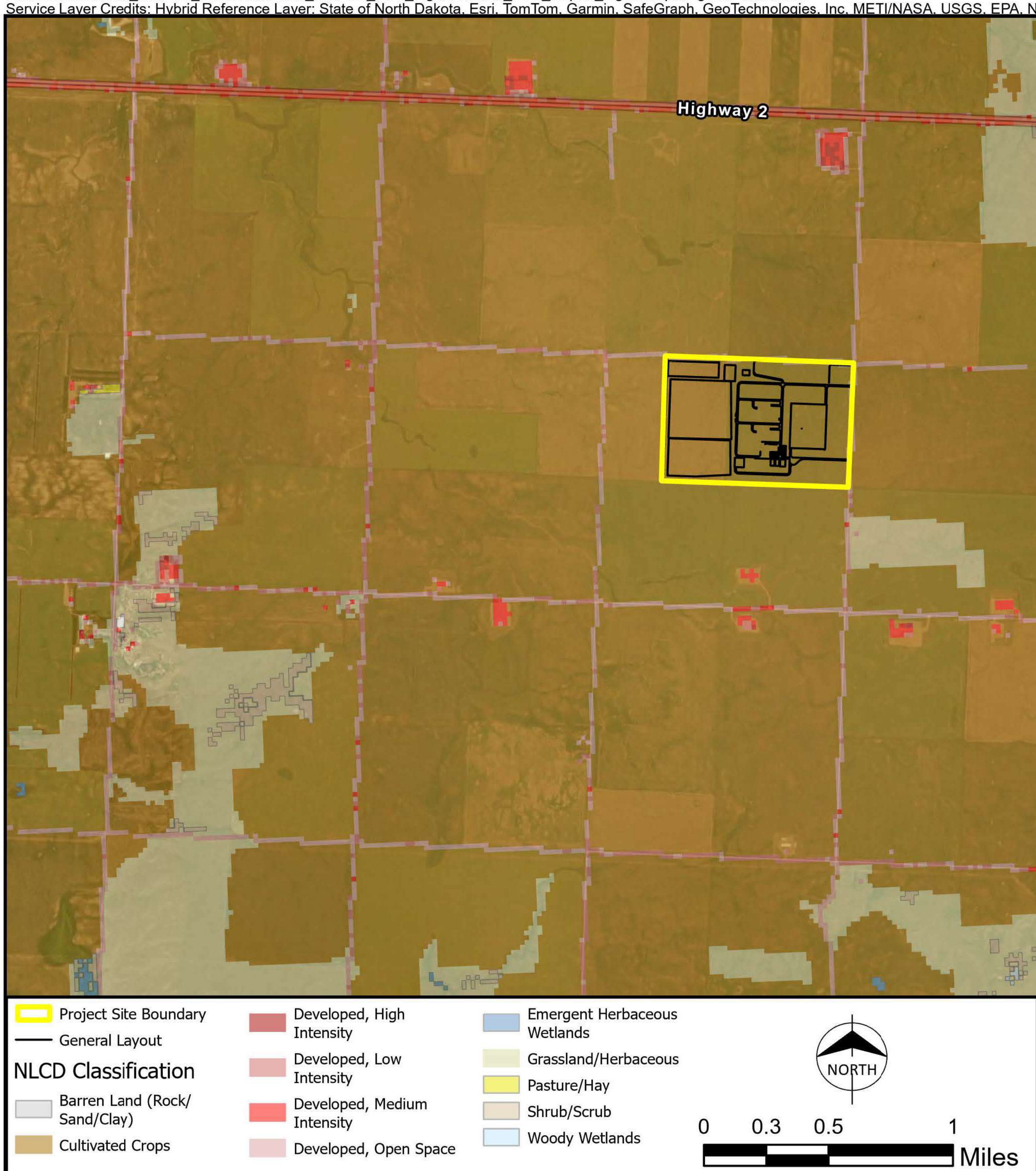


Figure 4.1
Land Use
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, NLCD, Basin EPC, Burn & McDonnell

Issued: 2/27/2025

Figure 4.2: Photo 1

Photo 1: This photo was taken from 121st Avenue NW looking west directly at the site.

Figure 4.3: Photo 2

Photo 2: This photo was taken from U.S. Highway 2 looking south toward the site. The site is approximately 1 mile south of this photo location (harvested crop area in the background).

4.3.3 Mitigation

It is anticipated that impacts to agriculture in Williams County would be minor. According to the USDA Agricultural Census, Williams County has approximately 1,114,295 acres of farmland. Although the Project would require converting approximately 240 acres of farmland, total crop production and sales would not be noticeably impacted by the permanent conversion to industrial use based on the significant amount of agriculture in the region. Throughout construction and operation, BMPs would be used to limit impacts on the surrounding agricultural fields. After construction, approximately 30 acres of temporarily disturbed areas would be re-vegetated.

4.4 Public Services

4.4.1 Description of Resources

4.4.1.1 Local Service – General Discussion

The Project is located in rural North Dakota, which has a low population density. Well-established transportation and utility networks provide access and necessary services to industry, homesteads, and farms.

Emergency and social services are provided by Williams County and neighboring communities such as Williston (Table 4-2). In North Dakota, Emergency Medical Services (EMS) divides geographic regions into service areas in which the local EMS facilities are responsible for responding to medical emergencies. The Project site falls within the Ray EMS service boundary (NDGISHUB, 2024). The City of Williston also has emergency services such as a fire department, ambulance service, police department, and highway patrol department. The closest hospital/medical service and local retail service facilities are in Tioga. Multiple recreation areas are located in Williston such as parks, community centers, a library, a community pool, and a golf course.

Table 4-2: Local Services

Service Type	Facility Name	Approximate Distance from Project
Hospital	Tioga Medical Center	17.6 miles
EMS	Ray Fire Hall and EMS	6.4 miles
Fire	Epping Rural Fire Protection District	3.7 miles
Local Police	Ray Police Department	6.4 miles
State Police	Highway Patrol	18.4 miles

4.4.1.2 Electrical and Gas Service

The Project site is located in the Mountrail-Williams Electric Cooperative (MWEC) service area. MWEC is a part of Basin Electric's member cooperative and is a not-for-profit, member-owned electric distribution cooperative that provides electrical services to northwestern North Dakota. Basin Electric, through the operation of the SPP, also delivers electric supply to the area.

A Basin Electric owned electrical 230/115 kV substation with terminals used by MWEC and Basin Electric transmission lines is located approximately one mile north of the Project site. A Basin Electric owned 345 kV transmission line running east/west is located approximately one mile south of the Project site. A MWEC owned 115 kV transmission line runs north/south on the east side of 121st Ave NW. A Montana-Dakota Utilities (MDU) Company owned 115kV transmission line runs northeast/southwest through the southeast corner of the Project site. All Basin Electric and MWEC owned transmission lines are located within the SPP transmission system. The MDU owned transmission line is located within the MISO transmission system.

Based on available pipeline data there are two natural gas pipelines located approximately 3.5 miles south of the Project site.

4.4.1.3 Roads

The transportation network surrounding the property is generally located along section lines creating a grid-like network. Roads of various classifications, particularly county-maintained, typically occur every mile, east-west and north-south. These roads in this area of Williams County are typically gravel. The Project site is located along the west side of 121st Avenue NW, approximately one mile south of 64th St NW (U.S. Highway 2), a four-lane paved divided highway, and approximately 0.5 miles north of 62nd St NW.

4.4.1.4 Traffic

The existing traffic volume for some of the surrounding roads is documented in Table 4-3. Understanding traffic patterns and congestion can be complex; however, these recordings can provide a general idea of traffic patterns near the Project site. For comparison, a section of U.S. Highway 2, approximately 2.3 miles west of the City of Ray, has an Annual Average Daily Traffic (AADT) of 5,470 cars. In contrast, a section of U.S. Highway 2, approximately 0.5 miles south of the intersection of U.S. Highway 85 and U.S. Highway 2, has an AADT of 7,490 cars.

Table 4-3: Existing Daily Traffic Levels

Roadway Segment	2023 AADT	2023 Daily Truck Traffic
U.S. Highway 2 (2.3 miles west of the City of Ray)	5,470	1,625
123rd Avenue NW	320	90
119th Avenue NW	340	Not Recorded
129th Avenue NW	65	25

Source: North Dakota Department of Transportation (NDDOT)

The closest road monitored by North Dakota Department of Transportation (NDDOT) is 123rd Avenue NW, which was surveyed in 2023 and is identified as a primary county road. The 123rd Avenue NW AADT results were used as a proxy to examine potential AADT in the area surrounding the Project. The recorded AADT for 123rd Avenue NW has slightly less AADT recorded traffic than 119th Avenue NW, another primary county road. Both county roads have significantly less traffic than U.S. Highway 2. The lowest recorded AADT of 65 was for 129th Avenue NW, which is not designated as a primary county road. This helps estimate road usage in the general area of the site.

4.4.1.5 Water Supply

Public infrastructure service, such as water supply, is generally limited in rural areas like that of the Project site. Homes in the area tend to use water wells and septic systems for their household needs. The NWRWD, which has water distribution facilities throughout rural Williams County, will provide water for the Project. See Appendix F for NWRWD application with Basin Electric to provide water to the site.

4.4.1.6 Telephone, Fiber Optic, Television and Radio Communications

The Project would make use of the existing underground fiber cable servicing the surrounding area for temporary communications during construction and as backup communications for operation. A new approximately 100-foot communication/microwave tower would be constructed in the electrical substation for the main plant and electric transmission communication purposes.

4.4.2 Impacts

The following sections describe potential impacts on public services due to Project construction or operation.

4.4.2.1 Local Services

Construction crews would potentially use local services, such as emergency services, medical facilities, community facilities, and recreational facilities. In comparison to the overall workforce in the area and the amount of service development, the Project workforce would be small. Approximately 1,000 construction workers (i.e., approximately 800 craft/skilled workers and 200 construction management staff) are anticipated during the peak construction periods. Approximately 50 to 60 employees are anticipated during normal operation of the Project. The influx of workers could increase economic activity for the local community, providing a positive benefit. Based on the Labor Study (Appendix D), there is a current labor surplus for the examined occupations. No negative impacts to these local services are anticipated because the existing services/facilities in the City of Williston and Williams County would likely be able to accommodate use by construction crews that would be in the area on a temporary basis.

4.4.2.2 Electrical and Gas Service

Basin Electric has identified a need for additional electric generation in northwestern North Dakota to continue to meet increasing energy demand and provide system stability for the region. Energy would be generated at the Project site and distributed to the electrical grid system to meet electrical load requirements. The Project would improve the reliability of service in the region. Electrical needs during operation would be provided by the new plant itself or from its interconnection to the grid. The local electric cooperative will provide power during construction, which may serve as additional backup power during operation. The natural gas supply will be provided by WBI Energy through service contracts. As a result, no adverse effects to current electric and gas services in the area are anticipated.

4.4.2.3 Roads

The primary access road, 121st Avenue NW, would experience impacts due to the amount of construction traffic, and minimal impact as a result of plant operation traffic. The nearest highway, U.S. Highway 2, already experiences higher traffic volumes and is designed to support these levels and types of traffic for construction and operation. The amount of traffic generated from the Project would be minor compared to the current levels on U.S. Highway 2. There are no anticipated impacts to U.S. Highway 2 because of the construction or operation of the Project; however, Basin Electric will consult with North Dakota Highway Patrol (NDHP) for heavy hauling during construction and with NDDOT for other traffic requirements for operation of Project.

4.4.2.4 Traffic

The peak construction labor force for the Project is estimated to be 1,000 workers. The equipment and construction material deliveries generated by construction will fluctuate greatly throughout construction of the Project. It is anticipated that peak construction periods would occur in September 2027 and again in July 2028.

The proposed Project would staff approximately 50 to 60 full-time employees to maintain and operate the facility. This workforce and support services would generate an approximate maximum of 50 to 60 additional passenger vehicle trips on average per day. It is anticipated that no impacts to area roads would occur from Project operation.

It is anticipated that truck access to the Project site would utilize U.S. Highway 2 and 121st Avenue NW. There could be temporary traffic delays on these roads as a result of oversized loads or other construction traffic accessing the site. These impacts would be temporary and mostly be associated with the construction portion of the Project. If required, permits would be obtained and issued by the state, county, and/or township for oversized/overweight truck movements. Other than U.S. Highway 2 and a portion of 121st Avenue NW, traffic levels on local roads are anticipated to be minimal, and the network of county roads provides opportunities for general traffic reroutes to avoid areas of delays. All anticipated traffic levels generated as a result of the construction and operation of the Project will be reported as required by the NDDOT, and the appropriate safety and regulatory measures will be taken.

4.4.2.5 Water Supply

The water supply for the Project would be provided by NWRWD through a service contract. Water use during construction would largely be limited to water used for dust control and for potable uses by construction workers, which can be supplemented with temporary water supplies trucked to the site. During Project operation, water needs vary considerably, but typically include water for power generation equipment, combustion turbine maintenance, sanitary, and fire protection. The maximum water demand for the facility is 223 gallons per minute (gpm) with an average of 52 gpm. Processed noncontact wastewater generated during power generation processes will be directed to an approximate 55-acre lined evaporation pond. Wash waters used for combustion turbine maintenance will be routed to an on-site holding tank, collected, and hauled off-site and disposed of by a licensed contractor. Sanitary wastewater will be directed to an on-site leach field.

4.4.2.6 Telephone, Fiber Optic, Television and Radio Communications

The Project will include a 100-foot-tall communications tower contained within the footprint of the electrical substation, and Northwest Communications Cooperative will extend underground fiber cable to the site for temporary communications during construction and as backup communications for operation. No impacts to existing telephone, fiber optic, television, or radio communication resources are anticipated.

4.4.3 Mitigation

Construction and operation of the proposed Project would be in accordance with applicable federal, state, and local permits and laws, as well as industry construction and operation standards. Minor impacts are expected on the existing transportation infrastructure and traffic during the construction and operation of the Project, which are described below. Appropriate notification to the Federal Aviation Administration (FAA) would be provided for construction cranes, CCGT stacks, HRSG buildings, and the communications tower, as applicable. No adverse impacts are anticipated to the local water supply, telephone, fiber optics, television, or radio communication so mitigation is not proposed for these services.

4.4.3.1 Local Services

Construction, operation, and maintenance of the Project would have minimal impact to local services, and no mitigation is proposed.

4.4.3.2 Electrical and Gas Service

Construction of the Project would not negatively impact the existing electrical or gas service in the area. No mitigation for electrical and gas services is proposed in this application.

4.4.3.3 Roads

Basin Electric and pertinent contractors will coordinate with NDHP and local jurisdictions to obtain oversize/overweight permits as necessary before transporting heavy haul equipment. Restoration of roadways will be completed as necessary as part of jurisdictional authority requirements. At a minimum, it is anticipated that Basin will pave a section of 121st Avenue NW from U.S. Highway 2 southward to the main entrance to the Project site. Consultation with NDDOT will also be completed to determine if there will be any road improvements needed for operation of the Project.

4.4.3.4 Traffic

The transportation of materials and equipment will be conducted in accordance with NDHP regulations. All necessary provisions will be made to conform to safety requirements for maintaining the flow of public traffic. Construction operations will be conducted to offer the least possible obstruction and inconvenience to public traffic. Public roads, section lines and existing trails will be used, to the extent practicable, to access the proposed Project. Although, traffic impacts are expected to be minimal and temporary in this rural area, Basin Electric is having discussions with NDDOT to address operation staff traffic turning from US Highway 2 onto 121st Avenue NW.

4.4.3.5 Water Supply

NWRWD has sufficient capacity to serve the current area needs and supply the Project needs through a service contract. Construction, operation, and maintenance of the Project would not negatively impact the local water supply; therefore, no mitigation is proposed.

4.4.3.6 Telephone, Fiber Optic, Television and Radio Communications

Construction, operation, and maintenance of the Project would not negatively impact telephone, fiber optic, television, and radio communications; therefore, no mitigation is proposed.

4.5 Human Health and Safety

The following section describes human health and safety conditions within or near the Project area and describes potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.5.1 Description of Resources

The following section provides a description of human health and safety conditions within or near the Project area.

4.5.1.1 Human Health

Human health risks in and around the Project site include the potential exposure to electromagnetic fields (EMF) associated with electric transmission lines and substations, and potential exposure to regulated substances, such as anhydrous ammonia and petroleum-related products. The term EMF references two separate fields: electric fields and magnetic fields. Electric fields result from differences in voltage, while magnetic fields are created by electric current flows. A higher voltage creates a stronger electric field. A greater current of electric flow creates a stronger magnetic field. EMF is produced by natural sources (such as the build-up of electric charges from thunderstorms in the atmosphere) and human sources (such as household electronics, X-rays, and electric G&T facilities). Electric fields are measured in volts per meter (V/m) or kilovolts per meter (kV/m). Magnetic fields are measured in milligauss (mG).

Anhydrous ammonia will be used in SCR to reduce NO_x emissions. Ammonia is commonly used in agricultural practices as chemical fertilizers. Anhydrous ammonia will be delivered to the site via truck and then stored on-site in two bulk 58,000-gallon storage tanks. As the quantity of anhydrous ammonia is greater than 10,000 pounds, a Risk Management Plan (RMP) is required to be developed and implemented for the facility's storage, use, and handling of ammonia. Basin Electric will prepare an RMP as required by 40 Code of Federal Regulations (CFR) Part 68 Accidental Release Prevention Provisions, under Clean Air Act (CAA) Section 112(r), Prevention of Accidental Releases. The RMP establishes a general duty for owners and operators of stationary sources who produce, process, handle, or store regulated substances, to prevent and mitigate accidental releases of these substances by preparing detailed risk assessments and implementing safety procedures through the preparation of an RMP. These regulations require the owner or operator of an affected source to prepare and implement an RMP to detect and prevent or minimize accidental releases of regulated substances, and to provide a prompt emergency response to any such release to protect human health and the environment. Petroleum-based products will also be stored and used on-site over the minimum threshold of 1,325 gallons requiring the preparation and implementation of a Spill Prevention, Control, and Countermeasures (SPCC) Plan as required by 40 CFR Part 112, Oil Pollution Prevention. This plan will address the storage and use of petroleum-based liquids on-site, and reduce the potential risk for human and environmental exposure.

4.5.1.2 Human Safety

Occupational hazards include risks associated with construction and construction equipment, installation of equipment, heavy equipment transportation, and contact with electric lines. Potential public hazards include increased traffic volume due to construction vehicles in the area and large construction vehicles and equipment using local roads designed for lighter traffic.

Proper safeguards would be implemented during the construction and operation of the facility. The Project facilities would be designated to meet federal, state, local, and Basin Electric's standards regarding the installation and operation of these types of facilities.

4.5.2 Impacts

The following section describes potential impacts on human health and safety caused by the construction or operation of the Project.

4.5.2.1 Human Health

The proposed Project would result in the potential exposure of employees to EMF associated with the electrical substation and adjacent transmission lines. EMF would be strongest in and directly next to the substation and transmission lines and would decrease within increasing distance from these sources.

The EMF levels at the edge of the Project site, even under maximum operating conditions and normal operating conditions, are expected to be below the published International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines. The nearest residences are over a mile south/southwest of the Project site. No adverse impacts are anticipated from the construction or operation of the Project.

Injury from anhydrous ammonia commonly occurs from inhalation of ammonia gas or vapors, ingestion of ammonia-contained liquids, and direct contact with ammonia gas with skin or eyes. With the release of anhydrous ammonia, the closest to the release could be most affected. The nearest residences are over a mile from the Project site. No adverse impacts are anticipated from the construction or operation of the Project. Although it is anticipated that an accidental release of ammonia to the environment would not occur, preparing and implementing the RMP (as required) for the storage and use of anhydrous ammonia would reduce the potential for adverse effects on human health.

Due to containment requirements for the storage of petroleum-based products and developing an SPCC plan for operation and for construction if needed, it is anticipated there will be no impacts to human health or to the environment as a result of the use or storage of petroleum-based products.

4.5.2.2 Human Safety

During construction, a few potential safety hazards could result from heavy equipment operation, the presence of overhead materials and cranes, and the use of construction tools. Construction personnel are at higher risk than the general public during the construction period of the proposed Project. However, these increased human safety hazards are temporary and are typical of similar construction projects elsewhere.

Construction and operation of the proposed Project would involve the use and storage of regulated and hazardous materials such as diesel fuel, gasoline, and lubricating oils during construction and fuel, and anhydrous ammonia during the operation of the Project. At any point during the construction and operation of the facilities associated with the proposed Project, the hazard of an accidental leak or spill exists. Hydraulic fluid, paints, and solvents are likely to be present during the construction phase and would also pose a health hazard if accidentally spilled. All used oil generated at the proposed Project site and any other potentially hazardous materials would be collected by licensed/permitted recyclers. To reduce the potential for a release of regulated or hazardous materials during the construction phase of the proposed Project and during the storage of all hazardous materials during the operational lifetime of the Project, work would be planned and performed in accordance with Occupational Safety and Health Administration (OSHA) standards and protocols addressing the use of potentially hazardous materials and applicable federal and State environmental regulations. If a release were to occur, cleanup, management, and disposal of contaminated soils would be conducted according to the U.S. Environmental Protection Agency (EPA) and State standards. Conformance to these standards and procedures would reduce the potential for significant impacts resulting from the release of hazardous materials during the construction phase. During the operation of the Project, petroleum-based fluids and solvents, ethane, and anhydrous ammonia would be stored in liquid designated storage areas.

The general public would not be allowed to enter any construction areas within the Project site. The substation would be contained within a secured fence to prevent direct access and contact with energized equipment. Basin Electric's established safety procedures would be used should the substation need maintenance or repair to help maintain the safety of both workers and those in the surrounding area. The major risk to the general public would be from increased traffic volume on the roadways near or adjacent to the proposed Project due to commuting construction workers and transportation of equipment and materials. These impacts would be both temporary during construction and minimal during the long-term daily operation of the Project. Because of the low population density of the area, these impacts during construction and the operation of the facility are not expected to result in significant safety risks.

4.5.3 Mitigation

The following provides a description of mitigation measures to be implemented by Basin Electric related to human health and safety.

4.5.3.1 Human Health

No EMF-related impacts to human health or animals are anticipated due to the anticipated low levels of electric and magnetic fields and limited access to such resources. Therefore, no mitigation is required.

The Toxic Substances Control Act (TSCA) of 1976 grants the EPA the authority to regulate chemical substances and mixtures that represent an unreasonable risk of injury to human health and safety or to the environment. Basin

Electric will implement BMPs during construction and operation, along with the RMP and SPCC Plan for operation of the Project, which should adequately address potential accidental releases of regulated substances to protect the health and safety of employees, surrounding inhabitants, and the environment.

4.5.3.2 Human Safety

Construction-related hazards would be effectively mitigated by complying with applicable federal and state occupational safety and health standards, applicable NESC regulations, and utility design and safety standards.

Basin Electric would develop a Health and Safety (H&S) Plan to address public and worker safety during the construction and operation of the proposed Project. The H&S Plan would identify requirements for minimum construction or operation distances from residences or businesses, and for temporary fencing around staging, excavation, and laydown areas during construction. It would also include provisions for worker protection, as required by OSHA with emphasis on CFR 1926 – Safety and Health Regulations for Construction. During construction, all employees, contractors, and sub-contractors would be required to conform to OSHA safety standards and procedures. Adequate training would be mandatory for all onsite workers. Heavy equipment would be in compliance with OSHA requirements for safety devices such as backup warnings, seat belts, and rollover protection, personal protection safety equipment such as hard hats, ear and eye protection, and safety boots would be required for all onsite workers. All accidents and injuries would be reported to the designated safety officer.

Risks of accidental fire during construction could occur from human activities such as refueling, welding, cigarette smoking, and use of vehicles and construction equipment in or near dry, grassy areas. The H&S Plan would reduce fire-related risks to acceptable levels by imposing restrictions or procedures regarding these activities. A fire risk would be present during the operation of the proposed Project due to the use and storage of fuel and chemicals within the facility. The proposed Project would have a built-in fire suppression system. In addition, the implementation of industry-approved design measures for all proposed Project components would help reduce fire-related risks.

4.6 Air Quality

The following sections describe air quality within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.6.1 Description of Resources

Air quality is generally determined by comparing project pollutant concentrations with regulated standards. The maximum acceptable level of a pollutant is specified by the EPA. The CAA established two types of National Ambient Air Quality Standards (NAAQS), primary and secondary. The EPA has established NAAQS for six criteria air pollutants: sulfur dioxide (SO_2), CO, nitrogen dioxide (NO_2), ozone, respirable particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). Primary standards set limits to protect human health, and secondary standards set limits to protect public welfare. For the criteria pollutants, the North Dakota Ambient Air Quality Standards (ND AAQS) are the same as the federal NAAQS. Williams County is currently classified as attainment or unclassifiable (to be treated as attainment) for all NAAQS criteria pollutants.

Emissions from all phases of construction and operation of the proposed Project would be subject to applicable state and federal air regulations. Most air quality regulatory programs address emissions from stationary sources of air pollution; these programs would primarily affect ongoing operations of the Project. Air quality regulations affecting construction are primarily concerned with reducing emissions associated with construction equipment and fugitive dust.

The Project will include two one-on-one combined-cycle trains. Each combined-cycle train includes one combustion turbine, one HRSG with a duct burner, and one steam turbine. The combined-cycle turbines and duct burners will be fired solely on natural gas. Additionally, the following equipment will be included as part of the Project:

- One natural gas-fired auxiliary boiler (249.0 million British thermal units per hour (MMBtu/hr))
- Three natural gas-fired gas heaters (15.2 MMBtu/hr, each)
- Two emergency diesel generators (2,000 kW, each)
- One emergency diesel-fired fire pump (350 hp)
- Fuel storage tanks
- Haul road traffic fugitives
- Natural gas fugitives (piping components)
- Greenhouse gas-containing circuit breakers
- Building heaters

Two air cooled condensers (ACCs) (dry) will be installed as part of the Project instead of cooling towers for cooling. The ACCs are not included in the Project air emissions as there will be no emissions from this equipment.

The Project's air emission sources would be regulated at the federal level by the CAA, as amended, and at the state level by North Dakota Administrative Rules. Regulations applicable to the Project include:

- North Dakota Construction and Operating Permit Rules
- NAAQS
- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)

North Dakota air permitting requirements are codified in Article 33.1-15, Air Pollution Control. Chapter 33.1-15-14 establishes permit review procedures for all facilities that can emit pollutants to the ambient air. New facilities are required to obtain a Permit to Construct before initiating construction activities. Basin Electric has applied for a Permit to Construct from the North Dakota Department of Environmental Quality (NDDEQ) for the Project emission sources. The Project will be considered a major facility or project per the federal Prevention of Significant Deterioration (PSD) regulations.

The proposed Project would comply with applicable state and federal air quality regulations and obtain applicable air quality permits before commencing construction.

4.6.2 Impacts

Construction of the proposed Project would potentially have minor and temporary impacts on air quality. This would be due to fugitive dust emissions during ground-disturbing activities associated with construction and installation of the equipment and associated infrastructure of the Project. Construction emissions would also result from the combustion of fuel in construction equipment/vehicles, fugitive dust associated with site preparation/grading, and movement of construction equipment/vehicles onsite.

Because of their temporary nature, construction emissions would not have a long-term impact on ambient air quality, and Basin Electric's implementation of proposed emission control measures as well as other measures specified by NDDEQ is anticipated to reduce construction emissions impacts to less than significant levels.

Operation of the proposed Project would result in air emissions from stationary fuel-burning equipment. The Project would operate as allowed under applicable air permits obtained prior to construction and operation. Operation of the Project in compliance with the applicable permit limits would not result in an adverse impact to public health and welfare.

Combined-cycle turbines are a "listed source" per federal PSD regulations (40 CFR Part 52.21). Therefore, the Project may emit up to 100 tons per year (tpy) of any criteria pollutant before the Project would be subject to PSD review. The maximum potential emissions from the Project and PSD applicability are shown in Table 4-4.

Table 4-4: Project Potential Emissions and PSD Major Source Thresholds

Pollutant	Preliminary Estimated Potential Emissions (tons per year)[a]	PSD Significant Emission Rates[b] (tons per year)	PSD Review Applicable (Yes, No)
NO_x	**614**	40	Yes
CO	**1,023**	100	Yes
PM	**487**	25	Yes
PM_{10}[c]	**487**	15	Yes
$PM_{2.5}$[c]	**487**	10	Yes
SO_2	**66**	40	Yes
VOC	**416**	40	Yes
H_2SO_4 mist	**99**	7	Yes
Lead	0.006	0.6	No
CO_2e	**5,682,618**	75,000[d]	Yes

(a) Numbers in **bold** indicate the PSD significant emission rate (SER) is exceeded
(b) 40 CFR 52.21(b)(23)(i)
(c) Filterable plus condensable
(d) 40 CFR 52.21(b)(49)(iv)(a)

A "top-down" BACT analysis was performed for each of the pollutants in Table 4-4 that was above its corresponding PSD significant emission rate: NO_x, CO, $PM/PM_{10}/PM_{2.5}$, SO_2, VOC, sulfuric acid (H_2SO_4), and greenhouse gases (CO_2e). BACT is an emission limitation based on the maximum degree of reduction which the NDDEQ determines is achievable on a case-by-case basis, considering energy, environmental, economic impacts, and other costs.

State-of-the-art pollution control equipment has been proposed as BACT for the combined-cycle combustion turbines. Emissions of NO_x from the combustion turbines will be controlled by low-NO_x burners. NO_x emissions from the combustion turbines and the duct burner will be controlled with SCR systems. Emissions of CO and VOC will be controlled by good combustion practices and an oxidation catalyst (also referred to as a CO catalyst). Using clean fuels and good combustion practices will control SO_2, H_2SO_4, and $PM/PM_{10}/PM_{2.5}$ emissions. Greenhouse gas emissions will be controlled using natural gas fuel, monitoring and controlling excess air, oxidation catalyst, and efficient turbine design.

Since the Project is subject to PSD review, an air dispersion modeling analysis has been performed for each regulated NSR pollutant that exceeded its PSD significance level (NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2). According to this analysis, the Project will not cause or contribute to any modeled Class II PSD Increment or NAAQS.

In addition to the Class II modeling, a Class I Increment modeling analysis was performed to assess the air quality impacts at the four Class I areas within 250 kilometers of the Project. The modeling analysis submitted with the air permit application showed that no exceedances of the PSD Class I Significant Impact Level occurred for the NO_2 annual averaging period, PM_{10} and $PM_{2.5}$ annual and 24-hour averaging periods, SO_2 annual, 24-hour and 3-hour averaging periods.

Per PSD requirements, an additional impacts analysis was performed to assess whether the Project would have a significant impact on visibility, soils, growth, or vegetation in the surrounding area. The additional impacts analysis submitted to the NDDEQ showed that the Project will not have a significant adverse impact on the air quality, soils, vegetation, visibility, and growth in the surrounding area.

The Project is expected to emit GHG emissions, including CO_2, methane and nitrous oxide emissions. GHG emissions of 5,682,618 tpy (Table 4-4) from the Project would represent a small fraction of one percent of United States emissions of 6,343.21 million metric tonnes in 2022. Thus, construction and operation of the Project would not contribute measurably to global GHG emissions.

4.6.3 Mitigation

During construction, it is proposed that standard dust control measures be used to reduce the generation of fugitive dust due to surface disturbance. Dust control measures could include, but are not limited to, the following:

- Applications of water during grading
- Paving, chemical stabilization, or watering of internal roadways after completion of grading
- Reduction of speed on unpaved roadways to 15 miles per hour or less
- Use of sweepers or water trucks to remove “track-out” at any point of public street access
- Stabilization of dirt storage piles by chemical binders, tarps, fencing, or other erosion control

Construction of the proposed Project would also result in exhaust pipe emissions from a variety of sources, including cranes, loaders, excavators, graders, generators, vibratory rollers, concrete emplacement trucks, and crew trucks. It is proposed that the following measures be used to reduce emissions from vehicles and construction equipment during Project construction:

- Properly maintain construction equipment in accordance with manufacturers’ specifications or standard practices
- Limit truck idling to the extent practicable
- Burning waste materials will not be permitted and all waste materials will be disposed of at permitted waste disposal areas or landfills.

The two turbines would be equipped with SCR and low-NO_x burners to control NO_x and oxidation catalysts to control CO and VOC emissions. Use of these control systems, use of natural gas as the primary fuel, and compliance with operating limits imposed by required air emissions operating permits are anticipated to mitigate impacts to ambient air quality and maintain compliance with applicable ND AAQS and NAAQS.

4.7 Noise

The following sections describe noise within or near the Project area, potential associated impacts, and mitigation measures to be implemented by Basin Electric. The full noise study report is provided in Appendix G.

4.7.1 Description of Resources

4.7.1.1 Acoustical Terminology

The term “sound level” is often used to describe two different sound characteristics called sound power and sound pressure. Every source that produces sound has a sound power level (L_w). The sound power level is the acoustical energy emitted by a sound source and is an absolute number not affected by the environment. The acoustical energy produced by a source propagates through a medium as pressure fluctuations. These pressure fluctuations, also called sound pressure (L_p), are what human ears hear and microphones measure.

Sound energy is physically characterized by amplitude and frequency. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. A 3-dB change in a continuous broadband sound is generally considered “just barely perceptible” to the average listener. A 5-dB change is generally considered “clearly noticeable,” and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Frequency is measured in hertz (Hz), which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels (dBA). For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 4-8.

Sound in the environment is constantly fluctuating, such as when a car drives by, a dog barks, or an aircraft passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include exceedance and equivalent sound levels. The most common statistical level used to describe the average sound level for a given time period is the equivalent sound level (Leq).

Table 4-5: Sound Pressure Level, Subjective Evaluation, and Environment

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
		Outdoor
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private Office
40		Farm field with light breeze, birdcalls

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
		Outdoor
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Source: Adapted from *Architectural Acoustics*, M. David Egan, 1988 and *Architectural Graphic Standards*, Ramsey and Sleeper, 1994

4.7.1.2 Existing Acoustical Environment

Ambient noise measurements were taken to establish the existing ambient sound levels in the areas surrounding the Project. Continuous sound level measurements were collected at one measurement location from 1:00 PM on September 30, 2024, to 2:00 PM on October 1, 2024. Ambient sound levels in the area were primarily comprised of intermittent traffic and natural sound sources such as insects and birds. A summary of the measurement data is shown in Table 4-9.

Table 4-6: Ambient Measurement Summary

Time of Day[1]	L_{eq} (dBA)	L_{90} (dBA)	L_{eq} (dBC)	L_{90} (dBC)
Daytime Average	50	41	75	68
Nighttime Average	40	35	66	59

1) Daytime is from 7 AM to 10 PM, and nighttime if from 10 PM to 7 AM

4.7.2 Impacts

The following sections describe potential impacts related to noise due to Project construction or operation.

4.7.2.1 Facility Noise Design Criteria

The Project was modeled assuming use of standard equipment and typical or standard mitigation incorporated. The Project is located within Williams County, North Dakota within Wheelock Township. The State of North Dakota does not have applicable noise statutes which limit noise from the Project. The Williams County Zoning Ordinance Regulations were also updated recently (January 2024) and no longer include specific numerical noise limits applicable to the Project that previous versions of the ordinance did. However, Section 2-8-7 Performance Standards contains the following statement:

> *"Dust, fumes, odors, smoke, vapor, noise, lights, and vibrations from any industrial or manufacturing operations shall be contained within the HI district."*

While this is not a numerical noise limit, there is indication that nuisance noise from the industrial noise sources should be considered at nearby noise sensitive receptors. In absence of numerical noise limits, Project sound levels can be compared to EPA guidelines and American National Standards Institute (ANSI) S12.9 recommended sound levels.

In 1974, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. As part of this document, the recommended noise level is a day-night level (L_{dn}) of 55 dBA at the nearest noise sensitive receptors (equivalent to a 24-hour continuous L_{eq} of 48.6 dBA).

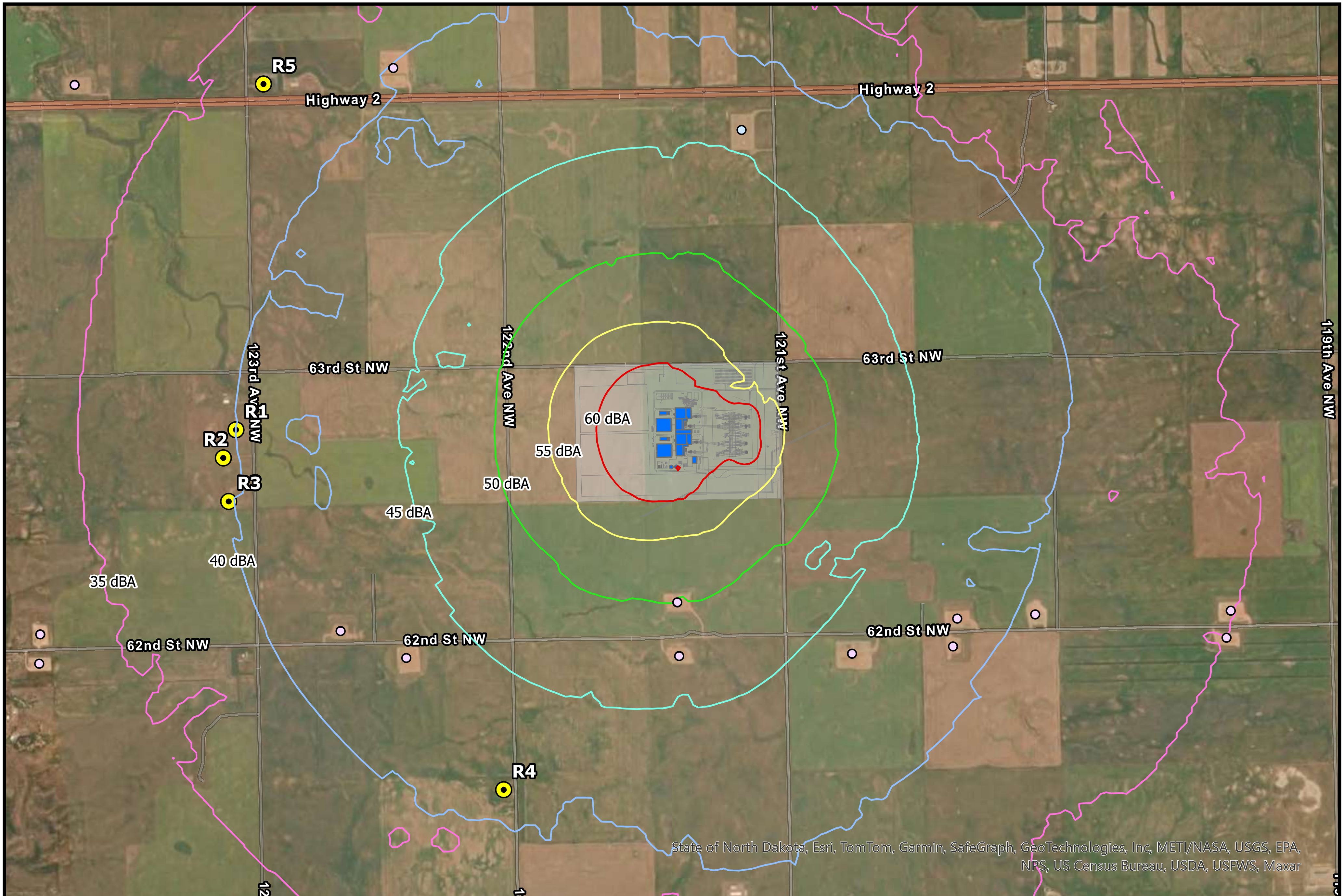
For Projects with the potential to emit low-frequency noise, ANSI S12.9 Part 4 provides informative guidance for sounds with strong low-frequency content. Section D.2 states that *"Generally, annoyance is minimal when octave-band sound pressure levels is less than 65 dB at 16, 31.5, and 63-Hz midband frequencies."* For sounds with strong low-frequency content, this would be approximately equivalent to C-weighted sound levels of 65 to 70 dBC.

Based on the existing ambient measured sound levels, Project design goals of 48.6 dBA and 68 dBC at the nearest residential receptors would be comparable to the existing environment, and align with the recommendations set forth by the EPA and ANSI guidelines. These design goals are only for normal Project operations.

4.7.2.2 Facility Normal Operation

The parcel of land proposed for the Project and the surrounding parcels are unclassified districts according to the Williams County Zoning Map. However, there are residential properties surrounding the proposed Project site where the Project design limit should apply.

To determine Project operational sound levels, noise modeling was performed using CadnaA, version 2024. The model predicts sound levels over a gridded area, and receivers were placed at the nearest neighboring residential structures to estimate sound levels at specific receptor locations. The predicted overall operational sound levels, which do not include contributions from ambient sound sources, are predicted to be below the Project design goals of 48.6 dBA and 68 dBC at neighboring residences. All equipment sound levels are expected to be base offered sound levels, with the combustion turbine and steam turbine equipment housed inside enclosures. A summary of the predicted Project sound levels is shown in Table 4-10. Sound level contours in 5-dB increments are presented in Figure 4.4.



Path: Z:\Clients\ENS\BasinEPC\175462_BasinWLPPermit\Studies\Modeling\Noise\GIS\Basin Williston GIS\Basin Williston GIS.aprx • Coordinate System: • Units:

LEGEND

- Project Property Boundary
- Receptors
- Structures
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- Existing Substation
- Existing Well Pads

REFERENCE

0 0.35 0.7 MILES

0 0.35 0.7 KILOMETERS

N

Figure 4-4
Sound Level Contours

LOCATION:	Williams County, ND
CLIENT:	Basin Electric Power Cooperative
PROJ. NO.:	175462
CREATED:	01/02/2025

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Table 4-7: Modeled Predicted Sound Level Impacts

Receptor Name	EPA Guidelines (dBA)	Project Sound Levels (dBA)	ANSI S12.9 Guidelines (dBC)	Project Sound Levels (dBC)
R1	48.6	40	68	64
R2	48.6	40	68	63
R3	48.6	40	68	63
R4	48.6	42	68	64
R5	48.6	36	68	59

During operation of the proposed Project, the highest L_{eq} sound levels are expected to approach 42 dBA at R4. Noise levels due to operation of the proposed Project are expected to meet the EPA and ANSI recommended levels and have minimal impact on the closest residences, as currently designed.

4.7.2.3 Construction Noise

Project construction has the potential to elevate local noise levels due to traffic and the construction of Project facilities. However, these activities and noise levels would occur in undeveloped and sparsely occupied areas and be relatively short and temporary in nature over the construction period for the Project. The closest residence is over one mile from the Project site; therefore, impacts related to construction noise should be minimal.

4.7.3 Mitigation

The predicted operational noise levels shown in Table 4-10 were modeled with the inclusion of typical base-offering mitigation. Incorporating typical mitigation, inclusive of a building enclosing the combustion turbines and steam turbines, should be sufficient to quiet noise levels to acceptable levels at the surrounding residences. Noise levels due to the operation of the proposed Project are expected to have little impact on the closest residences.

4.8 Visual Impacts

The following sections provide a description of visual resources within or near the Project site and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.8.1 Description of Resources

The topography surrounding the Project area is predominantly flat with rolling upland plains with gentle slopes and landforms. The Project site has an elevation of approximately 2,350 feet above sea level, slopes to the north, and has a flat undulating surface. The surrounding landscape is characterized by open crop fields interspersed with man-made features and county roads. Approximately 0.7 miles north of the Project site is existing electrical infrastructure including a MWEC electrical substation and transmission lines, which extend along the moderately to heavily trafficked U. S. Highway 2. Oil and gas facilities and transmission lines are also scattered throughout the surrounding landscape. Residences and farm buildings (inhabited and uninhabited) are located along the county and township roads. The nearest individual residences to the Project site are located over one mile to the southwest of the Project, 1.2 miles to the northeast of the Project, and 1.3 miles to the northwest of the Project. The nearest occupied communities/residential areas to the Project site are located in Wheelock, approximately 2.6 miles southeast of the Project, the City of Epping, approximately 3 miles to the southwest of the Project, and the City of Ray, approximately 6 miles to the northeast of the Project. Appendix A provides photo simulations for the

Project from the north and southwest. The Project will require exterior lighting for safety and security. Lights will be required in parking areas, on service roads around the facility, and at pedestrian entrances. Outdoor lighting fixtures will be shielded and directed downward to minimize light visible from adjacent properties and to reduce glare in the area. The Project may require safety lighting on motion sensors. During potential extensions of working hours, temporary shielded lighting may be used in the construction and laydown areas. Temporary lighting will be focused on work activities so as not to shine on neighboring properties or oncoming traffic.

4.8.2 Impacts

The construction of the Project would introduce additional permanent man-made structures to the existing environment. The tallest structures at the Project site would be the two exhaust stacks at approximately 250 feet tall, the two HRSG buildings at approximately 158.5 feet tall, the communication tower at approximately 100 feet tall, and the 230/345 kV takeoff structures in the electrical substation at approximately 85 feet tall. These taller facilities would be visible to landowners and community residents who live and travel near the Project site. The Project would not present a significant change to the visual landscape out of character with agricultural activities, light industrial facilities, and other existing electrical transmission facilities in and around the county. See Appendix A for photo simulations of the Project. No scenic roads, scenic waterways, or scenic overlooks were identified in the Project vicinity. Other short- and long-term visual impacts associated with the construction and operation of the Project would be increased human activity and associated vehicles and equipment within the Project area and the surrounding vicinity.

4.8.3 Mitigation

The Project would introduce a new facility to the Project vicinity, but it would not contrast significantly with the agricultural activities, light industrial facilities, and oil and gas developments already present throughout Williams County. The low population density area, distance from major highways, and distance from inhabited homes would limit any significant visual impacts; therefore, no mitigation measures are proposed.

4.9 Cultural Resources

The following sections describe cultural resources within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.9.1 Description of Resources

Six properties in Williams County are listed on the National Register of Historic Places (NRHP), including Old Armory, James Memorial Library, Old U.S. Post Office, Williston High School, Creaser Building, and Ray Opera House. No NRHP sites are located near the Project site; the closest NRHP site is approximately 6.3 miles away. A Class III Cultural Resource inventory was prepared by Metcalf Archaeological Consultants, Inc (Metcalf) in September 2024 to provide an inventory of precontact, historical, and architectural resources within the Project site. The approximately 240-acre site was inventoried, and three cultural resources were identified along the northern edge of the site. No direct adverse impacts to cultural resources are anticipated. Basin Electric is in discussions with SHPO and will provide that correspondence and final report when available. See Appendix H for the cultural report abstract.

4.9.2 Impacts

Based on the results of the cultural resources background review and field survey, it is anticipated that the SHPO would concur that the three sites identified are not eligible for the NRHP and that the closest NRHP sites would not be adversely affected by the Project. Depending on the SHPO determination, there are no anticipated impacts to cultural resources. Basin Electric has also provided an unanticipated discovery plan (see Appendix I).

4.9.3 Mitigation

Because it is anticipated there would be no impacts to cultural resources, there would be no proposed mitigation for cultural resources.

4.10 Recreational Resources

4.10.1 Description of Resources

Williams County has many recreational resources, including camping, hiking, biking, swimming, golfing, hunting, fishing, and nature observation. Existing industrial uses and visual impacts, including oil and electrical transmission facilities, are near the Project. No National Wild and Scenic Rivers are near the Project or in North Dakota, according to the National Wild and Scenic Rivers System. The Nationwide Rivers Inventory (NRI) also lists state-designated scenic rivers. The closest State Scenic River is the Little Missouri River, approximately 46 miles southeast of the Project site (National Parks Service [NPS], 2024). The closest parks to the proposed Project are Spring Lake Park, approximately 13.8 miles southwest, and Lewis and Clark State Park, approximately 13.3 miles southeast, along the Missouri River. The closest waterfowl production area is approximately 3.6 miles to the north. The North Dakota Private Land Open to Sportsman (PLOTS) Program is an agreement between private landowners and the North Dakota Game and Fish Department (NDGF) allowing for walk-in public hunting access on private land. The closest PLOTS agreement site is approximately two miles east of the Project (NDGF, 2024). No adverse effects to recreational resources are anticipated as there are abundant additional opportunities in the Project vicinity, and the visual character of the Project is not anticipated to detract from the use of other nearby areas.

4.10.2 Impacts

The Project site would not directly impact publicly accessible recreation areas because the property is privately owned and there are no public lands adjacent to the Project site. Impacts on recreational resources would be limited to surrounding property owners using private property for recreation and would be visual in nature. No local, state, or federal lands are managed within two miles of the proposed Project site. No adverse effects are anticipated due to existing agricultural practices and industrial land uses in the visual landscapes.

4.10.3 Mitigation

Recreational resources are not anticipated to be impacted; therefore, no mitigation is proposed.

4.11 Effects on Land-Based Economics

4.11.1 Description of Resources

4.11.1.1 Agricultural/Farming

According to the 2022 Agricultural Census, Williams County had 539 farms accounting for 1,741 square miles of farmland, which is approximately 83.8% of all land in the county. The primary crops produced in Williams County include wheat, canola, and forage (USDA, 2022). The entirety of the site is classified as cropland (NLCD; Figure 4.1).

4.11.1.2 Woodlands

As confirmed by aerial photography and environmental surveys, no trees are within the Project site; therefore, there will be no impact on woodlands.

4.11.2 Impacts

4.11.2.1 Agricultural/Farming

The proposed Project would result in the permanent removal of approximately 240 acres of cropland. Compared to the total cropland in Williams County, the conversion of 240 acres of cropland to industrial use would not significantly impact the overall crop production of the county. Approximately 30 acres of the Project's 240-acre total will be re-vegetated. Approximately 40 acres of the Project's 240-acre total will not be disturbed during construction. This area will be included within the permanent perimeter fence for the site and will be allowed to naturally vegetate. No impacts are anticipated to animal health and safety due to the construction or operation of the proposed Project because the site and surrounding land are used for agricultural production rather than livestock production.

Impacts to agriculture in Williams County would be minor. Although the Project site is currently used for agriculture, it is anticipated that the overall production of crops and total sales in Williams County would not be noticeably impacted by the removal of approximately 240 acres of cropland based on the extensive agricultural practices within Williams County. Approximately 70 acres of disturbed areas outside of the permanent Project footprint would be re-vegetated. Approximately 40 acres of undisturbed areas will be allowed to naturally vegetate. Where practical, construction activities will be scheduled during periods when agricultural activities would be minimally affected, or the farmer will be compensated accordingly if leased.

4.11.2.2 Woodlands

No woodlands are located within the Project site, and no mitigation is proposed.

4.11.3 Mitigation

4.11.3.1 Agricultural/Farming

Minimal impacts to agriculture and farming are anticipated. The Project will permanently remove 240 acres of cropland. Following completion of the Project, it is anticipated that 70 acres of land not hosting permanent Project facilities will be re-vegetated. Approximately 40 acres of undisturbed land will be included within the permanent perimeter fence for the site and will be allowed to naturally vegetate.

The necessary property and easements for the Project will be purchased through negotiations with the landowners affected by the proposed Project and payment will be made of full value for crop damages or other property damage during construction or maintenance.

4.11.3.2 Woodlands

No woodlands are located within the Project site; therefore, no mitigation is proposed.

4.12 Soils

The following sections describe soil resources within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.12.1 Description of Resources

The Project site contains four soil units: Williams-Zahl-Zahill complex with 6 to 9 percent slopes, Williams-Bowbells loams with 0 to 3 percent slopes, Williams-Bowbells loams with 3 to 6 percent slopes, Lehr-Williams loams with 0 to 6 percent slopes. The majority of the Project site contains Williams-Bowbells loams with 0 to 3 percent slopes and Williams-Bowbells loams with 3 to 6 percent slopes. Both predominant soil units in the Project site consist of deep, moderately well to well-drained soils formed in fine, loamy till. The Williams-Bowbells loams units are both classified as farmland of statewide importance, and neither is considered hydric. The Williams-Zahl-Zahill complex and the Lehr-Williams loams are not classified as prime farmland and neither are considered hydric by the Natural Resources Conservation Service (NRCS, 2024). The soil units within the Project site are shown in Figure 4.5.

Table 4-8: Soil Map Units within the Project Boundary

Map Soil Unit Symbol	Description	Acres	Percentage
C210A	Williams-Bowbells loams, 0 to 3 percent slopes*	130.1	53.7
C210B	Williams-Bowbells loams, 3 to 6 percent slopes*	93.2	38.5
C132C	Williams-Zahl-Zahill complex, 6 to 9 percent slopes	14.6	6.0
C818B	Lehr-Williams loams, 0 to 6 percent slopes	4.2	1.7

Source: NRCS, 2024

4.12.2 Impacts

Construction of the Project would result in the removal or disturbance of approximately 240 acres of soils within the Project site to accommodate the Project and all construction activities. The Project footprint would permanently occupy approximately 170 acres of land and temporarily disturbed areas of approximately 70 acres would be re-vegetated. Approximately 40 acres are not anticipated to be disturbed during construction and will be allowed to naturally vegetate. The primary soil types impacted within the Project footprint are Williams-Bowbells loams with 0 to 3 percent slopes, Williams-Bowbells loams with 3 to 6 percent slopes, and Williams-Zahl-Zahill complex with 6 to 9 percent slopes. Ground disturbances associated with temporary gravel laydown and construction parking areas would be temporary in nature and limited to the construction period. Typical soil impacts anticipated for Project construction would include soil compaction, altered surface runoff patterns, and a potential for increased erosion. Crews would limit ground disturbances wherever possible, and the temporary laydown areas would be restored as described in Section 1.5. To minimize erosion during and after construction, BMPs for erosion and sediment control would be utilized. These practices include temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization. Disturbed areas would be stabilized, restored and re-vegetated promptly after construction.

4.12.3 Mitigation

To minimize erosion during and after construction, Basin Electric would prepare and implement a SWPPP during construction and submit the Notice of Intent (NOI) to the NDDEQ before construction.

Significant amounts of excess subsoils and rock are not expected due to the planned rough grading cut and fill profiling of existing topography, to level the site and provide appropriate drainage. Any remaining excess subsoils and rock may be stockpiled at the site or spread throughout the site as part of final grading. If the need arises, excess subsoil and rock will be hauled off-site. Erosion and sediment controls will be established before construction, and then maintained and controlled through the application of SWPPPs. Sediment control measures (e.g. installation of silt fences) will be used, where appropriate, to prevent sediment from moving off-site and into nearby surface waters.

Maintenance operations will be scheduled during periods of minimum precipitation to minimize the potential of surface runoff and to reduce the risk of erosion, rutting, sedimentation and soil compaction. However, emergency repairs may occur during periods of inclement weather. Ruts, scars, and compacted soils resulting from emergency activities will be repaired by subsoiling, paraplowing, scarifying, harrowing, or disking, as appropriate.

Topsoil will be removed, stockpiled, and stabilized. Following construction, topsoil will be re-spread over disturbed areas, stabilized, and reseeded to establish vegetation cover.

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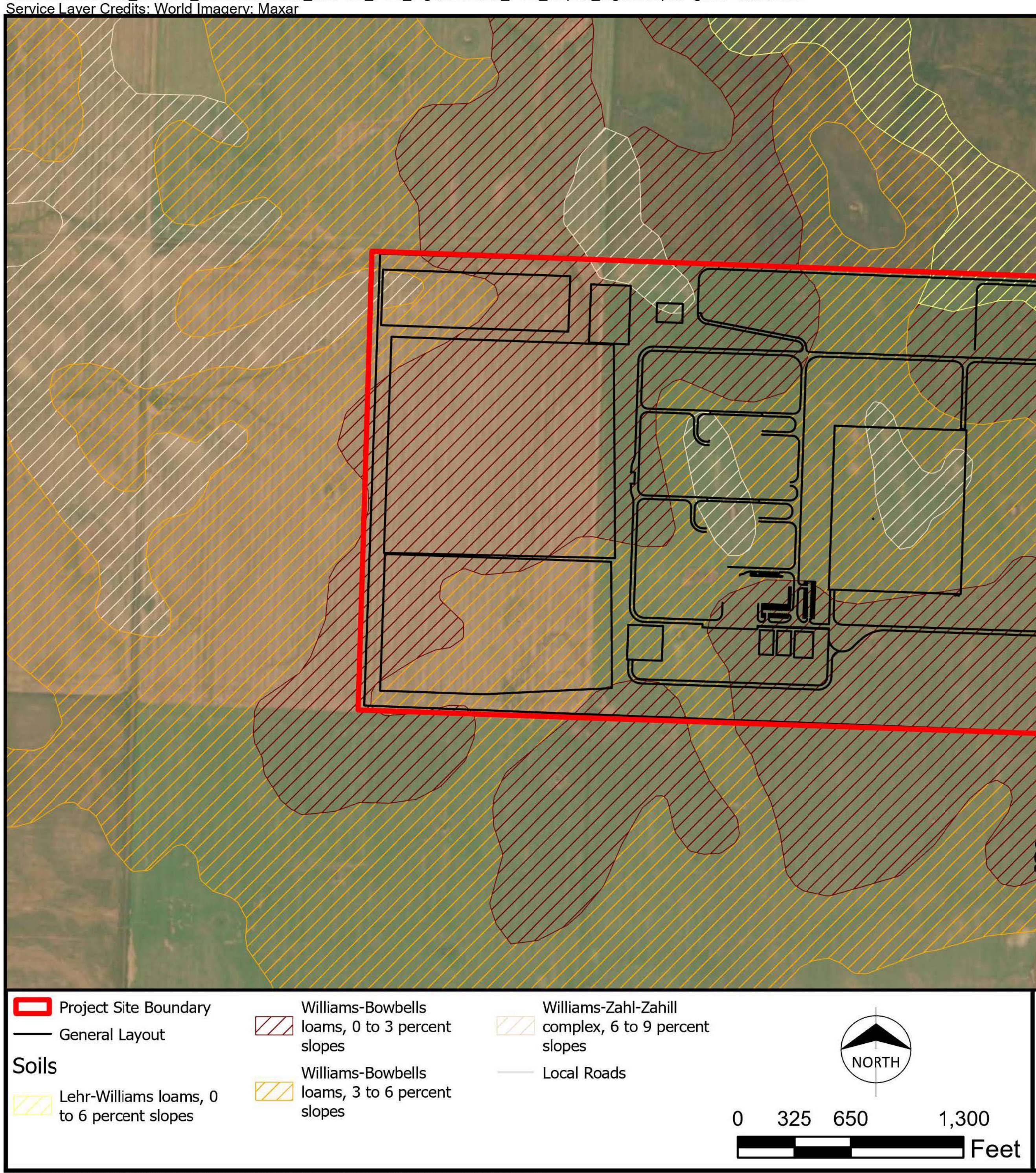

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Figure 4.5
Soils
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, SSURGO, US Census TIGER Line, Basin EPC, Burns & McDonnell

Issued: 2/27/2025

4.13 Geologic and Groundwater Resources

The following sections describe the geologic and groundwater resources within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.13.1 Description of Resources

The geological bedrock below the Project surface consists of Paleocene Epoch (65.5 to 56 million years ago) Sentinel Butte Formation. This formation consists of grayish brown silt, sand, clay, sandstone, and lignite. It contains river, lake, and swamp sediments which can range up to 200 meters or 600 feet in thickness (United States Geological Survey [USGS], 1983). Located in the Bakken-Lodgepole Total Petroleum System, Williams County, North Dakota sources high volumes of oil from the upper and lower shale members of the Bakken Formation reservoirs of the Mississippian Lodgepole Formation (USGS, 2008).

The majority of North Dakota and all of Williams County are in the Williston Basin Lower Tertiary Aquifer system. The Lower Tertiary Aquifer systems consist mostly of semi-consolidated to consolidated sandstone beds of Oligocene to Paleocene age. The Project is located within the Upper Fort Union aquifer.

The Basin Electric service area in northwestern North Dakota also contains extensive oil and gas resources within the Bakken shale formation, currently concentrated in McKenzie, Mountrail, and Williams Counties. This area has seen extensive geologic exploration and extraction-related activities and development to access and recover these oil and gas resources.

According to the North Dakota Geological Survey (NDGS), lignite beds, while common in North Dakota, are not economically feasible (too thin or too far from the surface) coal deposits near the Project site. The closest lignite mine is the Freedom Mine which is approximately 90 miles southeast of the Project near Beulah, ND (Lignite Energy Council, 2019). Occurrences of natural gas in shallow groundwater wells have been reported throughout North Dakota. Within Williams County, 66 well locations had positive shallow natural gas occurrence detections when field screened with a Flame-Ionization Detector (FID) (NDGS, 2010).

North Dakota is in an area of very low earthquake probability. Williams County has experienced five earthquakes from 1915 to 2009 with a magnitude of 3.7 or less (considered minor earthquake that is felt by many people, but no damage caused) (State of North Dakota, 2022). USGS seismic hazard maps show that the Project site would be in an area with the lowest long-term national seismic hazard risk (USGS, 2023). Related hazards, such as soil liquefaction, are therefore also unlikely. No identified landslide or unstable areas are located within the Project area.

4.13.2 Impacts

There are no anticipated impacts to geologic resources. Excavations of sufficient depth to encounter groundwater or other geologic formations are not anticipated for Project construction. Because no previously existing wells were identified and because no extensive deep-ground disturbance would occur within the Project site, no impacts on geological resources associated with the construction and operation of the Project are anticipated. Erosion control measures would be implemented as necessary for the construction of the Project. Basin Electric will also prepare an SPCC plan and implement appropriate containment to avoid the introduction of spilled materials into the groundwater if an unanticipated spill were to occur at the Project site.

4.13.3 Mitigation

To prevent potential impacts to geologic and groundwater resources, the construction contractor would minimize the likelihood of spilling fuel, hydraulic fluid, or other regulated materials that could infiltrate to groundwater by limiting refueling in secure areas and maintaining equipment in good working order. Storage tanks would be inspected regularly during the operation of the facility to reduce the likelihood of a spill event. Spill kits would be maintained at these sites to control and clean up any spills that may occur, and construction crew members would be trained in spill prevention and cleanup. Storage of any hazardous substances would occur in designated liquid storage areas during the operation of the Project. Erosion control measures will also be implemented during and following construction.

A Spill Prevention and Response Plan will be developed before the start of construction to prevent the potential for spills of hazardous substances into streams and drainages, and potential contamination of groundwater. The plan will include a procedure for storage of hazardous materials and refueling of construction equipment outside of riparian zones, spill containment and recovery plan, and notification and activation protocols. In addition, an SPCC plan will be developed for construction, if necessary, and will be developed prior to operation of the facility to address storage and use of petroleum-based products.

4.14 Surface Water and Floodplain Resources

The following sections provide a description of the surface water and floodplain resources within or near the Project area and describe the potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.14.1 Description of Resources

The Project is located in the Missouri Region, Lake Sakakawea Basin, East Fork Little Muddy River watershed. This watershed drains into the Missouri River (Lake Sakakawea), located approximately 15 miles southeast of the Project site. The National Wetlands Inventory (NWI, 2024) geospatial data identified two potential freshwater emergent wetlands within the 240-acre Project site, totaling 0.44 acres. Additionally, one intermittent stream was shown to potentially flow through the Project site. Upon conducting an on-site wetland delineation by Western EcoSystems Technology, Inc. (WEST) in September and October 2024, only one small palustrine emergent, temporarily flooded wetland (PEMA) and one ephemeral drainage were delineated on the Project site (Figure 4.6; Appendix J).

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) have not been developed for this portion of Williams County, no NFIP permits are likely required, according to the North Dakota Water Resources Department. However, because there are no major rivers or streams near the Project site, it is anticipated that the site is not located within a FEMA-designated floodplain. The nearest FEMA-mapped floodplains are shown on Figure 3.1 (exclusion areas are also shown due to the distance away and extent of this map) along the Missouri River, near Williston, approximately 17 miles away. Limited potential flood areas have been identified along some of the on-site drainages in the North Dakota Risk Assessment Map service and Base Level Engineering datasets. Basin Electric will work with the local zoning authority for any NFIP permits.

The Project will include two stormwater detention ponds to manage stormwater runoff a septic tank and leach field to manage sanitary wastewater, and evaporation ponds to manage process wastewater from the Project. The stormwater detention ponds will discharge to an on-site drainage that flows into an unnamed tributary of the East Fork Little Muddy River just north of the Project site. These tributaries appear to be in good condition and are not listed as 303d impaired waterways (EPA, 2024). Downstream, the Little Muddy River and Lake Sakakawea are listed as 303d impaired waterways; however, no impacts are anticipated based on the discharge management practices discussed above.

4.14.2 Impacts

The 794-foot-long open-ended ephemeral drainage that was delineated on-site would be permanently impacted by the Project. An ephemeral drain is a water feature that only flows during and for a short duration following a precipitation event. This ephemeral drainage is not under jurisdiction of the U.S. Army Corps of Engineers (USACE). The 0.15-acre PEMA wetland that was delineated on-site will also be permanently impacted by the Project. Basin Electric has submitted a Section 404 permit application and a preliminary jurisdictional determination form to the USACE.

Erosion and sediment (E&S) control and post-construction stormwater plans will be developed to address construction and operational stormwater discharges associated with the Project and to adhere to state water quality standards and the National Pollutant Discharge Elimination System (NPDES) permitting requirements. The Project will use a combination of stormwater controls, conveyance systems, and ponds to adhere to stormwater design requirements. Stormwater would be directed to two on-site stormwater detention ponds during construction and operation of the Project, then be discharged to the environment via on-site drainages that eventually flow into the East Fork Little Muddy River. The Project was designed to meet state water quality standards regarding stormwater discharges. To minimize erosion during and after construction, North Dakota BMPs for erosion and sediment control would be utilized. These practices include temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization.

During generation operation, processed noncontact wastewaters that are separate from stormwater, other wastewaters that are not recovered and returned to the service water storage tank, and are not CCGT wash waters, would be directed to an approximate 55-acre lined evaporation pond. This pond is adequately sized to accommodate the proposed volume of processed noncontact wastewater, so it would not be discharged to the environment. Also, during maintenance, CCGT wash waters would be directed to an on-site holding tank and collected and hauled off-site by licensed contractors, as necessary. Sanitary wastewater during construction would be addressed through portable bathrooms, managed and disposed of by licensed contractors until permanent facilities would be installed. During the latter parts of construction and during operation of the Project, sanitary wastewaters would be directed to an on-site leach field. As a result of the proposed stormwater and wastewater facilities, construction and operation of the proposed Project would not impact water quality. No impacts to floodplains would be expected.

Because the Project will store and/or use over 1,325 gallons of petroleum-based products, an SPCC Plan will be developed and implemented to address the accidental release and clean-up of petroleum-based products, minimizing the risk of it reaching a surface water and navigable waterway. The closest navigable waterway is the Missouri River, over 13 miles to the south of the Project site (USACE, 2012). Along with the distance from a navigable waterway and implementing an SPCC Plan, it is anticipated that surface waters would not be adversely impacted by the storage or use of petroleum-based products as part of the Project.

4.14.3 Mitigation

The Project was designed to meet state water quality standards related to stormwater discharges. In addition, a construction-related SWPPP and post-construction stormwater management plans will be developed to address stormwater discharges for the Project to minimize the potential for impacts to nearby surface waters. The SWPPP will be developed and implemented before initial construction activities. This SWPPP will include an analysis of materials utilized, site activities that could potentially impact stormwater, and the associated mitigation measures to minimize the potential for impacting off-site surface waters. The SWPPP implementation will include regular inspections of areas under construction, material storage and laydown areas, and structural devices for stormwater management. The SWPPP will be maintained until final stabilization of all disturbed areas has been completed.

The post-construction stormwater management plan will include permanent methods and measures for collecting, directing, and conveying stormwater to the permanent stormwater detention ponds to manage the quality and release of stormwater during operation.

The facility design includes one lined evaporation pond to contain processed noncontact wastewaters from operating the Project, a leach field to address operational sanitary wastewaters, and a holding tank to collect and allow hauling off of CCGT wash waters that could contain oily wastes and solvents. The lined evaporation pond will be permitted with the NDDEQ Division of Waste Management as it is a non-discharging impoundment.

A general spill control and response plan will be incorporated into the construction SWPPP. During the facility's operation, an SPCC Plan will be developed and implemented.

By preparing and developing these related plans, along with design measures, it is anticipated that there will be no adverse impacts to surface waters; thus, mitigation is not anticipated.

4.15 Wetlands

The following sections describe wetlands resources within or near the Project area and potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.15.1 Description of Resources

Two NWI freshwater emergent wetlands, totaling 0.44 acres, are within the 240-acre Project site. However, based on WEST’s wetland delineation conducted in September and October 2024, only one small, 0.15-acre PEMA wetland was delineated (Figure 4.6; Appendix J). This PEMA wetland is described as an isolated depression within a crop field that is historically farmed.

4.15.2 Impacts

This 0.15-acre PEMA wetland would be permanently impacted by the Project. Basin Electric has submitted a Section 404 permit application and a preliminary jurisdictional determination form to the USACE to obtain a Section 404 Dredge and Fill permit for this impact. As part of the permitting process, the USACE will determine if the permanent wetland impacts will require mitigation. No other wetlands were identified on-site that would be impacted by the Project.

4.15.3 Mitigation

Any necessary mitigation required would be coordinated with the USACE through the Section 404 Dredge and Fill permitting processes, if necessary. No other wetlands were identified on-site that would be impacted by the Project.

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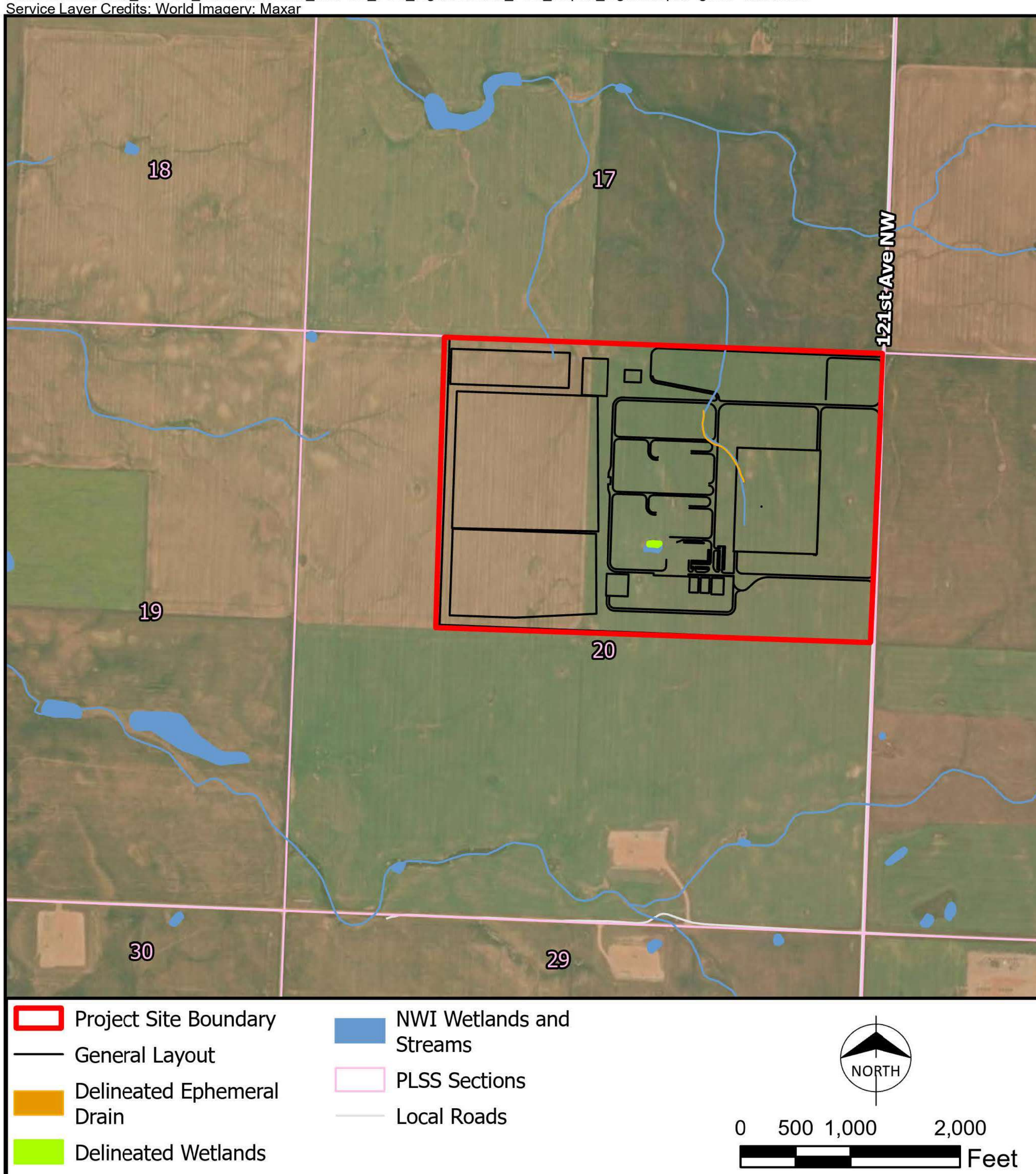
Service Layer Credits: World Imagery: Maxar



BURNS McDONNELL

Figure 4.6
Water Resources
Basin Electric Power Cooperative
Combined Cycle Plant

Source: ESRI, TIGER Line, NWI, WEST Inc., PLSS, Basin EPC, Burns & McDonnell

Issued: 2/27/2025

4.16 Vegetation

The following sections provide a description of the vegetation resources within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.16.1 Description of Resources

The Project is located in the Central Dark Brown Glaciated Plains within the Northern Great Plains Spring Wheat Region (NRCS, 2022). Farms and ranches are the primary land use within the region, with over half of the area being used as cropland. Spring wheat is a predominant crop with other acreage in corn, soybeans, alfalfa, and oats. Rangeland supports more native vegetation within the region consisting of tall grass prairie species. Native prairie vegetation consists of western wheatgrass (*Pascopyrum smithii*), needle-and-thread (*Hesperostipa comata*), green needlegrass (*Stipa viridula),* and big bluestem (*Andropogon gerardi*). Little bluestem (*Schizachyrium scoparium*) may be present on sloping or shallow soils. Prairie cordgrass (*Spartina pectinata*), northern reedgrass (*Calamagrostis stricta* spp.), and slim sedge (*Carex praegracilis*) may be present on wet soils. Western snowberry (*Symphoricarpos occidentalis*), stiff goldenrod (*Oligoneuron rigidum*), coneflower (*Echinacea* spp.), and prairie rose (*Rosa arkansana*) are also interspersed throughout the region. During the site visits conducted by WEST, the entire Project site was documented as tilled cropland with no trees or shrubs present (Appendix J). The Project site and surrounding area consist of crop fields (Figures 1.2 and 1.3).

4.16.2 Impacts

Construction of the Project would result in the removal of approximately 240 acres of agricultural land because of Project construction and operation. Vegetation within the area consists entirely of agricultural crops. Following construction, the Project site would no longer be used for crop production. Approximately 70 acres used for temporary construction and laydown would be re-vegetated. Areas that would be re-vegetated would be reseeded using NRCS-approved seed mixes. Approximately 40 acres are not anticipated to be disturbed during construction and will be allowed to naturally vegetate. During construction, movement of vehicles and materials to and from the site could transport invasive plants and noxious weeds which could become established in disturbed areas of the Project site.

4.16.3 Mitigation

The Project site is all cropland. Vegetative materials resulting from clearing operations will either be mulched on-site or removed and disposed of at an appropriate facility. Existing native vegetation within the construction area will be preserved whenever feasible.

Temporarily disturbed areas will be reclaimed using grassland species approved by the NRCS or county extension agency following recommended planting methods that will encourage the growth of native vegetation and minimize the potential for invasion by non-native species.

Erosion and sedimentation controls will be implemented to minimize indirect impacts to wetlands and riparian areas. Mulch and seeds used for revegetation, erosion, and sediment control will be certified as weed-free.

If noxious weeds are observed in the temporarily disturbed areas, populations will be controlled by herbicides, which will be applied by a certified herbicide applicator in accordance with label instructions and state and local County Weed Board regulations.

Before starting construction activities, construction vehicles and equipment will be thoroughly cleaned to prevent the possible spread of noxious weed seeds within the Project area. The reclaimed areas will be monitored annually for noxious weeds for three years following construction and reclamation. Herbicide applications likely will occur in late spring or early summer to eradicate or control noxious weeds before they mature, but will be modified as needed to follow current control recommendations.

4.17 Wildlife

The following sections provide a description of wildlife resources within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.17.1 Description of Resources

The Project is located within the Northern Great Plains region and contains species typical of this ecoregion. The Project site is entirely cropland that may provide temporary habitat for common wildlife species; however, the value to wildlife is likely limited due to continual cropland use. Typical wildlife of the Central Dark Brown Glaciated Plains includes white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), jackrabbit (*Lepus townsendii*), cottontail rabbit (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), ring-necked pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), sharp-tailed grouse (*Tympanuchus phasianellus*), mourning dove (*Zenaida macroura*), and various geese and duck species (NRCS, 2022). According to WEST's Natural Resources Inventory Report, the entire Project site comprises tilled cropland with limited potential for wildlife and avian species use (Appendix J). Small mammals, such as various species of voles and mice, may occupy the agricultural fields but would be disturbed annually by agricultural activities, such as ground tillage, in the fall and spring. Medium-sized mammals such as badger (*Taxidea taxus*), coyote (*Canis latrans*), and striped skunk (*Mephitis mephitis*) may also periodically forage within, traverse, or burrow within the Project site. The white-tailed and mule-deer may traverse and forage on the Project site.

4.17.2 Impacts

The Project would take place on a greenfield site currently used for crop cultivation. The proposed Project is not anticipated to result in the loss of quality wildlife habitat. While wildlife certainly uses the area, the seasonal disturbance for tilling and harvesting, as well as the monoculture of a crop and limited cover, provide limited wildlife habitat. Construction of the Project would result in temporary disturbance of approximately 200 acres of land within the Project site to accommodate the Project. Of that 200 acres, approximately 170 acres of cropland providing potential wildlife habitat would be permanently removed for operation of the Project and could result in displacement of wildlife species across portions of the Project site. However, it is anticipated that approximately 70 acres that are not hosting permanent Project facilities will be re-vegetated. Approximately 30 acres are not anticipated to be disturbed during construction and will be allowed to naturally vegetate. Impacts would be low due to revegetation and the abundance of similar habitat in the surrounding area. Re-vegetated grassland would continue to provide habitat for a variety of wildlife species in this region, particularly those adapted for grassland habitat types. Noise and human activity associated with construction may result in short-term, temporary displacement of wildlife species foraging in the surrounding area. The increased noise and human activity would temporarily deter any wildlife species from using the areas in the immediate vicinity of construction; however, following the completion of construction, the wildlife species would likely return.

4.17.3 Mitigation

If construction occurs during the raptor breeding season (February 1 through August 15), prior to construction activities, raptor breeding surveys will be conducted by a qualified biologist through areas of suitable nesting habitat to identify any active nest sites within 0.5 miles (1.0 mile for bald eagles) from the Project area. If applicable, appropriate protection measures, including seasonal constraints and buffer areas, will be implemented at active nest sites until the young have fledged and have dispersed from the nest area. These measures will be implemented on a site-specific basis and species-specific basis, in coordination with applicable state and federal agencies.

Where possible, construction excavations in unsecured areas and left unattended overnight will be marked and secured with temporary fencing and plywood covers to reduce the potential for livestock and wildlife entering the excavations as well as for public safety.

4.18 Rare and Unique Natural Resources

The following sections describe rare and unique natural resources within or near the Project area and describe potential associated impacts and mitigation measures to be implemented by Basin Electric.

4.18.1 Description of Resources

The Endangered Species Act (ESA) of 1973, as amended, provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. Federally listed threatened species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Federally listed endangered species are those already in danger of extinction throughout all, or a significant portion of, their range. Based on WEST's Natural Resource Inventory Report, the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) online database system, identified a list of threatened and endangered species with potential to occur near the Project site, and their potential impacts, was produced and listed in Table 4-12. Williams County may contain suitable habitat for, or have known occurrences of, three federally listed endangered species and three federally listed threatened species.

Table 4-9: Listed Species Potentially to Occur within Williams County

Common Name (*Scientific Name*)	**Federal Status**	**Critical Habitat**	**Anticipated Impacts**
Piping Plover (*Charadrius melodus*)	Threatened	Yes	No effect. Project site does not provide suitable habitat; thus, no impacts are anticipated. Closest designated critical habitat is located along Lake Sakakawea/the Missouri River approximately 13 miles to the southeast.
Rufa Red Knot (*Calidris canutus rufa*)	Threatened	No	No effect. The Project is located on agricultural fields and no critical habitat has been designated in Williams County. No stopover habitat is present at Project site. No impacts are anticipated.

Common Name (*Scientific Name*)	Federal Status	Critical Habitat	Anticipated Impacts
Whooping Crane (*Grus americana*)	Endangered	No	No effect. The Project is located on agricultural fields and no critical habitat has been designated in Williams County; however, the Project is located within major migratory routes. The species roosts in large, shallow marshes and feeds in harvested grain fields. The Project does not provide suitable habitat; thus, no impacts are anticipated. There have been 29 verified sightings in Williams County, thus any sightings must be reported to USFWS. Noise and activity during construction may divert cranes from the area, but would be unlikely to directly or indirectly effect the number of fatalities.
Monarch Butterfly (*Danaus plexippus*)	Proposed Threatened	No	No effect. The Project is located in agricultural fields and no critical habitat has been designated in Williams County. Any suitable habitat that is currently present is likely fragmented, highly disturbed and is unlikely to provide usable habitat. Permanent impacts are in agricultural fields and are not anticipated to adversely affect the monarch.
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)	Proposed Endangered	No	No effect. The Project is located on agricultural fields and no critical habitat has been designated in Williams County. Suckley's cuckoo bumble bees are obligate social parasites. Cuckoo bumble bees can be found in areas of cropland, but only if a host bee species is present. There are no known sightings of the Suckley's cuckoo bumble bee in North Dakota in recent years. The species is unlikely to occur at the Project site.

Source: WEST Natural Resources Inventory Report, 2024 (Appendix J)

4.18.1.1 Bald and Golden Eagles

The migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act (BGEPA) of 1940 protect both bald and golden eagles, both of which may occur within Williams County.

Preferred habitat for bald eagles (*Haliaeetus leucocephalus*) includes mature trees near permanent bodies of water, prairie dog colonies, or other abundant prey sources. The primary land cover of the study area is cultivated croplands and is not the preferred habitat of golden eagles. Desktop review and site observations on September 9, 2024, identified no suitable habitat or nesting raptors within 0.5 miles of the Project (Appendix J). It is possible that both bald and golden eagles could fly over or forage in the area, but it is unlikely that Project development or operation would have any significant impact on these species due to the lack of suitable habitat present.

4.18.2 Impacts

Suitable habitat for protected species is not present within or adjacent to the Project site. Therefore, the construction and operation of the Project is not anticipated to impact rare and unique resources.

4.18.3 Mitigation

It is anticipated that the proposed Project would not have impacts on rare or unique species; therefore, no mitigation is proposed.

Construction and operation of the proposed Project will have limited impacts to listed threatened or endangered species, migratory birds, or eagles. Should instances such as the observation of an active bald eagle nest occur during construction activities, Basin Electric will work with the USFWS to minimize potential impacts.

The endangered whooping crane potentially migrates through the general Project area, typically from March 15 to May 15 and from September 10 to November 15. An awareness for this species will be conveyed prior to and during construction activities to all on-site personnel. Any observations of the endangered whooping crane within 1.0 miles of the Project will require immediate reporting to the USFWS and the suspension of all activities.

4.19 Summary of Site Impacts

Table 4-13 summarizes the resources that would be impacted as a result of the construction of the Project and the appropriate mitigation.

Table 4-10: Summary of Project-Related Impacts

Resource	Impact	Mitigation
Demographics and Socioeconomics	Positive impacts to local economies such as Williston and Tioga due to a surge in workforce during the construction of the site.	No mitigation proposed.
Land Use	The Project would permanently convert 240 acres (approximately 0.375 square miles) of farmland to industrial uses. Compared to the total farmland in Williams County (1,741 square miles of farmland), this conversion would not be a significant portion of the farmland within the county.	No mitigation proposed.
Public Services	Minimal impacts to public services are anticipated. Construction traffic could result in damage to roads.	Basin Electric will work with the appropriate entity to establish any mitigation for roads, if necessary.

Resource	Impact	Mitigation
Human Health and Safety	A potential impact from anhydrous ammonia is possible, in the event of a leak or spill. In addition, there are risks of potential fires with fuel storage being on site.	Basin Electric BMPs will be implemented during construction and operation, along with the RMP and SPCC Plan for the operation of the Project and should adequately address potential accidental releases of regulated substances to protect the health and safety of employees, surrounding inhabitants, and the environment. Basin Electric would develop a Health and Safety Plan to address public and worker safety during the construction and operation of the proposed Project. The Health and Safety Plan would reduce fire-related risks to acceptable levels by imposing restrictions or procedures regarding these activities. A risk of fire would be present during operation of the proposed Project due to the use and storage of fuel and chemicals within the facility. The proposed Project would have a built-in fire suppression system. In addition, implementation of industry-approved design measures for all proposed Project components would help reduce fire-related risks.

Resource	Impact	Mitigation
Air	Construction of the Project could potentially have minor and temporary impacts on air quality due to fugitive dust and fuel combustion. Operation of the proposed Project would result in air emissions from stationary fuel-burning equipment. The Project is subject to PSD review, and air dispersion modeling analysis was performed for each regulated NSR pollutant that exceeded its significance level.	Construction dust control measures could include: • Applying water during grading • Paving, chemical stabilization, or watering of internal roadways after completion of grading • Reducing speed on unpaved roadways to 15 miles per hour or less • Using sweepers or water trucks to remove "track-out" at any point of public street access • Stabilizing dirt storage piles by chemical binders, tarps, fencing, or other erosion control Construction emission reduction and control measures could include: • Properly maintaining construction equipment according to manufacturers' specifications or standard practices • Limiting truck idling to the extent practicable • Burning waste materials will not be permitted, and all waste materials will be disposed of at permitted waste disposal areas or landfills The two turbines would be equipped with SCR and low-NO_x burners to control NO_x and oxidation catalysts to control CO and VOC emissions. Use of these control systems, use of natural gas as the primary fuel, and compliance with operating limits imposed by required air emissions operating permits are anticipated to mitigate impacts to ambient air quality and maintain compliance with applicable ND AAQS and NAAQS.
Noise	No impacts are anticipated to noise-sensitive receptors.	No mitigation proposed.

Resource	Impact	Mitigation
Visual	The height of multiple structures on the site would be over 100 feet, including the stacks, communication towers, and HRSG buildings. The height of the structures will make the facility more visible within the surrounding area. Communication towers, substations, transmission line towers, and oil facilities are present in the vicinity of the Project site.	No mitigation proposed.
Cultural and Archaeological	Three cultural sites located on the northern side of the Project site were surveyed and Basin Electric is in discussions with SHPO and will provide that correspondence and final report when available.	No mitigation proposed.
Recreational Resources	Impacts on recreational resources would be limited to surrounding property owners using private property for recreation and would be visual in nature. No adverse effects are anticipated due to existing agricultural practices and industrial land uses in the visual landscapes.	No mitigation proposed.
Land Based Economics	The Project would result in 240 acres of cultivated lands be removed from crop production.	No mitigation proposed.
Soils	The Project would permanently impact 170 acres of soil and 70 acres would be temporarily disturbed. Approximately 30 acres would not be disturbed during construction.	BMPs will be used to minimize impacts to soils where possible.
Geologic and Groundwater Resources	No impacts to geologic and groundwater resources.	No mitigation is proposed. If necessary, an SPCC Plan will be developed prior to construction.
Surface Water and Floodplain Resources	The Project site will include 1,325 gallons of petroleum-based products, which, if spilled, could cause contamination. The Project area is not FEMA mapped, and no NFIP permits are likely required. Floodplains have been identified in the North Dakota Risk Assessment Map service and Base Level Engineering datasets.	An SPCC Plan will be developed and implemented, which would address the accidental release and clean-up of petroleum-based products and minimize the risk of it reaching a surface water and navigable waterway. Basin Electric will work with the local zoning authority for any NFIP permits.
Wetlands	One wetland (approximately 0.15 acres) and one ephemeral drain (approximately 0.06 acres) are on-site.	Basin Electric will work with USACE to receive a permit for construction and identify mitigation if required.

Resource	Impact	Mitigation
Vegetation	Approximately 200 total acres would be disturbed during construction, with 170 acres being converted to industrial use to accommodate the new facility. Approximately 70 acres would be temporarily disturbed during construction and would be re-vegetated following construction. Approximately 40 acres are not anticipated to be disturbed during construction and will be allowed to naturally vegetate.	Existing native vegetation within the construction area will be preserved whenever feasible. If not returned for use as cropland, temporarily disturbed areas would be reclaimed using native species, as approved by NRCS or county extension office and will be planted at the appropriate times in order to reestablish vegetative cover and minimize the potential for invasion by non-native species. Erosion and sedimentation controls will be implemented to minimize indirect impacts to wetlands and riparian areas. Mulch and seeds used for revegetation, erosion, and sediment control will be certified as weed-free. If noxious weeds are observed in the disturbed areas or restored areas, populations will be controlled with the application of herbicides, which will be applied by a certified herbicide applicator in accordance with label instructions and State and local County Weed Board regulations. Prior to the initiation of construction activities, construction vehicles and equipment will be thoroughly cleaned to prevent the possible spread of noxious weed seeds within the Project area. The construction area and surface disturbance areas will be monitored annually for noxious weeds for a 3-year period following construction and reclamation. Herbicide applications will occur in late spring or early summer to eradicate or control noxious weeds before they mature.
Wildlife	Minimal impacts to wildlife due to the temporary increase in noise and human activity.	Where possible, construction excavations in unsecured areas and left unattended overnight will be marked and secured with temporary fencing and plywood covers to reduce the potential for livestock and wildlife entering the excavations as well as for public safety.
Rare and Unique Natural Resources	Suitable habitat for protected species is not present; therefore, no impacts anticipated.	No mitigation proposed.

5.0 Public and Agency Coordination

Correspondence regarding the Project was sent to federal, state, and local agencies for comment on September 12, 2024. The information letter, Project location map, agency contact list, and agency responses are included in Appendix K. Table 5-1 provides a list of agencies contacted and responses received.

Table 5-1: List of Agency Correspondence

Agency	Contact Name	Response	Summary
Federal			
Bureau of Land Management (BLM)	Sonya Germann	Yes	BLM has no resource concerns at this time.
Federal Aviation Administration	Dave Anderson	No	
Military Aviation and Installation Assurance Siting Clearinghouse	Whom it May Concern	Yes	Requested a shapefile/KMZ of the project, tallest structure heights, and associated transmission infrastructure. A response was sent with the requested items on January 21, 2025.
Natural Resources Conservation Service	Wade Bott	Yes	Farmland Protection Policy (FPPA) does not apply. No further action is needed.
Twentieth Airforce Ninety-First Missile Wing	Sam Warren	No	
U.S. Army Corps of Engineers	Jason Renschler	Yes	A Section 404 permit may be required for the discharge of dredged or fill materials into waters of the United States.
U.S. Department of Defense	Lloyd J. Austin	No	
U.S. Fish and Wildlife Service	Luke Toso	Yes	Requested details on how the generated product will be transported and along what route, and anticipated noise levels for the Project. A response was sent with the information requested on January 23, 2025.
State			
Aeronautics Commission	Kyle Wanner	No	
Attorney General	Drew H. Wrigley	No	
Governor’s Office	Doug Burgum	No	
Grand Forks Air Force Base	Robert Greene	No	
Jobs Service North Dakota	Patrick Bertagnolli	No	
Minot Air Force Base	Same Warren	No	
ND Department of Agriculture	Doug Goehring	No	
ND Department of Career and Technical Education	Wayde Sick	No	
ND Department of Commerce	Joshua Teigen	No	
ND Department of Environmental Quality	David L. Glatt	No	
ND Department of Health	Dr. Nizar Wehbi	No	

Agency	Contact Name	Response	Summary
ND Department of Human Services	Wayne Salter	No	
ND Department of Labor and Human Rights	Nathan Svihovec	No	
ND Department of Transportation	Ron Henke	No	
ND Department of Trust Lands (Minerals Management)	Chris Suelzle	No	
ND Department of Trust Lands (School/Surface Trust)	Joseph Stegmiller	Yes	The response stated that NDDTL does not manage any surface estate interests in the listed tract of land stated in the received letter. Any proposed projects crossing NDDTL-managed property would need to apply for a Right of Way and would be subject to review and approval by the Board of University and School Lands.
ND Energy Infrastructure and Impact Office	Whom it May Concern	No	
ND Forest Service	Thomas Claeys	No	
ND Game and Fish Department	Jeb Williams	Yes	NWI indicates wetlands within or adjacent to the proposed area. Protect any wetlands that cannot be avoided, alterations should not be made to existing drainage, and above-ground appurtenances should not be placed in wetland areas. Unavoidable destruction or degradation of wetlands should be mitigated. No significant/adverse effects on wildlife or habitat.
ND Geological Survey	Whom it May Concern	No	
ND Indian Affairs Commission	Brad Hawk	No	
ND Industrial Commission	Whom it May Concern	No	
ND Parks and Recreation Department	Kathy Duttenhefner	No	
ND Pipeline Authority	Justin Kringstad	No	
ND State Water Commission (Department of Water Resources)	Aaron Carranza, P.E.	Yes	The Project does not require conditional or temporary permit for water appropriation, unless surface or groundwater will be diverted for construction of future projects. No FEMA floodplains were identified; therefore, no NFIP permits are required. The use of ND Risk Assessment Mapservice and Base Level Engineering data is recommended in the absence of FEMA NFIP data and a flood risk was identified. It was requested to work directly with the local floodplain administration for the zoning authorities impacted. No drainage or construction permits are likely required so long as no water courses are modified and no ponds/lakes with a drainage area of 80 or more acres are drained.

Agency	Contact Name	Response	Summary
ND Transmission Authority	Claire Vigesaa	Yes	The Project is vital for grid reliability for the region. The North Dakota Transmission Authority sees no concerns and is supportive of your endeavor.
State Historical Society of North Dakota	William D. Peterson, PhD	Yes	Requested information on the total height of the project and anticipated noise levels. A response with the requested information was sent on January 21, 2025.
ND 68th Legislative Assembly – District 2 Senator	David S. Rust	No	
ND 68th Legislative Assembly – District 2 Representative	Bert Anderson	No	
ND 68th Legislative Assembly – District 2 Representative	Donald W. Longmuir	No	
Local			
Williams County Commission	Steve Kemp	No	

6.0 Identification of Required Permits/Approvals

The Federal and state permits or approvals that have been identified as potentially being required for the construction and operation of the Project are shown in Table 6-1.

Table 6-1: Potential Permits and Approvals

Agency	Type of Approval	Status	Need
Federal			
U.S. Army Corps of Engineers	Clean Water Act - Section 404 Permit	Submitted Application February 2025	A permit application and preliminary jurisdictional determination form were submitted to the USACE to obtain a Section 404 permit. Mitigation may also be required.
U.S. Fish and Wildlife Service	Section 7 Threatened and Endangered Species Consultation and Clearance	Prior to construction	If the Project will potentially impact protected species or their respective habitat, or if a Section 404 and/or NPDES permit is required
	Migratory Bird Treaty Act / Bald and Golden Eagle Protection Act Compliance	Prior to construction	Required when construction or operation of a proposed facility could impact migratory birds, their nests, and especially threatened or endangered species. Project is in cropland; thus, avian nesting habitat unlikely occurs on-site or will be impacted.
Federal Aviation Administration	Notice of Proposed Construction	Prior to construction	Required for the construction of structures 200 feet tall or within the distance to height ratio from the nearest point of a FAA airport runway. Also required for construction equipment reaching heights over 200 feet, or for equipment taller than an FAA-issued 7460-1 hazard determination.
U.S. Environmental Protection Agency	Risk Management Plan (RMP)	Prior to commissioning	Required if the facility will have regulated toxic and flammable substances in excess of the threshold quantities listed in 40 CFR Part 68 (including 10,000 lbs. or more of anhydrous ammonia).
	Clean Water Act Hazardous Substance Facility Response Plans	Prior to operation	Perform initial Screening and if needed assess the worst-case discharge plans for hazardous substances. Similar to plans for large oil facilities that may release to surface waters.
U.S. Environmental Protection Agency	Spill Prevention, Control, and Countermeasure (SPCC) Plan Amendment	Prior to construction and operation	Required if the facility will have 1,320 gallons or more of aboveground petroleum storage capacity in 55-gallon-sized or larger containers
State of North Dakota			
NDPSC	Certificate of Site Compatibility	Subject of this Application	Included herein

Agency	Type of Approval	Status	Need
North Dakota Department of Environmental Quality, Division of Air Quality	Permit to Construct (Major Source Air Construction Permit)	Application submitted February 2025.	A permit to construct is required for any new stationary source or modification to an existing source.
	Title IV Acid Rain Permit	Needs to be applied for within 2 years of commencing operation	A Title IV acid rain permit is required for the operation of applicable air emission sources. As the site is greenfield, first an ORIS code must be obtained by submitting an EIA.
	Title V Air Operating Permit	Needs to be applied for within 1 year of commencing operation	A Title V air operating permit is required for operation of air emission sources. The Title V permit includes conditions in all construction permits as well as compliance methods.
North Dakota Department of Environmental Quality, Division of Water Quality	Section 401 Water Quality Certification (WQC)	Prior to construction	The purpose of the WQC is to confirm that the discharge of fill materials (Section 404 Permit) will be in compliance with the State's applicable water quality standards. The WQC will be authorized with issuance of the NWP 39.
	North Dakota Pollutant Discharge Elimination System (NDPDES) General Permit/Authorization to Discharge Stormwater Associated with Construction Activity	Prior to construction	This permit will be required since land disturbance will exceed 1 acre. As part of this permit, a stormwater pollution prevention plan (SWPPP) must be prepared and implemented for the Project.
	NDPDES Temporary Discharge Permit	During construction, prior to discharge, as needed	Authorizes the temporary discharge of waters from construction dewatering activities and hydrostatic testing of pipes, tanks, or other similar vessels.
	NPDES Industrial Stormwater/Multi-Sector General Permit	Prior to discharge of operation related stormwater	Steam electric facilities must implement a SWPPP to minimize pollutants in runoff during facility operation. Facilities conduct routine inspections to ensure the plan is implemented.
	NDPDES Industrial Discharge Permit	Prior to operation	The facility would be required to obtain NDPDES Industrial Discharge Permit to address the discharge of industrial wastewaters to a surface water of the State. Project may qualify for a zero-discharge facility because wastewaters will be contained within an evaporation pond, and turbine wash waters will be collected in a tank and hauled off-site as necessary. As a result, this permit is not anticipated to be required.
North Dakota Department of Environmental Quality (NDDEQ), Division of Waste Management (WM)	Impoundment Permit (considered a solid waste management facility)	Prior to construction	Authorizes the construction and operation of the impoundment that does not discharge from the NDDEQ (it is considered a Waste Management facility-not discharging).

Agency	Type of Approval	Status	Need
North Dakota Department of Water Resources (DWR)	Construction Water Permit (Dam Safety)	Prior to construction	A construction permit is required from the DWR if a water control structure is constructed or modified and is capable of retaining, diverting, or obstructing more than 50 acre-feet for dikes, and low-hazard dams.
State Historical Society of North Dakota	National Historic Preservation Act – Section 106 Clearance	Prior to construction	Under Section 106 of the National Historic Preservation Act, Federal agencies must work with the State Historic Preservation Office to address historic preservation issues when planning projects or issuing funds or permits that may affect historic properties and archaeological resources listed in or determined eligible for the National Register of Historic Places.
North Dakota State Fire Marshal, Office of Attorney General	Aboveground Fuel Storage Pre-Installation Approval for Fuel Dispensing Sites	Prior to installation	Required for all permanent and non-portable tanks used for the storage of flammable/combustible liquids and exceeding 660 gallons in individual capacity. Project is proposing to install two, 500-gallon fuel tanks.
North Dakota Highway Patrol	Oversize/Overweight Permit	Contractors would obtain as necessary prior to transporting equipment	Permit required for hauling construction equipment and materials on state highways
County/Local			
Williams County	Rezoning Approval	Approved January 2025	Due to the type of facility, rezoning approval will be required by the county.
	Building and Occupancy Permits	Prior to construction of components requiring a building permit or plan review.	A building permit, along with signage, electrical, mechanical, plumbing, and septic permits may all be required. Once approved and when the facility passes building and fire inspections, an occupancy permit may be issued.
	Stormwater Management Plan	Prior to construction	A separate grading review and approval may be required for site earth work along with review and approval of a drainage plan.
	Approach/Driveway Permit	Prior to construction	The county requires a driveway/approach permit to install a new driveway off of a local road.
	Load/Frost Permits	Prior to Hauling	The county requires load permits for oversized loads on local roadways, which also includes seasonal/road condition restrictions.
	Fire Protection Systems Approval	Prior to building occupancy	Requires submittal of an application to the County Fire Inspector for review and inspection to verify the facility is meeting applicable Fire Code requirements.
	Flammable/Combustible Bulk Storage Permit	Prior to installation of the tank	County adopted IFC which includes requirements for installing aboveground or underground flammable/combustible liquid storage tanks, along with portable tanks exceeding 660 gallons. Complete an application and submit it to the Williams County Fire Inspector.

7.0 Factors Considered

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

The preceding sections discussed the potential effects of the proposed facility on public health and welfare, natural resources, and the environment. Chapter 4 details the research and investigations used to identify expected environmental impacts and mitigation related to the Project. Chapter 1 discussed construction and operation techniques. All impacts evaluated for the Project would consist of both short-term and long-term impacts and would be minor.

7.2 Technologies to Minimize Adverse Environmental Effects

Basin Electric will use current technologies and systems to minimize impacts to the environment. Specifically, the Project will utilize SCR and HRSG technology to limit emissions and maximize energy efficiencies. Chapter 1 discusses the engineering and operational design of the Project.

7.3 Potential for Beneficial Uses of Waste Energy

Basin Electric has identified the need for additional generation in the Williston area of North Dakota due to increased demand and the availability of unused fuel resources, which would allow Basin Electric to reliably meet energy production and system stability requirements for the region. By utilizing HRSG technology, heat generated by the combustion turbines can be captured and repurposed into steam generation. Chapter 1 reviews the engineering and operational design of the Project.

7.4 Unavoidable Adverse Environmental Effects

Chapter 4 details the research and investigations that were used to identify expected environmental impacts and mitigation related to the Project. The environmental effects of the Project would be both short- and long-term and minor with the proper use of mitigation techniques discussed in this application. Unavoidable adverse environmental effects include the visual impacts associated with the Project facilities, noise from the operation and construction of the facility, removal of 240 acres of cropland vegetation, and filling of the wetland within the Project boundary. The Project area consists of other pre-existing visual and noise impacts, including U.S. Highway 2, transmission lines, and oil and gas development interspersed throughout similar cropland land use. The proposed facility would not significantly increase these overall impacts within Williams County. Basin Electric will coordinate with the USACE regarding wetland impacts.

7.5 Irreversible and Irretrievable Commitment of Natural Resources for the Site

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources would have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored because of the action. The proposed Project would convert approximately 240 acres of cropland for the construction and operation of the Project. This land would be unavailable for agricultural production for the life of the Project. A few commitments of resources associated with the construction of the proposed Project are irreversible and irretrievable. However, much of the material used to construct the Project could be recycled following demolition of the Project after its life. Resources that would be used to construct the Project include aggregate resources, concrete, steel, and hydrocarbon fuel, with fuel being the primary irretrievable resource.

7.6 Direct and Indirect Economic Impacts of the Proposed Facility

The direct and indirect economic impacts are minor and positive. To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers would contribute to the total personal income of the region. Additional personal income would be generated for residents of the county and the state by circulation and recirculation of dollars paid out by Basin Electric as business expenditures and State and local taxes. Expenditures made for equipment, energy, fuel, operating supplies, and other products and services also benefit businesses in the county and the State.

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

No conflict with existing development plans was identified as part of this application. The county also issued zoning approval in January 2025. In recent years, oil and gas development has continued to expand in the Williams County area. It is reasonably foreseeable that areas near the Project would be considered for gas and oil development. This is evidenced by the existing oil wells close to the Project site. The location of the Project is not expected to inhibit the potential for future gas and oil development.

7.8 Effect on Scenic Areas, Cultural Resources, and Paleontological Sites

The Project site is not located on or near locally or nationally recognized scenic areas or any known paleontological sites. Within North Dakota, there are 3,620 fossil localities with an average of approximately 68 fossil localities in each county across the state. Williams County is well below the county average at 22 fossil localities, less than 1 percent of fossil localities in North Dakota (NDMR, Collections Database). As described in Chapter 4, the cultural resource survey of the Project site recommended findings of “No Significant Sites Affected”. Basin Electric is in discussion with SHPO and will provide that correspondence and final report when available. Depending on their review, there are no anticipated impacts to cultural resources. There are also no identified scenic areas within proximity of the site; thereby, scenic areas are not anticipated to be impacted. Basin Electric has established an unanticipated discovery plan in the event that any paleontological or cultural resources are discovered on site (see Appendix I).

7.9 Effect on Biological Resources

Effects on Biological Resources such as rare and unique species, wildlife, wetlands, and vegetation are discussed throughout Chapter 4. As discussed in section 4.15, one wetland would be permanently filled to construct the Project. Basin Electric will continue to coordinate with the USACE on permitting and any required mitigation for the wetland. There would be no impacts to rare or unique species and only minor impacts to vegetation and wildlife. The North Dakota Parks and Recreation Department indicated that the Project does not appear to affect properties that the NDPRD owns, leases, or manages. The Project does not appear to affect any properties protected under Section 6(f) of the Land and Water Conservation Fund (NDPR, Land and Water Conservation Fund). No known rare species or significant ecological communities are documented by the NDPRD within or immediately adjacent to the Project site.

7.10 Effects of Site on Sensitive Species and Habitats

As discussed in Chapter 4, no federally listed species are known to occur within the Project site and are not likely to be adversely impacted within Williams County. Habitat for listed species is either completely lacking or is located a significant distance from the Project site; therefore, no impacts are anticipated as a result of the Project.

7.11 Concerns Raised by Agencies

See Table 5-1 for a list of agencies contacted and a summary of the correspondence. Appendix K contains an example Project notification letter, an agency contact list, and copies of letters received from the agencies.

8.0 Qualifications of Contributors

Name, Role, and Company	Education and Professional Experience
Benjamin Hertz, PE Power Supply Planning Manager Basin Electric Power Cooperative	B.S. Mechanical Engineering 18 Years Experience
Garrett Schilling Power Supply Engineer Basin Electric Power Cooperative	B.S. Electrical Engineering 11 Years Experience
Erin Dukart Environmental Services Director Basin Electric Power Cooperative	B.S. Biology 16 Years Experience
Ryan King Environmental Coordinator Basin Electric Power Cooperative	Master of Natural Resources Management B.S. Construction Management 13 Years Experience
Chris Bauer, PE Structural Engineering Supervisor Basin Electric Power Cooperative	B.S. & M.S. Civil Engineering 21 Years Experience
Robert Everard Senior Project Manager Burns & McDonnell Engineering Company, Inc.	B.S. Wildlife Biology/Natural Resources and Environmental Sciences M.S. Environmental Studies 26 Years Experience
Mary Hauner-Davis Air Permitting Specialist Burns & McDonnell Engineering Company, Inc.	B.S. Chemistry M.S. Environmental Engineering 27 Years Experience
Gage Ruff Environmental Scientist Burns & McDonnell Engineering Company, Inc.	B.G.S. Environmental Studies P.S.M. Environmental Impact Assessment 3 Years Experience
Audra McCaslin Environmental Scientist Burns & McDonnell Engineering Company, Inc.	B.S. Fisheries and Wildlife 7 Years Experience

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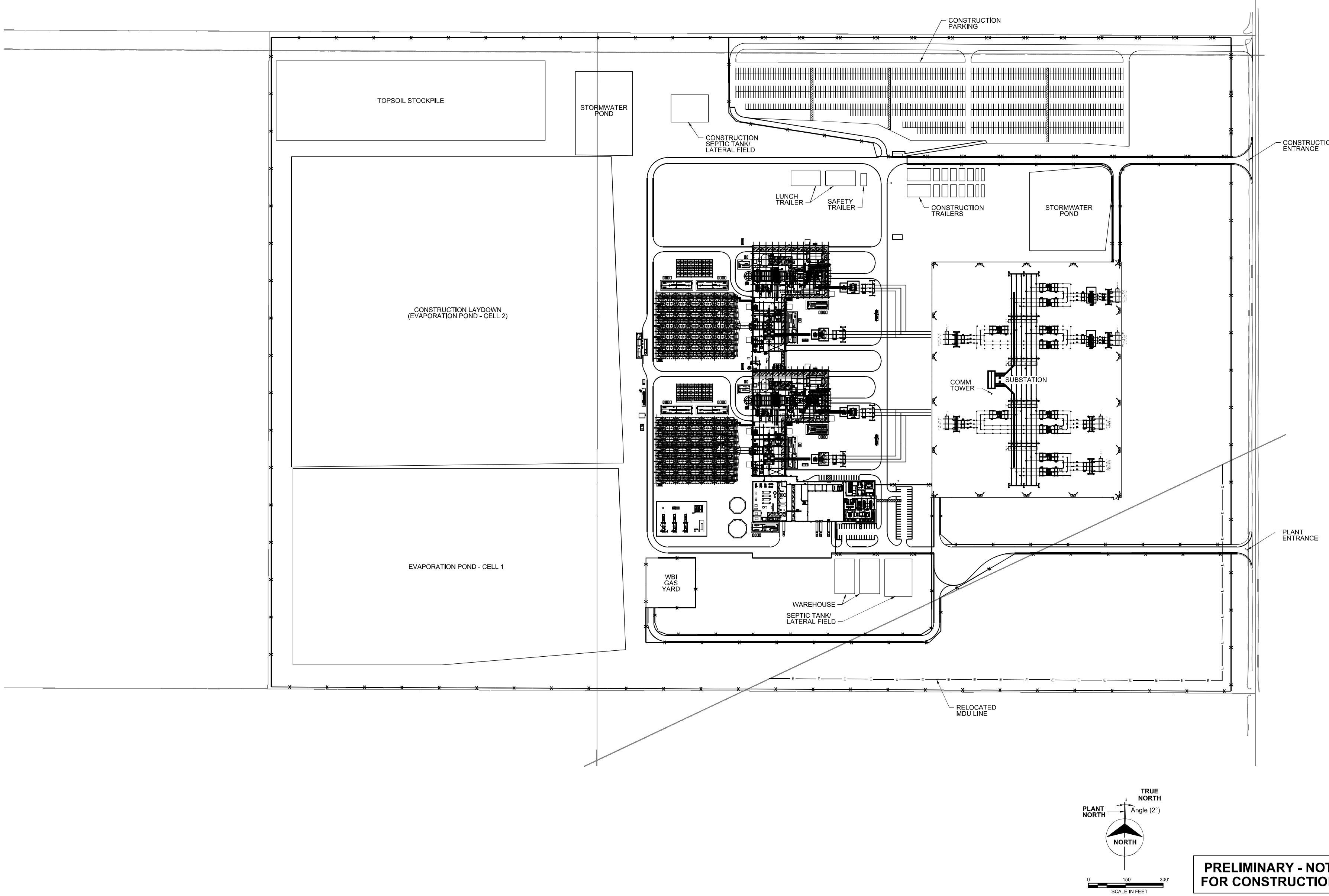
APPENDIX A – SITE PLAN DRAWINGS



PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
D	2/26/25	KJE	-	ISSUED FOR REVIEW
C	2/23/25	KJE	-	ISSUED FOR REVIEW
B	2/5/25	KJE	-	ISSUED FOR REVIEW
A	2/4/25	KJE	-	ISSUED FOR REVIEW

no.	date	by	ckd	description

BURNS McDONNELL
9400 Ward Parkway
Kansas City, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
LICENSE NO 016PE

designed K. ENGHOLM | detailed K. ENGHOLM

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

WILLIAMS COUNTY, NORTH DAKOTA

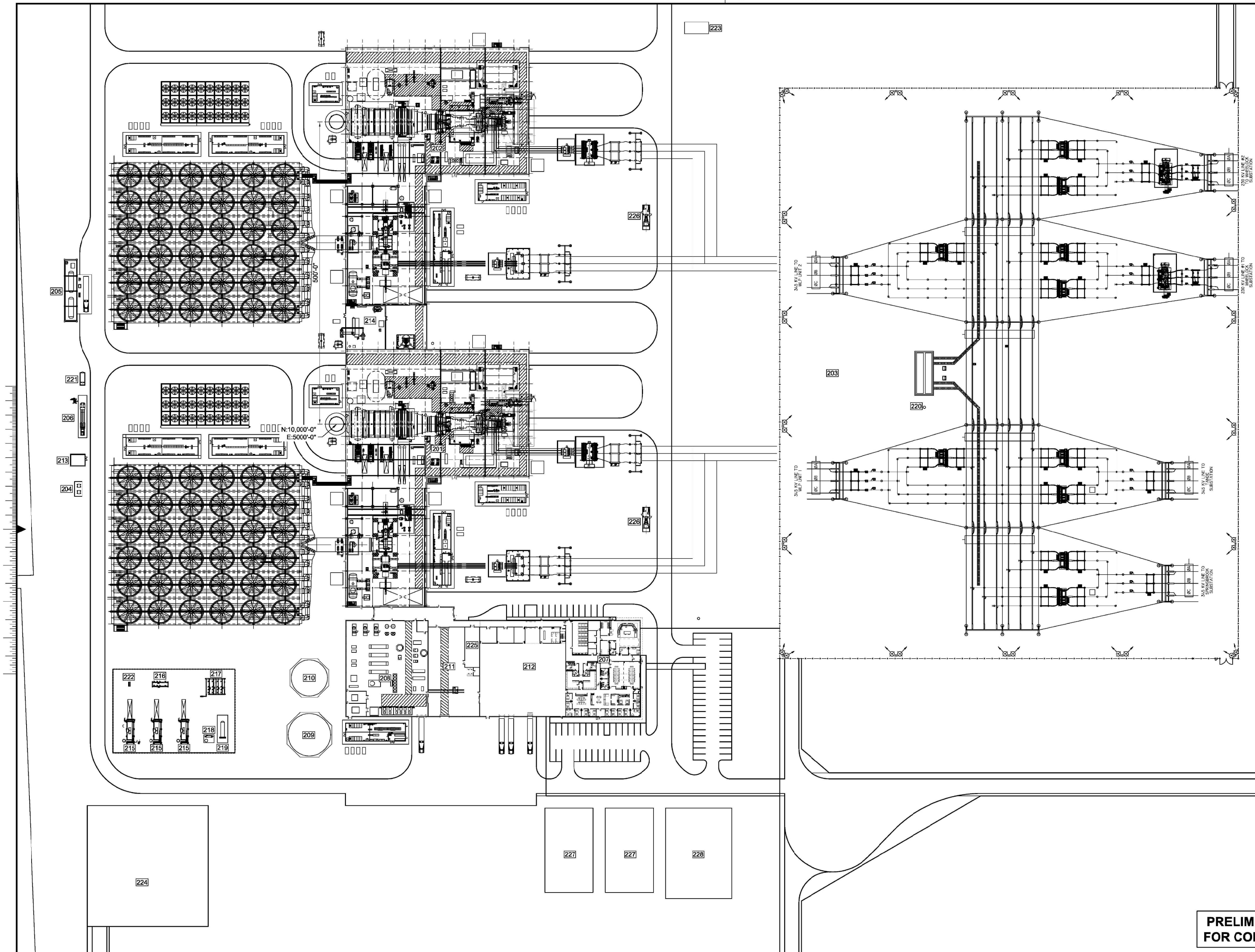
BISON GENERATION STATION
2 X (1 X 1) JAC CCGT PLANT
SITE PLAN

project 178637 | contract

drawing SKC002 — rev. D

sheet of sheets

file 178637SKC002.dgn



EQUIPMENT IDENTIFICATION	
DWG REF	DESCRIPTION
201	UNIT 1 POWER BLOCK
202	UNIT 2 POWER BLOCK
203	SWITCHYARD
204	500 GAL GAS / DIESEL FUEL TANKS
205	AMMONIA STORAGE
206	HYDROGEN STORAGE TRAILER
207	ADMINISTRATION BUILDING
208	WATER TREATMENT BUILDING
209	SERVICE AND FIRE WATER STORAGE TANK
210	DEMINERALIZED WATER STORAGE TANK
211	MAINTENANCE SHOP
212	WAREHOUSE BUILDING
213	OIL STORAGE BUILDING
214	AUX BOILER BUILDING / OUTAGE SUPPORT
215	FUEL GAS DEWPOINT HEATER
216	LP PRESSURE REGULATING SKID
217	HP PRESSURE REGULATING SKID
218	FUEL GAS DRAINS TANK SKID
219	FUEL GAS FILTER SEPARATOR SKID
220	COMMUNICATION TOWER
221	CARBON DIOXIDE STORAGE TANK
222	NITROGEN BOTTLE RACK
223	ESSENTIAL SERVICES TRANSFORMER
224	WB GAS YARD
225	E&I SHOP
226	EMERGENCY DIESEL GENERATOR
227	WAREHOUSE
228	SEPTIC FIELD

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	02/26/25	TLB		ISSUED FOR PSC APPLICATION
A	02/05/25	TLB		ISSUED FOR PSC APPLICATION

NORTH

0 60' 120'
SCALE IN FEET

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
Firm Reg. No. 016PE

designed T. BROSS
detailed T. BROSS

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

WILLIAMS COUNTY, NORTH DAKOTA

BISON GENERATION STATION
2x (1X1) JAC CCGT PLANT
GENERAL ARRANGEMENT

project 178637
contract
drawing SKM-002 –
rev. B
sheet
of
sheets
file 178637_GA3000.dwg

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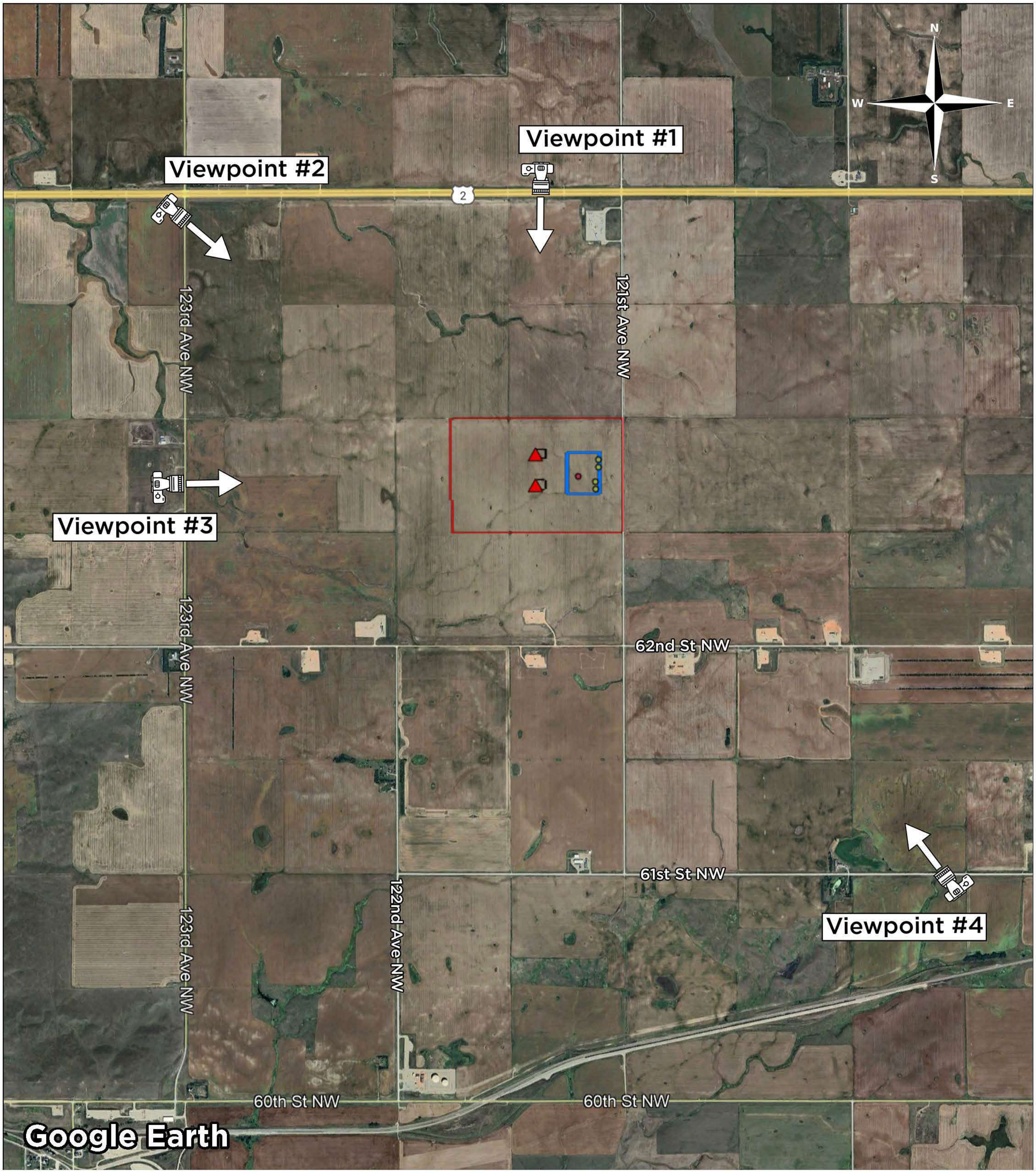
Millimeters
Inches



BURNS McDONNELL

Williston Photosimulations

Viewpoint Map

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

EXISTING

PROPOSED

BURNS McDONNELL

Williston Photosimulation

Viewpoint #1

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

EXISTING

PROPOSED

Burns McDonnell

Williston Photosimulations

Viewpoint #2

Basin Electric Power Cooperative
A Touchstone Energy Cooperative


N
W
E
S
123rd Ave NW
Google Earth
EXISTING


PROPOSED

BURNS McDONNELL

Williston Photosimulations

Viewpoint #4

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy Cooperative

APPENDIX B – BASIN ENVIRONMENTAL RESOLUTIONS

RESOLUTIONS
ADOPTED BY THE MEMBERS OF
BASIN ELECTRIC POWER COOPERATIVE

August 14, 2024

RESOLUTIONS COMMITTEE

District #1	Gary Bachman	East River Electric Power Cooperative
District #2	David Hansen	L & O Power Cooperative
District #3	Mark Brehm	Central Power Electric Cooperative
District #4	Louis C. Reed	Northwest Iowa Power Cooperative
District #5	Bob Frankmore	Tri-State G&T Association
District #6	Alan Johnstone	Central Montana Electric Power Cooperative
District #7	Dwight Rossow	Rushmore Electric Power Cooperative
District #8	David Sigloh	Upper Missouri G&T Electric Cooperative
District #9	Deborah Erickson	Minnesota Valley Electric Cooperative
District #10	Philip Habeck	Members 1st Power Cooperative
District #11	Dave Onken	Corn Belt Power Cooperative
	Allen Thiessen	Basin Electric Board of Directors
	Government Relations	Basin Electric Power Cooperative
	Member and External Relations	Basin Electric Power Cooperative

CONTENTS

STATEMENT OF PURPOSE

The Basin Electric Resolutions Committee shall review all resolutions before presentation to the membership at each Annual Meeting, and that all resolutions are subject to change by the membership at the Annual Meeting.

STATEMENT OF IDEALS AND OBJECTIVES

This statement was initially adopted by the Membership at the 1967 Annual Meeting.

It has been reviewed and readopted by the Membership at each subsequent Annual Meeting, and was last revised in 2023.

Basin Electric Power Cooperative (Basin Electric) was organized by its member systems in the Missouri River Basin to provide an adequate wholesale supply of dependable, low-cost electric power under democratic member control, consistent with the public interest.

We believe:

1. That an adequate, universally available, and safe supply of affordable electricity is a vital ingredient for maintaining and improving the economy and the people's standard of living. Basin Electric commits to ensuring that our generation and transmission resources are used for the benefit of Basin Electric and its member-owners, now and in the future, through cooperation with our power-supply partners.
2. That a clean and healthy environment, which we all need and enjoy, must be maintained and that the energy industry should minimize impacts to the environment.
3. That Basin Electric is dedicated to supporting a healthy agricultural economy, which is essential to the greater development of rural areas and the nation’s general welfare. Furthermore, our commercial and industrial consumer-members are similarly important to cooperative health and should be encouraged.
4. That the Rural Utilities Service program of providing long-term, low-interest loan funds and loan guarantees to rural electric cooperatives is a vital element in providing low cost electricity for the social and economic benefit of people, and is one of the most beneficial programs ever undertaken by our federal government, and that this program should be supported as an important device to foster the economic development of rural areas and to help improve the standard of living of its consumer-owners.
5. That federal hydropower is an important renewable energy resource in the region, providing competitive cost-based rates to the membership. The long-standing statutory and contractual relationship between the membership and the federal government for preference power from these facilities should continue uninterrupted.
6. That the benefits of the development of our national resources should accrue to the people and that the federal government has the principal responsibility for establishing and maintaining programs and policies to protect the public interest in the multipurpose development, conservation, and utilization of our water and power resources.
7. That Basin Electric was established for all its members and the benefits of its operation should accrue to them on a consistent and uniform basis.

8. That people have the right to organize themselves to provide needed goods and services; that cooperatives and their associated entities can provide a yardstick of costs which benefit all consumers; and that they are consistent and help preserve our private enterprise system.
9. That members of Basin Electric Power Cooperative should strive to resolve issues through the established cooperative board/committee or other member engagement processes prior to pursuing legal actions, including FERC intervention/protest, adverse to Basin Electric. After exhausting all internal processes in the event any issue is not then resolved, prior to any adverse filing, members should notify Basin Electric of their intent to file.

We pledge:

1. To provide our members with an adequate supply of wholesale electric power and high-quality service at the lowest-possible cost by:
    a. Supporting use of the federal hydroelectric generating plants so these facilities continue to serve as the backbone of a region-wide power supply system.
    b. Encouraging prudent development of clean and efficient power technologies, legislation, and research in the fuels and energy fields as it affects our lives and environment.
    c. Operating Basin Electric's energy production facilities in the most efficient, productive, and safe manner possible.
2. To maintain a competent staff of dedicated employees by establishing policies which provide challenging careers and fair compensation, and which recognize their rights and responsibilities.
3. To conduct the business affairs of Basin Electric as trustees for the interest of the members on a basis of honesty and equity.
4. To help promote economic development throughout Basin Electric's service area by working with member systems in the planning and execution of programs to help develop the natural, human, and economic resources within the region, and to encourage conservative and efficient use of electrical energy.
5. To conduct a vigorous communication and education program to promote Basin Electric's policies, plans, and progress among its employees, members, and the public.
6. Through membership, aid other rural electric cooperatives, public agencies, and consumer-controlled organizations to obtain reliable wholesale power at the lowest-possible cost.
7. To encourage development of and work with consumer-owned and other organizations having similar objectives.

CONTINUING RESOLUTIONS

Resolution 1 - Federal Hydropower

Basin Electric Power Cooperative (Basin Electric) supports federal hydropower as an important generation resource for Basin Electric and its members. Hydropower should be treated at the state and federal level as a renewable resource in any energy policy decision.

Basin Electric remains committed to the principle of preference as originally outlined in the Flood Control Act of 1944. Preference should be given to cooperatives and public power entities for all hydroelectric generating capacity, including additional capacity which may evolve as additional generation facilities are added.

Basin Electric also opposes any policies that would undermine the long-standing statutory rights of preference customers to federal hydropower at cost-based rates. This includes any proposal to sell or otherwise transfer from federal control by the federal power marketing administrations or their assets or policies that would require payment of non-reimbursable costs at federal multipurpose water projects by power and water consumers.

Background:

Federal dams were constructed by the federal government to provide flood control, navigation, recreation, irrigation, and hydroelectric production. Energy generated at federal hydroelectric facilities of the Pick-Sloan/Missouri River Basin (Pick-Sloan) program is essential to rural consumers, including farms, businesses, and industries within the nine states of Basin Electric's service area. The members of Basin Electric hold direct power supply contracts for a substantial portion of the Pick-Sloan power supply resources.

An important element in maintaining this resource is a preference right to federal power resources by the consumer-owned and public power entities. Basin Electric's membership and other consumer-owned and public power entities have a statutory and contractual right to federal hydropower through the preference clause.

The federal investment and ongoing operation and maintenance in these hydropower facilities is being systematically repaid, on schedule, with interest, to the United States Treasury by these federal preference power customers. Power and water consumers have historically accepted and agreed with the division of costs and repayment structure where they are required to pay for those costs and investments allocated to their specific benefit but are not required to pay those costs which benefit the general public, such as flood control, navigation, recreation, and fish and wildlife.

Non-reimbursable costs are defined as mandated studies and miscellaneous items which are repaid out of the Federal Treasury without reimbursement by a project beneficiary.

Resolution 2 - Protection of States' Water Rights

Basin Electric Power Cooperative (Basin Electric) favors due protection of the water rights of individual states, while taking into consideration the well-being of the entire region.

Background:

Decisions concerning water rights must involve all the people of an area who could possibly be affected by physical, economic, social, and political changes.

Resolution 3 - Control and Use of Missouri River Basin Waters

Basin Electric Power Cooperative (Basin Electric) urges strict adherence to the intent of the Flood Control Act of 1944, which states that downstream navigation should not interfere with upstream uses for domestic, municipal, stock water, irrigation, mining, recreation, or industrial purposes. Basin Electric believes any changes in the management of the Missouri River should be undertaken only with the full recognition of the potential impact on consumer-member power users.

Background:

Changes in water releases from Missouri River reservoirs could have a substantial impact on the value and amounts of power delivered by the Western Area Power Administration (WAPA) to preference customers and on residents along the river corridor. Hydroelectricity must be preserved for preference customers, and any changes in river operations should ensure there is no financial or other detrimental impact on hydropower or on property along the river corridor. Any financial impact resulting from changes in river operations must be borne by all the country's citizens and not just the hydroelectric users of the region.

Resolution 4 - Environment

Basin Electric Power Cooperative (Basin Electric) supports the care and utilization of our natural resources. Basin Electric believes that is best accomplished through 1) clear and easily interpreted environmental laws and regulations; 2) single, efficient, and predictable permitting processes; and 3) local oversight of compliance that ensures needed interpretations consider the realities of the environment and local interests are being fairly considered.

Background:

Basin Electric has provided leadership, resources, and efforts in research to advance state-of-the-art conservation measures, including land reclamation and significant development of renewable generation sources from its inception. Basin Electric, its membership, and member-consumers are committed to maintaining a clean and healthy environment for us and our communities. Basin Electric also recognizes the economic realities that dictate both an achievable environmental standard be maintained while providing satisfactory balance between protecting the environment and sustaining the economy.

Resolution 5 - All-Additional-Requirements Contract

An all-additional-requirements provision should be the standard for all Class A members except in unusual circumstances as determined by the Board of Directors. Wholesale power contracts are a bond and a pledge among cooperatives to work jointly together, as a group, on behalf of all their retail member-owners.

Background:

By pooling their power requirements, member cooperatives have established an effective method of regional wholesale power planning. The all-additional-requirements contracts between Basin Electric Power Cooperative (Basin Electric) and its members constitute the *financial backbone of Basin Electric, as its members enable them to finance generating and transmission facilities on a long-term basis over the useful life of those assets. This is vital to maintaining low rates and reliability. Such contracts are essential to the overall wellbeing of Basin Electric, and recognize such contracts may, in certain instances, accommodate specific arrangements on a cooperative-by-cooperative basis.*

Resolution 6 - Discretionary Powers of State and Federal Governments

Basin Electric Power Cooperative (Basin Electric) urges state legislatures and Congress to ensure that cost-benefit analysis and appropriate risk evaluation standards are incorporated into all legislative and regulatory initiatives, so the laws take into consideration the impact of their work on citizens, businesses, private property, employment, and state and local government revenue. Congress and state legislatures should refrain from imposing costly mandates without providing some form of financial compensation.

Background:

In its operations, Basin Electric and its member systems must deal with local, state, and federal agencies, which have the power to affect operations and play a significant part in affecting the survival of a cooperative. Many state and federal laws outline regulations for environmental, health, and safety reasons without the benefit of an evaluation prior to enactment, which identifies the level of risk involved as well as the anticipated level of risk reduction expected through the law's implementation.

Without an appropriate state and federal "prior enactment" risk assessment and cost-benefit evaluation incorporated into the decision-making process, businesses, industries, and individuals affected by the laws are frequently required to comply with regulations that have minimal beneficial effect but are extremely costly.

Resolution 7 - Capper Volstead Act

Basin Electric Power Cooperative (Basin Electric) reaffirms its staunch support of the time-tested and valuable Capper Volstead Act.

Background:

The Capper Volstead Act of 1922 has historically enabled consumers to form cooperative organizations in America and farmers, ranchers, and dairy operators have especially seen their ability to compete in the marketplace enhanced by this Act.

Resolution 8 - Rural Communications and Broadband Systems

Basin Electric Power Cooperative (Basin Electric) urges Congress to continue to provide financial support through loans, grants, and universal service mechanisms to rural communication and broadband systems to ensure a high-quality communication system and internet access in rural America.

Congress, the federal government, state governments, rural electric and telecommunication cooperatives, and other telecommunication companies should work diligently together wherever possible to ensure the continued development of an affordable and efficient communication and broadband system throughout rural America.

Background:

Rural cooperative telecommunication and internet services play an integral part in the social, economic, and political viability of rural America. This includes access to satellite service from privately owned companies, improved television service, two-way data and voice satellite communications, and broadband services as provided by the National Rural Telecommunications Cooperative and supported by the National Rural Electric Cooperative Association.

Resolution 9 - Employee Safety and Health

Basin Electric Power Cooperative (Basin Electric) supports the continuous improvement process and activities that create a strong safety and health program and pledges to devote the necessary resources to do so.

Background:

The employees of Basin Electric are a valuable resource and Basin Electric appreciates the efforts of its employees to work safely and protect their fellow employees. Basin Electric's safety and health program uses a continuous improvement process to maintain a safe and healthy work environment, provide hazard awareness, and encourage proactive action and involvement among its employees. The processes, workplace safety policies, and procedures are implemented to reduce exposure and increase productivity.

Resolution 10 - Economic Development in Rural America

Basin Electric Power Cooperative (Basin Electric) and its member systems pledge to continue their efforts to realize the tremendous potential of the Upper Great Plains region more fully for sustained and manageable growth as a vehicle for economic vitality in rural America.

Background:

Basin Electric was established in response to the need for a reliable power supplier in the Missouri River Basin that would understand and be responsive to the energy needs of the people working, producing, and living in the region. To spur economic development in the region and in America, Basin Electric developed a program of electrical power marketing, which involves promoting the efficient use of electricity. Basin Electric and its member systems have aggressively been working to enhance community and economic development opportunities by utilizing their own human and financial resources in coordination with private individuals, businesses, local governments, state governments, National Rural Electric Cooperatives Association, Department of Energy, Department of Agriculture, and the Rural Utilities Service.

Resolution 11 - Land and Wildlife Mitigation Efforts

Basin Electric Power Cooperative (Basin Electric) urges federal and state agencies to refrain from purchases of private land for wildlife habitat and direct their management efforts toward the better use of the land already under their control. Basin Electric opposes any mandatory requirements to mitigate the effects of energy facility construction on private land through the purchase of comparable land elsewhere.

Background:

Basin Electric facilities may require investments in environmental mitigation, existing federal, state, and voluntary programs to improve the quality of available habitat for wildlife should be considered prior to additional purchases of land.

Resolution 12 - Private Property Rights

Basin Electric Power Cooperative (Basin Electric) fully believes no person should be deprived of the use of private property without due process of law and no private property should be taken, damaged, or reduced in value by government action without just and fair market compensation.

Background:

Basin Electric was created by farmers and ranchers and is still represented by people with a deep and abiding faith in the rights of property owners as protected by the United States Constitution.

Resolution 13 - Standing Bylaw Review Committee

The standing Bylaw Review Committee consisting of one director and one manager from each Basin Electric Power Cooperative (Basin Electric) district shall conduct an annual review of the Basin Electric bylaws.

Background:

The member cooperatives' needs are constantly changing to better serve their membership and the rate of this change is ever increasing. Basin Electric bylaws will need to address any changes the membership is experiencing.

Resolution 14 - Touchstone Energy Brand

Basin Electric Power Cooperative (Basin Electric) supports the promotion of a unified brand, Touchstone Energy, as an essential part of a comprehensive strategy to position electric cooperatives as superior energy and service providers. The largest possible number of electric cooperatives belonging to Touchstone Energy will result in the strongest enhancement of local and regional consumer-owned electric systems' efforts to market energy and provide superior customer service.

Background:

A challenge for electric cooperatives is how to capitalize on the strength of their network to develop and market a single, identifiable image of competitive, high-quality energy services. The ability to achieve unity and market strength rests on the determination of the entire electric cooperative family to operate as a unified network with common goals and a sense of mission that transcends its diversities.

Many of the nation's rural electric cooperatives and most Basin Electric's member systems joined in creating Touchstone Energy as a unifying identity under which the electric cooperatives' energy and services may be marketed through a nationwide, locally owned network. Generations of experience, as well as extensive consumer research, shows that being in touch with consumers and the community and offering consumers a voice in their cooperative's operations create competitive advantages.

Resolution 15 - Commendations

Basin Electric Power Cooperative (Basin Electric) commends the Statewide Rural Electric Cooperative Associations throughout its service area, National Rural Electric Cooperative Association, Mid-West Electric Consumers Association, and Western Fuels Association for their collective efforts to protect and promote the rural electrification program, and all of its recipients throughout the country.

Basin Electric's members commend and extend their thanks to the Board of Directors and CEO and General Manager for their leadership, courage, and guidance to Basin Electric and the member-owners, and to the employees for their dedication and commitment to Basin Electric and the member systems.

CURRENT RESOLUTIONS

Section A - Energy Policy

A-1 - Energy Policy

Basin Electric Power Cooperative (Basin Electric) supports an all the above energy policy that includes technologies that enable a diverse, reliable, and resilient energy supply mix. Basin Electric supports the responsible development of the region's natural resources and the expansion of generation and transmission infrastructure that may help maintain the reliable, affordable flow of electricity on which Basin Electric's members have come to depend.

Fossil fuels continue to fill an essential role in supplying the needs of our member-consumers. Fully dispatchable resources, such as many hydroelectric facilities and those fueled with coal, natural gas, oil, and uranium should remain a viable choice for the future.

Markets

Basin Electric encourages federal energy regulators and regional transmission organizations to compensate dispatchable power for the resiliency and reliability it brings to the grid through spinning reserves and standby power. The wind doesn't always blow, and the sun doesn't always shine, yet wind and solar are given an unfair advantage in the market through significant tax subsidies that make it harder for dispatchable plants to compete and leads to stranded costs. State and federal energy policy should promote efficiency improvements at existing electrical generating facilities by eliminating the current disincentives to those efficiency improvements.

Basin Electric also encourages the development of an organized electricity market in the West with strong public power governance to facilitate efficiencies in electricity markets that will help integrate and optimize generation resources, bring down electricity costs, and increase the reliability and resilience of the grid.

Incentives

Basin Electric believes that a national energy policy based on a tax policy that picks winners and losers is not sustainable, and Congress and the states need to ensure the economic impacts of incentives for energy generation are uniform when applied to different technologies and taxpayers (e.g., public power utilities, rural electric cooperatives, and others).

Research and Development

Basin Electric supports the research, development, and demonstration of technologies to ensure commercial alternatives that take advantage of our natural resources and support our nation's energy independence are available to our industry. The development of new technologies should be supported through state and federal financial incentives that will expedite deployment of pilot and commercial-scale carbon capture technologies as well as advanced fossil fuel energy generation and storage technologies.

<u>Background:</u>

Basin Electric and its members believe that the cooperative-owned-and-controlled segment of the electric utility industry has been and will continue to be a reliable and competitive supplier to *its members. State and national leaders should consider the unique structure and role of rural electric cooperatives in setting energy policy.*

Basin Electric is greatly concerned with efforts at the state and federal level to overregulate the country's electric utilities and manipulate energy markets to further selected social agendas. Overregulation of the energy sector affects Basin Electric's ability to develop power generation facilities, control fuel costs, develop and expand the transmission system, and comply with environmental regulations. This also affects Basin Electric's ability to market power, provide stable rates for our membership, hire, and retain a reliable work force, and maintain a commendable rating by finance agencies.

The price volatility associated with commodities like natural gas, the availability of hydropower, wind and solar, and weather can challenge the reliable and economic supply of electricity to Basin Electric's members, which demands a diverse portfolio of generation assets and a robust, redundant transmission system. Intermittent energy sources like wind and solar currently require back-up generation through baseload or peaking power, including the development of dependable and affordable long-duration power storage devices to be a reliable source of electricity.

While wind and solar are subsidized through tax incentives, the federal government provides no compensation for coal generation to remain on standby as an offset to the losses incurred when the wind blows and the sun shines. Additionally, wind and solar levels can abruptly fluctuate throughout the day, forcing other generation, primarily fossil fuel-based, to start up or "ramp up" from lower generation levels.

Federal regulations regarding existing power plants are a significant deterrent to power plant upgrades that would provide the efficiency improvements that lead to economic and environmental benefits. Many coal-based power plants operated by cooperatives today, including Basin Electric, were built at a time the federal government prohibited the use of natural gas as a fuel for electric generation, and required state-of-the-art pollution controls. This shows how policies that discriminate against or promote specific fuels can hinder, rather than encourage, diversification in the utility industry. State and federal policies should give utilities the flexibility to make fuel decisions based on sound business practices and their obligation to serve electric consumers.

A-2 - Renewable Energy

Basin Electric Power Cooperative (Basin Electric) supports renewable energy resources by investing in or committing to green projects and for continuing the strong legacy of environmental stewardship upon which Basin Electric was built. Basin Electric will continue to evaluate potential renewable energy projects to include a variety of sources on a case-by-case basis, while ensuring reliability. Congress and the states should ensure incentives for energy generation are applied uniformly to cooperative utilities as they are provided to other utilities.

Background:

Basin Electric's members already receive a portion of their electricity from federal hydropower facilities. Basin Electric encourages the development of other renewable energy projects by and within its member electric cooperative systems. Basin Electric has encouraged renewable *energy development by expanding the amount of wind, solar, and recovered energy generation in its generation mix.*

Basin Electric assists its member systems by providing a variety of other renewable energy options to their consumers, including, but not limited to, waste heat recovery, solar, geothermal, and biomass by reviewing projects on an individual basis, their business viability, and potential markets.

A-3 - Public Utility Regulatory Policy Act (PURPA)

Basin Electric Power Cooperative (Basin Electric) urges Congress to completely repeal the qualified facility purchase mandate under PURPA and ensure that cooperative utilities can receive full reimbursement for existing obligations incurred under PURPA. No utility should be required to purchase power it does not need from an electric generator simply because the generation is from a renewable source, especially if that generating facility would operate within the same open market as the utility and has equal access to that market.

Background:

The Public Utility Regulatory Policy Act of 1978 (PURPA) was designed to assist in the development of alternative energy sources, especially the utilization of renewable resources.. (move next paragraph up)

However, Section 210 of PURPA contains a mandate for utilities to purchase the output of alternative energy from renewable energy resources. The intent of PURPA was, in part, to ensure that the output of renewable facilities would be incorporated into a utilities fuel mix, but this requirement is no longer valid in an operating wholesale market.

Basin Electric has voluntarily moved forward with the development of renewable energy for its membership for nearly two decades

A-4 - Net Metering

Basin Electric Power Cooperative (Basin Electric) only supports net-metering policy if the net-metered generator compensates the cooperative system for services used by the net-metered generator, this includes distribution and transmission infrastructure and backup services required by the net-metered generator and supplied by the retail cooperative. Basin Electric opposes net-metering and feed-in tariffs if costs are shifted to other consumers to provide services to the net-metered customer.

Background:

Several legislative proposals have been considered over the years to require subsidies, such as net metering or feed-in tariffs, for consumers with small renewable energy facilities. Many supporters of renewable energy advocate the use of net metering or feed-in tariffs for these facilities.

Both net metering and feed-in tariffs result in shifting of costs to other consumers, wherein the other consumers bear the cost burden of providing services to the net-metered consumer, such as standby power, transmission, and distribution, which should rightfully be charged to the net-metered consumer. Feed-in tariffs also create added power costs to other consumers as the tariff may be several times the cost of traditional sources.

A-5 - Retail Choice

Basin Electric Power Cooperative (Basin Electric) opposes efforts to restructure the electric utility industry to impose mandatory retail choice requirements on utilities or authorize retail choice that negatively impacts incumbent utilities, their investments in electric infrastructure, and their ratepayers. Such efforts, whether on a state or national level, threaten to undermine both member-owners and their cooperatives, and make it difficult for cooperatives to continue to provide their remaining members with safe, reliable, and affordable services.

Basin Electric only supports legislative or regulatory initiatives with respect to distributed generation, feed-in tariffs, and net metering that do not increase member-owners' rates, degrade reliability or safety, impose other undue economic costs on electric cooperatives, or interfere with the power supply or other contractual relationships between cooperatives.

Background:

The future of distributed or dispersed generation is an important issue for electric cooperatives. This technology may provide benefits in some applications, but prove to be a safety, cost, and reliability burden in others. As member-owned utilities, we are concerned by efforts on both the state and national levels to restructure the electric industry without providing appropriate safeguards for all member-owners. Any federal or state rules regarding retail choice, distributed energy, cost allocations, affiliate transactions, and separation of functions should recognize electric cooperatives' unique size, member-ownership, and not-for-profit characteristics.

A-6 - Protecting Cooperative Service Areas

Basin Electric Power Cooperative (Basin Electric) supports its member systems in their efforts to retain the right to serve the areas they have previously served and are presently authorized to serve. Basin Electric supports territorial integrity legislation for cooperatives and will oppose any legislative, regulatory, or other effort to abolish or weaken territorial integrity laws. Exclusive distribution service areas must be maintained, and duplication of electrical facilities should be avoided.

Congress should prohibit the use of federally subsidized tax-exempt securities to finance the acquisition of facilities of rural electric systems and adopt uniform rules regarding territorial integrity, ensuring that no distribution cooperative is forced to relinquish territory or consumers without fair and adequate compensation.

Basin Electric opposes the taking of rural electric cooperative customers, facilities, and service territory by municipal utilities. Municipal utilities should only be permitted to acquire rural electric cooperative facilities or property through mutual agreement between the utility and the cooperative. Any municipal utility should be required to provide fair and adequate compensation for the acquisition, including the cost of investments at replacement or market value, whichever is greater, made in such facilities, as well as consideration for loss of future revenues.

Background:

Rural electric cooperatives initiated service because other utilities refused to provide electric service to rural areas due to the high cost of serving the low number of consumers per mile, which limited their profitability. The rural electric program is being undermined by the erosion of service territory and existing and future loads in and around the towns and cities within Basin

Electric's service territory. Retention of cooperative territory is fundamental to the rural electrification program that the Rural Utilities Service depends on for rate stability and loan repayment. The problems incurred through the loss of these firm boundaries include weakened credit worthiness of the systems, waste of natural resources, and needless duplication of existing utility generation, transmission, and distribution systems.

Basin Electric's member systems serve all persons in their service areas. The cost of providing this service in sparsely settled rural areas has been high while the returns have been low. In recent years, growth has taken place in some areas served by rural electric systems surrounding urban centers, which has prompted municipalities to attempt to seek control of these growing sections of the rural electric systems through annexation. Several states have enacted policies that protect cooperatives when this occurs, but the threat remains throughout the region.

A-7 - Federal Coal Leases

Basin Electric Power Cooperative (Basin Electric) believes the federal coal leasing program needs to be improved and streamlined, not hindered. The federal government, through its land agencies, has a statutory obligation to develop public resources, assist in providing affordable and reliable power, and guarantee that taxpayers are receiving a fair market return on this resource.

Basin Electric supports a robust federal coal leasing program and opposes any changes that would arbitrarily increase the cost of securing federal coal leases and, in turn, adversely increase the cost of electricity purchased by our member-owners.

Basin Electric is committed to reasonable reforms to the federal coal leasing program that protect the ability of coal producers to access federal coal tracts in a timely and economic manner that works in concert with the development of adjacent non-federal coal resources.

Background:

Basin Electric and its members rely on coal from both North Dakota and Wyoming for a significant portion of their generation. The mining of coal from federal leases is an important part of Basin Electric's fuel suppliers' ability to maintain a reliable and economical supply of coal.

The current federal coal leasing process serves as a barrier to producing federal coal, with many coal producers having to wait years and undergo costly analysis with little guarantee of permitting federal coal. Over the years, environmental groups whose stated goal is to bring an end to the federal leasing program have used the court system to force superfluous analysis during the National Environmental Policy Act process, such as the social cost of carbon and greenhouse gas emissions when federal coal is mined and combusted.

A-8 - Support for the Rural Utilities Service

Basin Electric Power Cooperative (Basin Electric) supports the Rural Utilities Service (RUS) Program and believes RUS should continue to be a source of low-cost financing for rural electric cooperative infrastructure and urges Congress to find a bipartisan solution that will maintain the role of RUS as a primary cooperative lender.

Background:

The rural electric cooperatives within the Basin Electric region and other rural electric cooperatives across the country are investing funds to either build new or update aging electrical systems, working with their communities in rural economic development, and helping develop the rural infrastructure in areas of rural water, communication, broadband internet access, and other services.

The RUS provides universally available programs at low-cost funding for electrical system improvements, engineering guidelines and standards for construction and operation of the electrical systems, and zero-based loans through the Rural Economic Development Loans and Grants that promote economic development and job creation, all which support building rural infrastructure.

Cooperatives face the challenges of increased load growth as well as actions that threaten to undermine the ability of cooperatives to provide affordable, reliable electricity to their member-owners. With aging electrical facilities in need of replacement at many distribution cooperatives; with distribution cooperatives retaining the responsibility for serving sparsely populated rural areas; with rural cooperative consumers continuing to pay higher rates for electricity; there still exists a need for a strong RUS.

A-9 - Energy Efficiency and Conservation

Basin Electric Power Cooperative (Basin Electric) supports cost-effective energy conservation policies while striving to provide reliable and efficient electrical power generation.

Background:

Basin Electric supports a clean environment, and the members of Basin Electric recognize the need to use energy more efficiently to hold down the cost of producing additional energy and to conserve our natural resources. The cost of energy has increased in recent years due to a variety of factors including growth; demand fluctuations in fuel supplies and price; and economic, regulatory, and political pressures.

Basin Electric has taken steps to conserve power at its facilities, and many of Basin Electric's member cooperatives have implemented load management programs so large loads can be reduced to diminish demand and conserve power during peak periods.

Section B - Member Support

B-1 - Electric Vehicle Policies

Basin Electric Power Cooperative (Basin Electric) supports policies and investments by the membership to develop and deploy electric vehicle (EV) programs, and further develop charging infrastructure within the cooperative service territories. Basin Electric is supportive of policies that remain favorable to cooperatives regarding sale of energy, utility rate development, and appropriate fees that recoup lost gas tax revenues for road infrastructure and maintenance.

Background:

Several states within the Basin Electric service territory have considered legislative and regulatory initiatives related to the deployment of EVs and associated infrastructure. Issues that have surfaced with these discussions include clarifying the definition of public utility so electric vehicle charging station owners are not regulated as public utilities or cooperatives, as well as ensuring that EVs pay fees in lieu of gas tax for road construction and maintenance.

B-2 - Basin Electric Power Cooperative Growth

Basin Electric Power Cooperative (Basin Electric) believes growth of sustainable member load and the membership may provide long-term benefits to Basin Electric and should be encouraged.

Background:

Since Basin Electric's incorporation in 1961 and its subsequent construction of the Leland Olds Station, Basin Electric has grown because of both the increase in the electrical requirements of the membership, as well as the addition of new members signing all requirements contracts. While growth provides challenges, it has also been the catalyst in the evolution of Basin Electric, propelling the development of the scope and sophistication of its facilities and services.

Membership load growth is a sign of prosperity in the service territory, and the generating equipment constructed to serve load growth enhances energy security of the entire membership. Interest by other non-profit power suppliers in joining Basin Electric is a vote of confidence in the organization and is consistent with the principles upon which Basin Electric was established.

B-3 – Member Strategic Planning and Organizational Structuring

It is imperative that Basin Electric Power Cooperative (Basin Electric) and its member systems prepare to deal with the ever-changing electric utility marketplace by planning for the future. Basin Electric supports the efforts of its member systems to improve their competitive position, and thereby Basin Electric's competitive position, by continuing to support member strategic planning efforts and voluntary organizational restructuring through available means.

Background:

The rural economy, changing demographics of rural and urban areas, and regulatory uncertainty, place considerable pressures on electric cooperatives. Basin Electric encourages member strategic planning and organizational restructuring of rural electric cooperatives to *improve competitive positioning, eliminate duplication, reduce costs, and provide power at competitive rates for the consumers of rural electric cooperatives.*

B-4 – Electric Heating, Efficiency and Other Incentive Rates

Basin Electric Power Cooperative's (Basin Electric) members support the use of efficient heating and cooling systems to promote energy efficiency and conservation. Basin Electric's members support the use of incentive rates that encourage load growth and diversity of loads within the member cooperatives.

Background:

Basin Electric and its member systems want to provide affordable electric power to their member-owners in the most efficient way possible. Compared to direct-fueled systems, electric systems convert 100 percent or more of the energy in the electricity to useable energy. Geothermal and air-source heat pumps are some of the more effective and efficient ways to provide residential heating and cooling. Electric water heaters provide valuable benefits to cooperative members by providing off-peak electric thermal storage, and many cooperatives use these types of heaters as part of their demand-response programs.

Basin Electric has established special rates for member systems to make efficient electric heating and cooling systems more attractive and affordable to their consumers. As loads change and new loads emerge, it is important to consider these and other incentives that will support member cooperatives' efforts to promote and market electricity as the fuel of choice to their member-owners.

Section C – Agriculture Policy

C-1 – Support for Biofuels

Basin Electric Power Cooperative (Basin Electric) supports the production of biofuels, including ethanol, which enhances the economy, the environment, and national security.

Background:

A successful national program to promote the availability and use of diverse fuels and technologies for diverse energy needs will be of significant value in moving the country away from dependence on foreign sources of energy along with the resultant periodic rises in the cost of petroleum.

Maximizing the use of biofuels derived from agricultural products and renewable feedstocks will improve the farm and rural economy, thereby supporting rural electric cooperative consumers. Development of biofuels and other diverse fuels, especially ethanol, is responsible for creating numerous jobs and increasing household income and much-needed agricultural income in rural America.

C-2 – Maintaining a Viable U.S. Farm Economy

Basin Electric Power Cooperative (Basin Electric) encourages the United States Congress to work in a bipartisan effort to enact sound policy and provide adequate funding to ensure a strong agricultural economy continues well into the future.

Background:

Basin Electric's membership believes a healthy agricultural economy is an essential part of rural America and the nation. Legislation such as, the farm bill, which is reauthorized every five years, has provided farmers and ranchers with an important safety net by extending and expanding many key programs for commodities and livestock.

Section D – Environmental

D-1 – Carbon Management

Basin Electric Power Cooperative (Basin Electric) reaffirms the environmental and economic principles laid out in its Statement of Ideals and Objectives and Continuing Resolutions. Basin Electric is committed to reasonable, commercially viable carbon management solutions that are technologically and economically achievable; that give utilities a realistic timeframe to comply; and that provide opportunities to develop and deploy carbon management technology so we can continue to provide our members with reliable, affordable power.

Any carbon management policy, including regulations under the Clean Air Act, a carbon tax, carbon pricing in wholesale electric markets, or clean energy standard, should not prohibit (directly or indirectly) the continued use of fossil fuels as part of the country's generation mix. To do so, carbon management policies need to recognize existing investments in fossil generation, and not reduce the remaining life of such assets by imposing increased costs or otherwise require a premature shutdown. Further, while policies should include adequate incentives to develop electric generation technologies that significantly reduce or eliminate carbon emissions, or otherwise provide compensation for stranded costs incurred by Basin Electric and its member-owners, these policies should not be translated into required carbon restrictions.Incorporating these elements into carbon management policy are necessary to maintain grid reliability as well as protect ratepayers.

Background:

Basin Electric's strong record of environmental stewardship and land reclamation shows that we can have a robust energy industry and a clean environment, with reclaimed lands virtually indistinguishable from unmined lands. Basin Electric has a history of developing highly controlled fossil fuel-based energy generation facilities, using state-of-the-art pollution controls, and operating with exemplary compliance records. We can have reliable, affordable energy in the United States and a clean environment, if industry is part of the solution and provides the time, flexibility, and resources necessary to respond.

Long before the debate over regulating carbon dioxide (CO_2) evolved into what it is today, Basin Electric was capturing CO_2 emissions by installing the first-in-the-nation carbon capture system on the Great Plains Synfuels Plant. Additionally, Basin Electric has partnered with the State of Wyoming, Tri-State G&T Association, National Rural Electric Cooperative Association, and the Wyoming Municipal Power Agency to build the Integrated Test Center, a state-of-the-art carbon research facility, at the Dry Fork Station in Gillette, Wyoming.

Basin Electric continues to invest time and money in advancing research into other carbon capture, carbon sequestration, and advanced fossil fuel energy generation technology projects to further develop these technologies, as well as diversifying our electricity mix through renewable energy and natural gas-based generation. Basin Electric also supports agricultural stewardship practices to sequester carbon. Basin Electric supports the development of an appropriate mix of all energy supply technologies, including fossil fuels, renewables, nuclear, and advanced fossil-fuel technologies, to ensure we can continue providing the membership with reliable, affordable electricity.

D-2 – Regional Haze

Basin Electric Power Cooperative (Basin Electric) has been committed to meeting its Regional Haze reduction goals in a timely, cost-effective manner. Any future reductions sought through State Implementation Plans (SIPs) should not be the sole responsibility of utilities, which have already committed to reductions. States should continue to exercise their discretion in any Regional Haze SIP for the facilities under their jurisdiction, and Basin Electric urges the Environmental Protection Agency (EPA) to continue to defer to the states as they exercise their discretion in making Regional Haze determinations regarding reasonable progress. States should also work with EPA to consider international and non-anthropogenic sources and adjust goals accordingly.

Background:

The EPA's Regional Haze Rule requires industries to reduce haze-forming pollution to return visibility in the nation's parks and wilderness areas to pre-industrial levels by 2064. The first round of these regulations required certain facilities to install Best Available Retrofit Technologies (BART), as determined by the states.

Under these regulations, states develop SIPs by considering technology availability, the costs of compliance, energy and non-air environmental impacts, existing controls at the source, the remaining useful life of the source, and potentially, the visibility improvement that can be reasonably expected from controlling the emissions. The federal courts have determined that EPA must afford substantial deference to regulatory decisions, including BART and SIP determinations, made by the states pursuant to their authority under the Clean Air Act.

Basin Electric has upgraded its power plants to comply with Round 1 of the Regional Haze SIPs by installing Selective Non-Catalytic Reduction, Selective Catalytic Reduction, scrubbers, and other technology on its power plants in North Dakota and Wyoming, where appropriate, to meet the goals agreed to by the states, EPA, and Basin Electric.

At times, the EPA unfairly substitutes its own judgment for the states' decisions, leading to protracted litigation and unnecessary delays in responding to the rules. The Regional Haze Rule anticipates a lengthy process with a goal of reducing haze and improving visibility from numerous sources and industries over multiple decades rather than a few years, and therefore states and utilities should be granted the time and resources necessary to respond in a manner that does not adversely affect electric consumers or reliability of the electric grid.

D-3 – Coal Ash Regulation

Basin Electric Power Cooperative (Basin Electric) supports a Coal Combustion Residuals (CCR) regulations that are risk-based, flexible and allows utilities sufficient time to implement in a cost-effective manner. Any Federal CCR regulations should recognize existing state programs. Basin Electric supports efforts to permanently classify CCRs as non-hazardous waste and to place CCR regulation solely under state control. Basin Electric also supports the beneficial use of CCRs.

Background:

Using and recycling CCRs conserves natural resources by replacing materials that would otherwise have to be mined, and each ton of recycled fly ash offsets a ton of cement production, *which eliminates the release of a ton of CO_2.The EPA appropriately regulates CCRs as a non-hazardous waste under Subtitle D rather than as hazardous waste under Subtitle C of the Resource Conservation and Recovery Act.*

Court decisions have caused uncertainty for many utilities and would place onerous requirements on some existing coal ash disposal sites. States should be granted flexibility to develop disposal and monitoring regulations and timelines that reflect the unique situations in each state.

D-4 – Clean Air Act

Basin Electric Power Cooperative (Basin Electric) believes the Environmental Protection Agency (EPA) should not use the Clean Air Act to implement wholesale regulation of the entire electric industry, and instead should focus on the primary intent of the Clean Air Act. EPA should focus on standards for emissions from individual point sources based on technologies that are adequately demonstrated, available on the commercial market, cost-effective, and allow the energy requirements of the nation to be considered and met.

Regulations should be based on sound scientific methods; use of monitors to determine the real-world impacts of air pollutants and programs to reduce emissions; should be flexible and take into account regional differences; maintain fuel diversity; and give utilities sufficient lead time for compliance. If EPA uses modeling to develop regulations, the methodology must be transparent and technically sound. EPA must uphold its statutory obligation to practice cooperative-federalism, and work with states to develop implementation strategies.

Basin Electric supports legislative efforts to reform New Source Review to allow utilities to install technologies that reduce emissions or increase efficiency without forcing power plants to undergo a wholesale environmental review that would result in unachievable, onerous expenses that have little or no effect on air quality.

Background:

The Clean Air Act regulates hazardous and "criteria" pollutants by doing scientific studies and assessments and setting appropriate standards based on those studies. Since the enactment of the Clean Air Act in the 1970s, the nation's air has seen substantial reduction in the criteria pollutants of sulfur oxides, nitrous oxides, and particulates; the removal of which also captures significant amounts of trace metals and other potential emissions.

In addition to investing $2 billion in control technologies, Basin Electric has taken the initiative to diversify its generation portfolio with renewable generation, such as wind, solar, and waste heat generation, which has resulted in the displacement of emissions. The New Source Review program, as it is currently administered, places burdens on companies that seek to maintain their facilities in an efficient way by categorizing routine maintenance projects as significant projects that require retrofitting of units with exorbitantly expensive emissions controls. Further, the EPA has exercised its authority under the Good Neighbor Rule to impose additional regulations on facilities that it determines contribute to nonattainment of regulated pollutants in other states.

D-5 - Clean Water Act

Basin Electric Power Cooperative (Basin Electric) opposes an overreaching definition of "Waters of the United States (WOTUS)." Basin Electric supports its farmer-rancher consumer-members, whose livelihoods could be severely impacted by this definition, and supports efforts to repeal and replace the regulatory definition. Congress should pass common-sense legislation that ensures the goals of the Clean Water Act are met without imposing cumbersome regulations on farmers, ranchers, and agriculture.

Background:

The Clean Water Act defines "navigable waters" as "Waters of the United States, including the territorial seas." State and local governments, businesses, environmental groups, the courts, and federal officials have long grappled with the question of how far federal jurisdiction extends to waters not generally considered "navigable" by traditional means, such as isolated wetlands and prairie potholes.

The U.S. Supreme Court has limited federal jurisdiction over some wetlands and waterways but did not resolve the longstanding question over the extent that small, intermittent streams or wetlands are subject to federal jurisdiction.

Wetlands provide essential habitat for migratory birds and other wildlife, and provide an invaluable resource for recreation, including hunting. Farmers and ranchers have a vested interest in clean water and have long taken voluntary land conservation and improvement measures. Regulations from the Environmental Protection Agency and the U.S. Army Corps of Engineers to define "Waters of the United States" should follow the statutory limits of the Clean Water Act while recognizing private property rights, balanced development of infrastructure, and the agriculture industry.

Section E - Special

E-1 - Dakota Gasification Company (Dakota Gas)

Basin Electric Power Cooperative (Basin Electric) resolves to continue to make the necessary business decisions to eliminate Dakota Gas' adverse financial impacts on the Basin Electric membership.

Background:

Basin Electric formed the subsidiary Dakota Gasification Company and purchased what is now the Great Plains Synfuels Plant in 1988. The Synfuels Plant gasifies lignite coal to produce natural gas and several other valuable products, including fertilizers and diesel exhaust fluid. Located adjacent to Antelope Valley Station, the two facilities share coal handing and water infrastructure, boosting efficiency in the operation of both facilities and reducing waste.

Since purchasing the Synfuels Plant, Basin Electric has invested heavily in the facility to bring it into environmental compliance, improve efficiency, and diversify the product slate. It is continually seeking opportunities to expand into new markets, and currently produces many co-products.

E-2 - Regulatory Reform

Basin Electric Power Cooperative (Basin Electric) supports research, legislation, and environmental mitigation efforts at the state and federal levels, which will maintain a clean and healthy environment, minimize economic and social disruptions to the population, and encourage economic development in rural areas.

Regulatory actions must be scrutinized on an appropriate cost/benefit basis that ensures verifiable integrity of the assumptions used, compelling value is returned to those who must pay the cost of meeting the regulation, and that America's competitive interests are preserved or enhanced by the adoption of these direct or indirect regulations.

Basin Electric urges Congress to judiciously exercise its oversight of the Environmental Protection Agency (EPA) and other regulatory agencies through appropriate legislation and other actions to provide transparency, encourage public participation in the regulatory process, preserve cooperative federalism, and ensure current and proposed environmental regulations adhere to the aforementioned goals.

Background:

Basin Electric and its members have been confronted routinely with escalating regulatory requirements that include interpretations of existing and proposed rules with respect to the production of electricity, especially environmental emissions, and the use of fossil fuels. These rules, many proposed by agencies such as the EPA, would increase the costs of electricity and uncertainty in resource planning, affect the efficient operation of coal-based and natural gas generation, or adversely affect our rural communities, as well as individual consumers, farmers, and ranchers by adding additional and costly burdens on their operations.

Basin Electric and its members have always been committed to striking an appropriate balance between maintaining a clean and healthy environment and sustaining the economy by ensuring that proposed regulations are reasonable, cost-effective, and achievable.

E-3 - Utility Policies on Tribal Lands

Basin Electric Power Cooperative (Basin Electric) and its member cooperatives support a reliable and efficient utility delivery system both on and off reservation lands, and work with area tribes to maintain existing and support new utility infrastructure for the benefit of all cooperative members. Any terms for tribal rights-of-way for infrastructure necessary to maintain or improve the cooperative's service of electric power should be reasonable and fair.

Background:

Basin Electric, through its member cooperatives, serves American Indian tribes and recognizes tribal sovereignty. Tribal cooperative members are eligible to vote in cooperative elections and are eligible to serve as directors of their local rural electric cooperatives.

Some tribal governments are in the process of developing their own tribal utility programs. Rural electric cooperatives have already invested in the infrastructure necessary to provide tribes and tribal members with electricity on the reservations, and duplication of these services is not in the best interest of cooperative members.

The process to obtain and retain utility rights-of-way across trust lands administered by the Bureau of Indian Affairs is cumbersome and results in considerable delays. Rural electric cooperatives like Basin Electric have a fiduciary duty to provide their member cooperatives with electric service at the lowest-possible cost, and fees for rights-of-way access proposed by some tribes would result in increased electric rates to all members.

E-4 - Endangered Species Act

Basin Electric Power Cooperative (Basin Electric) supports reforming the Endangered Species Act (ESA) to provide fair, reasonable, science-based decision making with respect to the protection and recovery of threatened and endangered species.

Background:

A diverse natural ecosystem should be protected for future generations, and it is essential that officials find a reasonable balance between protecting threatened and endangered species, while allowing for continued economic growth and prosperity.

The ESA was a landmark environmental law designed to protect endangered and threatened animals and plants. Unfortunately, it has been subject to intense debate since its implementation. Federal officials have debated reauthorization of ESA for more than a decade, focusing on changes to make the ESA more efficient, effective, and less costly.

E-5 - Legal and Judicial Reforms

Basin Electric Power Cooperative (Basin Electric) supports judicial and legal reform efforts that ensure the interests of consumers are fairly and transparently represented, including:

- Tort reform legislation that provides balance in our judicial system that has been overburdened with costly lawsuits.
- Legislation to modify federal agency procedures that allow for what is commonly called "Sue-and-Settle" citizen lawsuits to allow all stakeholders the opportunity to be informed and heard throughout the process.

- Tracking and reporting requirements for all Equal Access to Justice Act (EAJA) reimbursements to attorneys and creation of a searchable, online database of all EAJA payments.

Background:

Tort Reform legislation would include addressing an increasing trend of climate change litigation where citizens pursue litigation against the federal government for its alleged failure to address climate change and local governments pursue litigation against companies that produce fossil fuels for their alleged contributions to climate change. Plaintiffs have requested courts to allow them to recover damages for future economic damages or non-economic damages that can be difficult or impossible to calculate.

"Sue-and-settle" citizen lawsuits are increasingly used by environmentalists and other organizations, wherein these groups sue federal agencies to force out-of-court settlements as a tool to advance their agendas. These lawsuits sometimes result in changes to laws, rules, and policies under federal environmental acts such as the Clean Air Act, the Clean Water Act, and the Endangered Species Act.

The EAJA was enacted to help individuals and groups with limited financial means seek judicial redress against federal government actions and was intended to allow individuals to recover attorney's fees and costs if they prevail in a lawsuit. Plaintiffs need not win in court to be eligible for EAJA payments, since out-of-court settlements also qualify. In recent years, large environmental groups with vast independent financial resources have repeatedly used EAJA to finance their own lawsuits against the federal government. There is no known tracking of how the funding is distributed or administered despite the requirement for annual reports to Congress on the program's expenditures.

APPENDIX C – TECHNOLOGY ASSESSMENT

2023 Generation Technology Assessment

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

Basin Electric Power Cooperative

2023 Generation Technology Assessment

April 2023

2023 Generation Technology Assessment

prepared for

Basin Electric Power Cooperative
2023 Generation Technology Assessment
Bismarck, North Dakota

April 2023

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ACE	Affordable Clean Energy
BMcD	Burns & McDonnell Engineering Company, Inc.
BACT	Best Available Control Technology
CCGT	Combined Cycle Gas Turbine
CEMS	Continuous Emissions Monitoring System
CO	Carbon Monoxide
COD	Commercial Operating Date
CPP	Clean Power Plan
DLN	Dry Low NOx
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FGD	Flue Gas Desulfurization

Abbreviation	Term/Phrase/Name
FTE	Full-Time Equivalent
GCF	Gross Capacity Factor
GSU	Generator Step-Up Transformer
GTG	Gas Turbine Generator
HHV	Higher Heating Value
HRSG	Heat Recovery Steam Generator
ITC	Investment Tax Credit
LEC	Lignite Energy Council
LHV	Lower Heating Value
MCFC	Molten-Carbonate Fuel Cell
MECL	Minimum Emissions Compliant Load
NCF	Net Capacity Factor
NOx	Nitrous Oxides
NREL	National Renewable Energy Laboratory
NSPS	New Source Performance Standard
OEM	Original Equipment Manufacturer
PM	Particulate Matter
PV	Photovoltaic
SCGT	Simple Cycle Gas Turbine
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
SOFC	Solid Oxide Fuel Cell

Abbreviation	Term/Phrase/Name
STG	Steam Turbine Generator
VOC	Volatile Organic Compounds

1.0 INTRODUCTION

Basin Electric Power Cooperative (Basin or Owner) retained Burns & McDonnell Engineering Company (BMcD) to evaluate various power generation technologies in support of its power supply planning efforts. The 2023 Generation Technology Assessment (Assessment) is screening-level in nature and includes a comparison of technical features, cost, performance, and emissions characteristics of the generation technologies listed below.

It is the understanding of BMcD that this Assessment will be used for preliminary information in support of the Owner's long-term power supply planning process. Any technologies of interest to the Owner should be followed by additional detailed studies to further investigate each technology and its direct application within the Owner's long-term plans.

1.1 Greenfield Technologies

- Simple cycle gas turbine (SCGT) technologies
    - ~50MW aeroderivative SCGT
    - E class SCGT
    - F class SCGT
    - HA class SCGT
    - Options for dual fuel, Selective Catalytic Reduction (SCR), and an add-on unit
    - Option for secondary fuel back-up, with a minimum of 20 ours of onsite storage
- Reciprocating engine technology
    - 6x 9MW engine plant
    - 6x 18MW engine plant
    - Dual fuel (fuel oil back-up)
    - Peaking and intermediate capacity factor options
    - Options for add-on 6x units with discussion on LNG vs fuel oil as a back-up
- Combined cycle gas turbine (CCGT) technologies
    - 1x1 configuration with duct firing
        - F class
        - G/H class
        - J class
        - Air cooled condenser
        - Option for add-on 1x1 configuration
    - 2x1 configuration with duct firing

    - F class
    - G/H class
    - J class
    - Air cooled condenser
  - Option for secondary fuel back-up, with a minimum of 20 ours of onsite storage
  - Option for 90% post combustion carbon capture
- Coal Technologies
  - 700 MW supercritical pulverized coal
    - PRB coal option
    - North Dakota lignite option
    - Air cooled condenser
    - Option for 90% carbon capture
- Nuclear Technologies
  - Advanced pressurized water reactor
  - Small modular nuclear reactors (SMR)
- Wind Generation: 200 MW
- Solar PV
  - 50 MWac single axis tracking
  - 100 MWac single axis tracking
- Battery Storage
  - Lithium ion
    - 5 MW / 20 MWh option
    - 10 MW / 400 MWh option
    - 50 MW / 200 MWh option
    - 100 MW / 400 MWh option

1.2 Fuel Conversion Sites

Technologies are also considered for conversion of existing Basin coal assets for natural gas operation. 50% and 100% conversion are considered at the following sites:

- Antelope Valley Station, Units 1-2
- Dry Fork Station, Unit 1
- Leland Olds Station, Units 1-2
- Laramie River Station, Units 1-3

1.3 Assessment Approach

This report compiles the assumptions and methodologies used by BMcD during the Assessment. Its purpose is to articulate that the delivered information is in alignment with Basin's intent to advance its resource planning initiatives.

Appendix A includes a scope assumptions matrix that serves as the basis for scope development for each option considered.

1.4 Statement of Limitations

Estimates and projections prepared by BMcD relating to performance, construction costs, and operating and maintenance costs are based on experience, qualifications, and judgment as a professional consultant. BMcD has no control over weather, cost and availability of labor, material and equipment, labor productivity, construction contractor's procedures and methods, unavoidable delays, construction contractor's method of determining prices, economic conditions, government regulations and laws (including interpretation thereof), competitive bidding and market conditions or other factors affecting such estimates or projections. Actual rates, costs, performance ratings, schedules, etc., may vary from the data provided.

2.0 STUDY BASIS AND ASSUMPTIONS

2.1 Scope Basis and Assumptions Matrix

Scope and economic assumptions used in developing the Assessment are presented below. A detailed scope matrix is included for reference in Appendix A.

2.2 General Assumptions

The assumptions below govern the overall approach of the Assessment:

- All estimates are screening-level in nature, do not reflect guaranteed costs, and are not intended for budgetary purposes. Estimates concentrate on differential values between options and not absolute information.
- All information is preliminary and should not be used for construction purposes.
- All capital cost and O&M estimates are stated in 2023 US dollars (USD). Escalation is excluded.
- Estimates assume an EPC contracting and execution methodology. This is consistent with current common execution structure and approach, including the current project that BMcD is doing with Basin for the Pioneer Station expansion.
- Greenfield options assume a generic site with no existing structures or underground utilities and with sufficient area to receive, assemble, and temporarily store construction material.
- Sites are assumed to be flat, with minimal rock and with soils suitable for spread footings.
- Fuel conversion options assume that all existing equipment is in adequate condition for continued operation.
- Technologies were evaluated based on the following conditions at 1,660 feet elevation in North Dakota:
  - Winter Conditions (Peak): 14.2 °F and 73.8% Relative Humidity (RH)
  - Annual Average Conditions: 41.3 °F and 65.1% RH
  - ISO Conditions: 59 °F and 60% RH
  - Summer Conditions (Peak): 69.0 °F and 61.7% RH
  - 1% Dry Bulb Conditions: 87.0 °F and 43.2% RH
- All performance estimates assume new and clean equipment and do not include operating degradation. Performance of existing equipment is based on prior studies and/or correspondence with Basin.
- An allowance for natural gas pipeline cost outside the site boundary is included as an Owner's cost. The project cost assumes that pipeline quality natural gas is available to the site.

- Fuel and power consumed during construction, startup, and/or testing are included.
- Piling is included under heavily loaded foundations.
- An allowance for site water supply and discharge is included as an Owner's cost.
- An allowance for transmission interconnect is included as an Owner's cost.
- Demolition or removal of hazardous materials is not included.
- Emissions estimates are based on a preliminary review of BACT requirements and provide a basis for the assumed air pollution control equipment included in the capital and O&M costs.

2.3 Owner Costs

Allowances for the following Owner's costs are included in the pricing estimates:

- Project development
- Owner's operations, project management, startup engineering personnel
- Operator training
- Legal fees
- Permitting/licensing
- Construction power, temporary utilities
- Site security
- Operating spare parts
- Switchyard (assumes 345 kV; excludes transmission)
    - Exception: Battery and PV options assume interconnection at 34.5 kV (distribution voltage)
- Political concessions / area development fees
- Permanent plant equipment and furnishings
- Site water supply and discharge
- Natural gas infrastructure
- Transmission interconnection
- Builder's risk insurance at 0.45% of construction cost
- Owner project contingency at 10% of total costs for screening purposes
- Owner cost exclusions: land, water rights, financing fees, interest during construction (IDC), escalation, sales tax, property tax, and property insurance are excluded from the cost estimates

2.4 Operating and Maintenance Assumptions

Operations and maintenance (O&M) estimates are based on the following assumptions:

- O&M costs are based on a greenfield facility with new and clean equipment.
- O&M costs are in 2023 USD.
- O&M estimates exclude emissions credit costs, property taxes, and property insurance.
- Where applicable, fixed O&M cost estimates include labor, office and administration, training, contract labor, safety, building and ground maintenance, communication, and laboratory expenses.
- Where applicable, variable O&M costs include routine maintenance, makeup water, water treatment, water disposal, ammonia, selective catalytic reduction (SCR) replacements, and other consumables not including fuel.
- Fuel costs are excluded from O&M estimates.
- Where applicable, major maintenance costs are shown separately from variable O&M costs.
- Gas turbine major maintenance assumes third party maintenance based on the recommended maintenance schedule set forth by the original equipment manufacturer (OEM), through the first major inspection.
- Base O&M costs are based on performance estimates at annual average ambient conditions.

3.0 SIMPLE CYCLE GAS TURBINE TECHNOLOGY

An SCGT plant utilizes natural gas to produce power in a gas turbine generator. The gas turbine (Brayton) cycle is one of the most efficient cycles for the conversion of gaseous fuels to mechanical power or electricity.

3.1 Simple Cycle Technology Description

Simple cycle gas turbines are typically used for peaking power due to their fast load ramp rates and relatively low capital costs. However, the units have high heat rates compared to combined cycle technologies. Simple cycle gas turbine generation is a widely used, mature technology.

Evaporative coolers or inlet foggers are often used to cool the air entering the gas turbine by evaporating additional water vapor into the air, which increases the mass flow through the turbine and therefore increases the output. Evaporative coolers are included in the Project Capital Cost on all SCGT technologies in this Assessment.

While this is a mature technology category, it is also a highly competitive marketplace. Manufacturers are continuously seeking incremental gains in output and efficiency while reducing emissions and onsite construction time. Frame unit manufacturers are striving to implement faster starts and improved efficiency. Combustor design updates allow improved ramp rates, turndown, fuel variation, efficiency, and emissions characteristics. Aeroderivative turbines also benefit from the research and development (R&D) efforts of the aviation industry, including advances in metallurgy and other materials.

Low load or part load capability may be an important characteristic depending on the expected operational profile of the plant. Low load operation allows the SCGT's to remain online and generate a small amount of power while having the ability to quickly ramp to full load without going through the full start sequence. Most turbines can sustain stable operation at synchronous idle when the SCGT generator is synced with the grid but there is virtually no load on the turbine. At synchronous idle, a turbine runs on minimal fuel input and generates minimal power.

3.1.1 Aeroderivative Gas Turbines

Aeroderivative gas turbine technology is based on aircraft jet engine design, built with high quality materials that allow for increased turbine cycling. The output of commercially available aeroderivative turbines ranges from less than 20 MW to approximately 100 MW in generation capacity. In simple cycle configurations, these machines typically operate more efficiently than larger frame units and exhibit shorter ramp up and turndown times, making them ideal for peaking and load following applications.

Aeroderivative units typically require fuel gas to be supplied at higher pressures (i.e. 675 psig to 960 psig for many models) than traditional frame units.

A desirable attribute of aeroderivative turbines is the ability to start and ramp quickly. Most manufacturers will guarantee ten-minute starts, measured from the time the start sequence is initiated to when the unit is at 100 percent load. Simple cycle starts are generally not affected by cold, warm, or hot conditions. However, all gas turbines start times in this Assessment assume that all start permissives are met, which can include purge credits, lube oil temperature, fuel pressure, etc. Available aeroderivative gas turbine models include both Dry Low NOx (DLN) and water injection methods to control emissions during natural gas operation. Additionally, some aeroderivative models include intercooler or fogging systems that would also require greater water usage. Both factors can greatly influence variable O&M to acquire water of the quality necessary to meet these needs.

Aeroderivative turbines are considered mature technology and have been used in power generation applications for decades. These machines are commercially available from several vendors, including General Electric (GE), Siemens (including Rolls Royce turbines), and Mitsubishi-owned Pratt & Whitney Power Systems (PWPS).

3.1.2 Frame Gas Turbines

Frame style turbines are industrial engines, more conventional in design, that are typically used in intermediate to baseload applications. In simple cycle configurations, these engines typically have higher heat rates when compared to aeroderivative engines. The smaller frame units have simple cycle heat rates around 11,000 Btu/kWh (HHV) or higher while the largest units exhibit heat rates around 9,000 Btu/kWh (HHV). However, frame units have higher exhaust temperatures (≈1,100°F) compared to aeroderivative units (≈850°F), making them more efficient in combined cycle operation because exhaust energy is further utilized. Frame units typically require fuel gas at lower pressures than aeroderivative units (~500 psig). Most available frame gas turbine models utilize DLN to control emissions during natural gas operation. This can result in decreased water usage in comparison to aeroderivative gas turbines, which reduces variable O&M costs.

Traditionally, frame turbines exhibit slower startup times and ramp rates than aeroderivative models, but manufacturers are consistently improving these characteristics. Conventional start times are commonly 30 minutes for frame turbines, but fast start options allow 10 to 15 minute starts. Fast start times and fuel consumption estimates are also shown in the Summary Table.

Frame engines are offered in a large range of sizes by multiple suppliers, including GE, Siemens, and Mitsubishi. Commercially available frame units range in size from approximately 50 MW to 400 MW and advancements in turbine control systems and further testing has led equipment manufacturers to tout capacities greater than 430 MW. Continued development by gas turbine manufacturers has resulted in the separation of gas turbines into several classes, grouped by output and firing temperature: E class turbines (nominal 85 to 100 MW); F class turbines (nominal 200 to 240 MW); G/H class turbines (nominal 270 to 300 MW); J class turbines (nominal 325 to 400 MW); and HA class turbines (nominal 400 to 430 MW). While there are smaller frame turbines than the E class size, this Assessment only considered E class, F class, and HA class turbines for SCGT generation options.

3.2 Simple Cycle Gas Turbine Emissions Controls

Emissions estimates are shown in the Summary Table for full load operation at annual average conditions on natural gas fuel. SCR systems are not included in base SCGT information provided and not reflected in cost, performance, and emissions estimates, but capital cost options are included for information.

Emissions levels and required NO_x and CO controls vary by technology and site constraints. Historically, natural gas SCGT peaking plants have not required post-combustion emissions control systems because they normally operate at low capacity factors. However, permitting trends suggest post-combustion controls may be required depending on annual number of gas turbine operating hours, proximity of the site to a non-attainment area, and current state regulations.

In addition, there is a New Source Performance Standard (NSPS) limit for NO_x emissions measured in parts per million (ppm), independent of operating hours. Per NSPS, units with heat inputs below 850 MMBtu/hr have a NO_x limit of 25 ppm, but units with heat inputs greater than 850 MMBtu/hr have a NOx limit of 15 ppm. Furthermore, in the event the overall facility has the potential to emit greater than 250 tons per year of NO_x emissions, SCR may be required or the number of operating hours available for the facility may be limited.

Most turbine manufacturers will guarantee emissions down to a specified minimum load, commonly 40 to 50 percent load. Below this load, turbine emissions may spike. As such, emissions on a ppm basis may be significantly higher at low loads.

The E, F, and HA class gas turbines in this evaluation use dry-low-NO_x (DLN) combustors to achieve NO_x emissions of 9 ppm or below at 15 percent O_2 while operating on natural gas fuel. Since these units emit less than 15 ppm NO_x, it is assumed that SCR is not required. Frame gas turbine units operating on fuel oil require water injection for NOx control. Base information for costs, performance, and emissions reflects natural gas operation, while an optional add-on capital cost for dual fuel (natural gas and fuel oil) capability is included for informational purposes. SCR technology is not included in the capital or O&M costs in this Assessment, however an optional add-on capital cost estimate is included for information purposes. It should be noted that OEMs may offer to tune the turbines to balance output and emissions targets depending on site specific needs.

Aeroderivative units commonly have options for DLN combustors or water injection to control NOx emissions to approximately 15-25 ppm. The aeroderivative option in this Assessment utilizes DLN combustors to achieve NO_x emissions of 25 ppm at 15 percent O_2 while operating on natural gas fuel. Because the aeroderivative option has a heat input below 850 MMBtu/hr, it is expected to meet the appropriate 25 ppm NO_x limit and therefore it is assumed that SCR is not required. An SCR system is not included in the capital or O&M cost estimates in this Assessment, however an optional add-on capital cost estimate is included for information purposes.

Oxidation catalysts can be used to control CO emissions to 2 ppm at 15 percent O_2 while operating on natural gas fuel. However, it is assumed that catalysts are not required on the peaking plants in this Assessment, so no post-combustion controls for CO are included.

Outside of good combustion practices, it is assumed that emissions control equipment is not required for CO_2 and particulate matter (PM). Sulfur dioxide emissions are not controlled and are therefore a function of the sulfur content of the fuel burned in the gas turbines.

3.3 Simple Cycle Gas Turbine Performance

Performance results are shown in the Summary Table. Full load and minimum load performance estimates are shown for winter, annual average, ISO, summer, and 1% dry bulb (DB) conditions. Summer and 1% DB ratings assume that evaporative coolers are installed and operating. Minimum load is defined as the minimum steady state operating load at which the gas turbine can maintain full load emissions levels (on a ppm basis) and is referred to as the Minimum Emissions Compliant Load (MECL). The general assumptions in Section 2.0 apply to the evaluation of all SCGT options, and additional assumptions are listed in the scope matrix in Appendix A.

The Summary Table includes startup times for SCGT options. Conventional start times are shown to full load and MECL, and frame turbine options also include fast-start times. Fast start packages allow simple cycle frame units to compare more favorably with aeroderivative units, which commonly start in 10 minutes. However, depending on the OEM, fast-start packages may impact turbine maintenance costs and/or performance. SCGT start times assume that fuel gas system purge credits are available. Fast start times are shown for informational purposes only and are not included in the cost and O&M estimates in this Assessment.

Outage and availability statistics are also shown in the Summary Table. They were collected using the NERC Generating Availability Data System (GADS). Simple cycle GADS data are based on the 2012 to 2021 operating statistics for applicable North American units that are no more than 10 years old.

Emissions estimates are shown in the Summary Table for full load operation at ISO conditions on natural gas fuel.

3.4 Simple Cycle Gas Turbine Cost Estimates

The simple cycle cost estimate results are included in the Summary Table. The project cost includes all equipment procurement, construction, and indirect costs for a greenfield simple cycle project.

Cost information is shown for a "First Unit" and "Next Unit". The first unit assumes a complete plant using a 1x SCGT arrangement. The next unit costs represent the incremental increase for each additional unit beyond the first installed unit (up to four total units). This methodology assumes that all units are constructed up front in a single project, and therefore the estimates are not valid for adding a unit to an existing plant at a later date.

Additional cost clarifications and assumptions are shown below:

- SCR systems are not included in the base estimate, however, add-on costs are presented for information purposes.
- It is assumed that natural gas is available at approximately 550 psig. Fuel compression is included for the aeroderivative option, but excluded for the E, F, and HA class options.
- SCGT plants assume that temporary demineralized water trailers are used.
- Demineralized water tank and related pumps are included for onsite storage.
- Evaporative coolers are included.
- Base costs are natural gas fuel only. Dual fuel option add-on cost includes GT upgrades, fuel tanks, associated piping, pumps, and fuel unloading systems. Initial fuel inventory assumes 20 hours of fuel oil storage.
- The estimate assumes the turbines are installed inside a building with administrative/control spaces and a warehouse.

3.5 Backup Fuel Options

The simple cycle technologies include an optional cost for dual fuel capability. This cost includes the GT modifications, fuel tanks, associated piping, pumps, and fuel truck unloading systems required for 20 hours of fuel oil storage and operation. It is assumed that fuel oil backup is for emergency use only. Fuel oil is a common backup fuel for SCGT plants, but other backup fuel options may be considered depending on the plant location and the associated logistics of fuel delivery. For example, plants located long distances from fuel oil terminals may have an increased likelihood of experiencing supply issues.

If fuel oil supply issues are expected, liquefied natural gas (LNG) may be an option to consider. Liquefaction is a process that cools natural gas until it becomes a liquid. Liquefaction reduces the volume of the gas by a factor of approximately 600, so it is useful for transporting or storing large volumes of natural gas. If the primary supply of pipeline gas is interrupted, then LNG would be drawn from onsite storage tanks, vaporized, and introduced to the turbines.

There are two options for onsite LNG backup facilities: liquefaction plus storage or storage-only systems. Both options would include onsite storage tanks, LNG pumps, vaporization equipment, piping/valves, fire protection, and control systems. A storage-only system would include unloading equipment for LNG truck deliveries. A fully operational LNG facility would include liquefaction equipment to produce LNG from pipeline natural gas (and may also include truck unloading equipment).

Capital costs are not provided for LNG facilities in this Assessment. However, based on BMcD experience and research, a storage-only LNG system for a simple cycle plant would be several times the cost of a comparable fuel oil storage system. A liquefaction plus storage system may cost 50 percent more than a storage-only system.

A storage-only LNG system may still be susceptible to fuel delivery issues depending on weather and seasonal availability. A liquefaction plus storage system is inherently more reliable than a storage-only system, but the source of fuel replenishment is the same as the primary fuel source. If the pipeline gas supply is interrupted, then truck deliveries would still be required to replenish storage tanks.

There are fundamental safety concerns inherent in unloading, storing, and processing LNG that would need to be addressed in the design. In addition, there would likely be regulatory requirements due to the quantity of storage required. Since the stored LNG would likely exceed a weight of 10,000 pounds, it would qualify as a “chemical of interest” (COI) under the Department of Homeland Security’s (DHS) Chemical Facility Anti-Terrorism Standards (CFATS). The CFATS standards would require Basin to register the facility with DHS, who would assign the facility a risk rating based on a pre-defined tier system. Depending on the tier rating, certain security implementations may be required at the plant (i.e. security cameras, fences, ballistic walls, etc.).

Please note that fuel oil storage may also incur CFATS requirements, but only if there are other COIs onsite, such as ammonia. If there is no SCR at the plant, then it is unlikely that additional security measures would be required for fuel oil storage. For this Assessment, it is assumed that the fuel oil storage at a simple cycle plant will not require additional security measures.

3.6 Simple Cycle O&M

The results of the simple cycle O&M evaluations are shown in the Summary Table. Additional assumptions are listed in the scope matrix in Appendix A. Major maintenance costs for aeroderivative engines are estimated on a dollar per gas turbine hourly operation ($/GTG-hr) basis and are not affected by number of starts. Fixed costs include an allowance for five full time equivalent (FTE) employees for the first unit and one additional FTE for the next unit.

Major Maintenance costs for the frame engines are estimated on either a $/GTG-hr or a dollar per gas turbine start ($/GT-start) basis, depending on operational profile. In general, if there are more than 27 operating hours per start, the maintenance will be hours based. If there are less than 27 hours per start, maintenance will be start-based.

4.0 RECIPROCATING ENGINE TECHNOLOGY

This Assessment includes a reciprocating engine plant for comparison among the SCGT options.

4.1 Reciprocating Engine Technology Description

The internal combustion, reciprocating engine operates on a four-stroke cycle for the conversion of pressure into rotational energy. Utility scale engines are commonly compression-ignition models, but some are spark-ignition engines. By design, cooling systems are typically closed-loop radiators, minimizing water consumption.

Reciprocating engines are generally less impacted by altitude and ambient temperature differences than gas turbines. With site conditions below 3,000 feet and 95°F, altitude and ambient temperature have minimal impact on the electrical output of reciprocating engines, though the efficiency may be slightly affected.

Reciprocating engines can start up and ramp load more quickly than most gas turbines, but it should be noted that the engine jacket temperature must be kept warm to accommodate start times under 10 minutes. However, it is common to keep water jacket heaters energized during all hours that the engines may be expected to run (associated costs have been included within the fixed O&M costs).

Many different vendors, such as Wärtsilä, Fairbanks Morse (MAN Engines), Caterpillar, Hyundai, GE (Jenbacher), Rolls Royce, etc. offer reciprocating engines. They are a popular option to pair with wind turbine generation with their quick start times and operational flexibility. There are slight differences between manufacturers in engine sizes and other characteristics, but all largely share the common characteristics of quick ramp rates and quick start up when compared to gas turbines.

4.2 Reciprocating Engine Emissions Controls

In addition to good combustion practices, it is expected that reciprocating engines will require SCR and CO catalysts to control NO_x and CO emissions. Operation on natural gas fuel with an SCR yields reduction of NO_x emissions to 5 ppm at 15 percent excess O_2, while a CO catalyst results in anticipated CO emissions of 15 ppm. It is assumed that emissions control equipment is not required for CO_2 and particulate matter (PM). Sulfur dioxide emissions are not controlled and are therefore a function of the sulfur content of the fuel. It is assumed that CEMS monitoring systems are also not required.

4.3 Reciprocating Engine Performance

Performance results are shown in the Summary Table. Estimated performance results are based on data from OEM ratings. Full load, part load, and minimum load performance estimates are shown for winter, annual average, ISO, summer, and 1% dry bulb (DB) conditions. Minimum load assumes a single engine at 50% load. The general assumptions in Section 2.0 apply to the evaluation of reciprocating engine options, and additional assumptions are listed in the scope matrix in Appendix A.

The Summary Table includes startup times for engine options. Start times of 5-10 minutes require that the engine jacket temperatures be kept warm for standby operation (this is addressed in the O&M costs). Outage and availability statistics, collected using NERC GADS, are also shown in the Summary Table. It should be noted that EFOR data from GADS may not accurately represent the benefits of a reciprocating engine plant, depending on how outage events are recorded. Typically, a maintenance event will not impact all engines simultaneously, so only a portion of the plant would be unavailable.

Reciprocating engines consume minimal water. Depending on site conditions and access to water, the low water consumption rate can be advantageous for comparison to other simple cycle plants.

Emissions estimates are shown for full load at ISO conditions on natural gas fuel. It is assumed that SCR and CO catalyst technologies are installed and operating.

4.4 Reciprocating Engine Cost Estimates

The cost estimate results are included in the Summary Table. The project cost includes all equipment procurement, construction, and indirect costs for a greenfield reciprocating engine project.

Cost information is shown for a “First Unit” and “Next Unit”. The first unit assumes a complete plant using a 6x engine arrangement. The next unit costs represent the incremental increase for each additional 6x block beyond the first installed 6x block. This methodology assumes that all units are constructed up front in a single project, and therefore estimates are not valid for adding to an existing plant at a later date.

Additional cost clarifications and assumptions are shown below:

- SCR and CO catalysts are included for reciprocating engines.
- It is assumed that natural gas is available at approximately 125 psig. Fuel compression is not required.
- The reciprocating engine plant includes an engine hall with associated administrative/control/warehouse facilities.

- Six engines are tied to a single GSU.

4.5 Reciprocating Engine O&M

The results of the O&M evaluations are shown in the Summary Table. Additional assumptions are listed in the scope matrix in Appendix A.

Fixed O&M costs include six (6) FTE personnel for the first 6x block, and no additional FTE for the next 6x block. Fixed O&M also includes an estimate for standby electricity costs to keep the engines warm and accommodate start times of less than ten minutes. Additional fixed O&M costs include allowances for administrative, communications, and other routine maintenance items.

Major maintenance costs are shown per engine, regardless of configuration. It is assumed that an LTSA with the OEM or other third party would include parts and labor for major overhauls and catalyst replacements.

Variable costs account for lube oil, SCR reagent, routine BOP maintenance, and scheduled minor engine maintenance. It is expected that the LTSA would include supervision and parts for these minor intervals (i.e. ~2,000 hour intervals), but that these may not be considered capital maintenance intervals, so they are included in the variable O&M.

4.6 Hydrogen Blend Capability

The use of hydrogen as a blended fuel for reciprocating engines has received a lot of attention as a pathway to decarbonize the combustion process required for power generation. When combusted, hydrogen is a clean burning fuel, so it does not produce any carbon emissions, making it a front-runner as a potential natural-gas fuel replacement. However, hydrogen has its own special set of properties that must be considered when utilized as fuel for a reciprocating engine. Hydrogen combusts at a higher temperature in comparison to natural gas, so it could potentially increase NOx emissions. Currently, reciprocating engine OEMs are quoting hydrogen-burn capabilities up to 25% hydrogen (by volume) in existing machines with minimal impact to output and performance. Depending on the specific machine, adjustments can potentially be made to burn at higher blending levels of hydrogen. Additionally, reciprocating engine manufacturers are striving to achieve 100% hydrogen capabilities in future machines with on-going factory tests.

5.0 COMBINED CYCLE GAS TURBINE TECHNOLOGY

5.1 Combined Cycle Technology Description

The basic principle of the combined cycle gas turbine (CCGT) plant is to utilize natural gas to produce power in a gas turbine which can be converted to electric power by a coupled generator, and to also use the hot exhaust gases from the gas turbine to produce steam in a heat recovery steam generator (HRSG). This steam is then used to drive a steam turbine and generator to produce electric power. The use of both gas and steam turbine cycles (Brayton and Rankine) in a single plant to produce electricity results in high conversion efficiencies and low emissions. Additionally, natural gas can be fired in the HRSG to produce additional steam and associated output for peaking load, a process commonly referred to as duct firing. The heat rate will increase during duct fired operation, though this incremental duct fired heat rate is generally less than the resultant heat rate from a similarly sized SCGT peaking plant.

5.2 Combined Cycle Emissions Controls

Combined cycle plants are designed for capacity factors consistent with intermediate or base load operation, and therefore it is expected that NO_x and CO emissions will need to be controlled. An SCR will be required to reduce NO_x emissions and a CO catalyst will be required to reduce CO emissions. This Assessment assumes NO_x emissions will be controlled to 2 ppm at 15 percent O_2 and CO emissions will be controlled to 2 ppm CO at 15 percent O_2.

The use of an SCR and CO catalyst requires additional site infrastructure. An SCR system injects ammonia into the exhaust gas to absorb and react with NO_x molecules. This requires on-site ammonia storage and provisions for ammonia unloading and transfer. The costs associated with these requirements have been included in this Assessment.

For all CCGT options, CO_2 emissions are estimated to be 120 lb/MMBtu, based on firing of natural gas fuel.

Sulfur dioxide emissions are not controlled and are therefore a function of the sulfur content of the fuel burned in the gas turbines. Sulfur dioxide emissions of a CCGT plant are very low compared to coal technologies, and the emission rate of sulfur dioxide for a combined cycle unit is estimated to be less than 0.001 lb/MMBtu.

5.3 Combined Cycle Performance

Estimated performance results are based on data from EBSILON heat balance models. The general assumptions in Section 2.0 apply to the evaluation of all CCGT options, and additional assumptions are listed in the scope matrix in Appendix A.

The Summary Table includes combined cycle start times to stack emissions compliance and base load according to cold, warm, and hot start conditions. Stack emissions compliance is commonly driven by the time required for the CO catalyst to reach its optimum temperature, which typically occurs after the turbine reaches MECL. Start times reflect unrestricted, conventional starts for all gas turbines. Capital costs assume the inclusion of terminal point desuperheaters, full steam turbine bypass, and associated controls. GT fast start options are not reflected in combined cycle information. Note that the startup times included are intended to be a reasonable representation of expected startup times, actual startup times may differ. For the purposes of air permit development, additional factors may need to be considered that could increase startup times to be included in air permit applications.

Outage and availability statistics, collected using NERC GADS, are also shown in the Summary Table. Combined cycle GADS data are based on the 2012-2021 operating statistics for applicable North American units that are no more than 10 years old.

Full load, part load, and minimum load performance estimates are shown for winter, annual average, and summer conditions. All performance assumes new and clean equipment. Emissions estimates assume that SCR and CO catalyst systems are installed. Emissions are shown for base load and peak load (i.e. duct fired operation), assuming natural gas operation at annual average conditions.

5.4 Combined Cycle Cost Estimates

The combined cycle cost results are included in the Summary Table. The project cost includes all equipment procurement, construction, and indirect costs for combined cycle projects. The general cost assumptions in Section 2.0 apply to the combined cycle options.

For the 1x1 configurations, cost information is shown for a “First Unit” and “Next Unit”. The first unit assumes a complete 1x1 plant. The next unit costs represent the incremental increase for one additional 1x1 unit. This methodology assumes that the entire 2x (1x1) plant would be constructed up front in a single project, and therefore the estimates are not valid for adding a unit to an existing plant at a later date. In line with the assumptions matrix in Appendix A, the following items are highlighted:

- Gas turbines, HRSGs, and steam turbines are installed inside a generation building, which also includes administrative, control, and warehouse spaces.
- All combined cycle options include air cooled condensers (ACC).
- All plants include duct firing capability to 1,600°F duct burner exit gas temperature.

5.5 Backup Fuel Options

The combined cycle technologies include optional costs for fuel oil backup. These costs for combined cycle plants include GT modifications, fuel tanks, associated piping, pumps, and fuel truck unloading systems required for 20 hours of fuel oil storage and operation. It is assumed that fuel oil backup is for emergency use only. Fuel oil is a common backup fuel for gas turbines, but other options may be considered depending on the plant location and the associated logistics of fuel delivery. For example, plants located long distances from fuel oil terminals may have an increased likelihood of experiencing supply issues.

If fuel oil supply issues are expected, liquefied natural gas (LNG) may be an option to consider. Liquefaction is a process that cools natural gas until it becomes a liquid. Liquefaction reduces the volume of the gas by a factor of approximately 600, so it is useful for transporting or storing large volumes of natural gas. If the primary supply of pipeline gas is interrupted, then LNG would be drawn from onsite storage tanks, vaporized, and introduced to the turbines.

There are two options for onsite LNG backup facilities: liquefaction plus storage or storage-only systems. Both options would include onsite storage tanks, LNG pumps, vaporization equipment, piping/valves, fire protection, and control systems. A storage-only system would include unloading equipment for LNG truck deliveries. A fully operational LNG facility would include liquefaction equipment to produce LNG from pipeline natural gas (and may also include truck unloading equipment).

Capital costs are not provided for LNG facilities in this Assessment. However, based on BMcD experience and research, a storage-only LNG system for a combined cycle plant would be several times the cost of a comparable fuel oil storage system. A liquefaction plus storage system may cost 50 percent more than a storage-only system.

A storage-only LNG system may still be susceptible to fuel delivery issues depending on weather and seasonal availability. A liquefaction plus storage system is inherently more reliable than a storage-only system, but its source of fuel replenishment is the same as the primary fuel source. If the pipeline gas supply is interrupted, then truck deliveries would still be required to replenish the tanks.

There are fundamental safety concerns inherent in unloading, storing, and processing LNG that would need to be addressed in the design. In addition, there will be regulatory requirements due to the quantity of storage required. Since the stored LNG would exceed a weight of 10,000 lbs., it would qualify as a "chemical of interest" (COI) under the Department of Homeland Security's (DHS) Chemical Facility Anti-Terrorism Standards (CFATS). The CFATS standards would require Basin to register the facility with DHS, who would assign the facility a risk rating based on a pre-defined tier system. Depending on the tier rating, certain security implementations may be required at the plant (i.e. security cameras, fences, ballistic walls, etc.).

Please note that fuel oil storage may also incur CFATS registration, but only if there are other COIs onsite, such as anhydrous ammonia. SCR systems are included in all combined cycle plants in the Assessment, however it is unclear if 19% aqueous ammonia would be considered a COI. For this Assessment, it is assumed that the fuel oil storage at a combined cycle plant will not require additional security measures.

5.6 Hydrogen Blend Capability

As discussed in Section 4.6, hydrogen is emerging as a potentially valuable new fuel in the electric power industry. The light element has been produced and used as a feedstock at the multi-million ton per year scale worldwide for decades, primarily in the petroleum, chemical, and ammonia/fertilizer industries. Historically, there has been little use for hydrogen in the electric power industry other than small niche uses like generator cooling. However, the potential applications for the simple molecule are expanding with decarbonization trends. For existing thermal assets, hydrogen can be burned either as a pure stream or as a blend with natural gas in most combustion turbines. Paired with on-site hydrogen storage, hydrogen is a candidate fuel for bulk energy storage. However, it must be recognized that while hydrogen handling is a very mature engineering field, the use of hydrogen in thermal power generation is still an emerging technology. In particular, high-concentration firing in combustion turbines creates very high NO_x emissions, and not all combustion turbine models have manufacturer support for hydrogen firing.

To combust high hydrogen fuels, available frame gas turbines models typically require either steam injection or water injection methods to control emissions. This requirement for water can greatly influence the viability of these technologies depending on project siting and conditions. Plants firing high hydrogen fuels would accordingly be expected to have variable O&M impacts to acquire water of the quality necessary to meet these needs.

Frame engines capable of firing high hydrogen fuel are offered in a large range of sizes by multiple suppliers, including GE, Siemens, and Mitsubishi. Historically, due to the large volume of hydrogen rich fuels necessary to fully meet the heat input requirements for larger frame turbines, smaller frame engines have had greater experience in hydrogen combustion applications. Industrial turbines are largely capable of operating on hydrogen at 65-100% capability by volume. For high hydrogen content fuels, water or steam injection may be required that might require exhaust energy recuperation to supply these engines with this mass flow.

Turbine suppliers offer a range of NO_x emissions levels based on their combustor technologies and control systems including water and steam injection. Selective catalytic reduction would be required to meet NO_x limits. Supplemental natural gas as required for turbine operation is expected to be the main driver for other emissions like CO, CO_2, sulfur dioxide, and particulate matter.

In addition to these performance concerns, costs for combined cycle applications are impacted by potential requirement of on-site hydrogen compression and modifications to the turbine enclosure and fuel conditioning packages. Burning hydrogen as a gas turbine fuel has been demonstrated commercially, but it requires modifications to the gas turbine system and overall balance of plant in order to be done safely.

5.7 Combined Cycle Carbon Capture Technology

The combined cycle plant options considered in this Assessment include options for 90% CO_2 capture using the advanced amine process. The advanced amine process is an enhancement on the Monoethylamine (MEA) process that was developed over 60 years ago and has been adapted to treat flue gas streams for CO_2 capture. Other organic chemicals belonging to the family of compounds known as “amines” are now being used to reduce cost and power consumption as compared to the traditional MEA solvent. New generations of carbon capture technology are either in the development stages or beginning pilot plant trials, including cryogenic separation technologies that isolate CO_2 as dry ice. Currently, only amine-based technologies are considered technologically mature and commercially available at the capacity range relevant to power generation.

In the advanced amine process, a continuous scrubbing system is used to separate CO_2 from the flue gas stream. The system consists of two main elements: an absorber where CO_2 is removed from the flue gas and absorbed into an amine solvent, and a regenerator (or stripper), where CO_2 is released (in concentrated form) from the solvent and the original solvent is then recovered and recycled. Cooled flue gases flow vertically upwards through the absorber countercurrent to the absorbent (amine in a water solution, with some additives). The amine reacts chemically with the CO_2 in the flue gas to form a weakly bonded compound, called carbamate. The scrubbed gas is then washed and vented to the atmosphere. The CO_2-rich solution leaves the absorber and passes through a heat recovery exchanger, and is further heated in a reboiler using low-pressure steam. The carbamate formed during absorption is broken down by the application of heat, regenerating the sorbent and producing a concentrated CO_2 gas stream. The hot CO_2-lean sorbent is then returned to the opposite side of the heat exchanger where it is cooled and sent back to the absorber. Fresh reagent is added as make up for losses incurred in the process.

5.8 Combined Cycle Plant O&M

The results of the combined cycle O&M evaluations are shown in the Summary Table. In line with the assumptions matrix in Appendix A, the following items are highlighted:

- O&M estimates are based on plant performance at annual average conditions.
- Combined cycle plants assume the following FTE personnel quantities.
  - 1x1: 22 FTE
  - 2x1: 25 FTE
  - 2x(1x1): 27 FTE
- SCR systems are included in the O&M evaluations for all combined cycle plants. SCR systems assume 19 percent aqueous ammonia and six-year catalyst life.

6.0 PULVERIZED COAL

6.1 Pulverized Coal Technology Description

Pulverized Coal (PC) steam generators are characterized by the fine processing of coal for combustion in a suspended fireball. Coal is supplied to the boiler from bunkers that direct coal into pulverizers, which crush and grind the coal into fine particles. The primary air system transfers the pulverized coal from the pulverizers to the steam generator's low NO_x burners for combustion. Two types of burner arrangements for pulverized coal units are wall fired and tangentially fired (T-fired). Wall fired burners are more common and involve multiple burners arranged in rows up the side of a boiler wall. In T-fired burner arrangements, rows of burners are located in the corners of a boiler. Each type of arrangement burns the coal in the middle elevation of the boiler in suspension. This is also referred to as a suspended fireball and, along with the fine coal particle size, is characteristic of pulverized coal combustion. PC technology is a mature and reliable energy production technology used around the world.

The steam generator produces high-pressure steam that expands in the steam turbine generator to produce electricity. A portion of the steam exits the turbine through extractions and flows to the feedwater heaters and may feed boiler feedwater pump turbines.

The power industry typically classifies conventional coal fired power plants as subcritical, supercritical, and ultra-supercritical based on the steam operating pressure. Subcritical units operate below the critical point of water, which is 3,208 psia and 705°F, supercritical units operate above the critical point of water. Ultra-supercritical units operate at even higher pressures or temperatures in order to increase efficiency. While efficiency is increased, higher grade and thicker materials must be used, which increase costs.

At pressures above the critical point of water, heat addition no longer results in the typical boiling process in which there is an exact division between steam and water. The fluid becomes a composite mixture throughout the heating process. Due to the increased steam pressures and temperatures, supercritical units are generally more efficient than subcritical units of the same size resulting in fuel savings and decreased emissions.

Most modern coal PC plants are operated at supercritical steam conditions because of the efficiency and emissions improvements compared to subcritical plants. If PC technology is chosen as the best technology to further develop, a more detailed study shall be performed to evaluate the optimal steam cycle.

Evaluations have shown that there are technical and economic constraints to supercritical PC unit minimum size. Units near 400 MW and below typically incur undesirable tube velocities and require prohibitively expensive materials to handle stress and erosion issues.

The PC plants evaluated for this Assessment are 700 MW supercritical units with 90% carbon capture capability. The 700 MW option is shown for two varieties of coal: Powder River Basin (PRB) coal and North Dakota lignite. Units of this size would typically consist of one boiler and one steam turbine. All plants include ACC systems for heat rejection.

6.2 PC Emissions Controls

NO_x emissions are controlled with combustion and post-combustion controls such as staged combustion in the form of low NO_x burners with separated overfire air and an SCR system. The SCR system will reduce NO_X emissions to an anticipated limit of 0.04 lb/MMBtu. 19% aqueous ammonia is assumed as the SCR reagent. Carbon capture equipment is expected to contribute additional NO_x emissions reductions.

A wet FGD is assumed to be installed for a PC boiler burning PRB or lignite to control SO_2 emissions to 0.02 lb/MMBtu. The addition of carbon capture equipment is expected to yield additional SO_2 emissions reductions.

This evaluation also includes a baghouse to remove particulate matter from the flue gas. Test information indicates that the inherent mercury control provided by a fabric filter followed by a wet limestone scrubber is adequate to achieve 90 percent removal. At this time, it is uncertain whether or not equipment manufacturers are willing to provide commercial guarantees to this level of mercury control.

6.3 PC Performance

Performance estimates shown in the Summary Table are based on full load, part load, and minimum load operation at winter, summer, and average ambient conditions. Performance estimates assume new and clean equipment and incorporate the auxiliary load of carbon capture systems, as applicable. Additional performance assumptions can be found in the scope matrix in Appendix A.

The addition of the advanced amine process increases the net plant heat rate (reduces efficiency) due to an increase in auxiliary power requirements. In addition, low pressure steam is extracted for the amine solvent regeneration process, thereby increasing the steam turbine heat rate and impacting net plant performance. Additional auxiliary power is required by solvent circulation equipment, CO_2 compression equipment, and other miscellaneous equipment associated with the CO_2 capture process.

6.4 PC Cost Estimates

The PC project cost includes all equipment procurement, construction, and indirect costs. In line with the assumptions matrix in Appendix A and the general plant assumptions in Section 2.0, the following items are highlighted:

- ACC systems are included for heat rejection.
- The PC units include the following pollution control technologies:
  - SCR
  - Wet limestone scrubber
  - Fabric filter baghouse
  - Varying levels of advanced amine carbon capture
- Costs do not include CO_2 transportation and sequestration/storage.

6.5 PC Carbon Capture Technology

The PC plant options considered in this Assessment include options for 90% CO_2 capture using the advanced amine process. The advanced amine process is an enhancement on the Monoethylamine (MEA) process that was developed over 60 years ago and has been adapted to treat flue gas streams for CO_2 capture. Other organic chemicals belonging to the family of compounds known as “amines” are now being used to reduce cost and power consumption as compared to the traditional MEA solvent. New generations of carbon capture technology are either in the development stages or beginning pilot plant trials, including cryogenic separation technologies that isolate CO_2 as dry ice. Currently, only amine-based technologies are considered technologically mature and commercially available at the capacity range relevant to power generation.

In the advanced amine process, a continuous scrubbing system is used to separate CO_2 from the flue gas stream. The system consists of two main elements: an absorber where CO_2 is removed from the flue gas and absorbed into an amine solvent, and a regenerator (or stripper), where CO_2 is released (in concentrated form) from the solvent and the original solvent is then recovered and recycled. Cooled flue gases flow vertically upwards through the absorber countercurrent to the absorbent (amine in a water solution, with some additives). The amine reacts chemically with the CO_2 in the flue gas to form a weakly bonded compound, called carbamate. The scrubbed gas is then washed and vented to the atmosphere. The CO_2-rich solution leaves the absorber and passes through a heat recovery exchanger, and is further heated in a reboiler using low-pressure steam. The carbamate formed during absorption is broken down by the application of heat, regenerating the sorbent and producing a concentrated CO_2 gas stream. The hot CO_2-

lean sorbent is then returned to the opposite side of the heat exchanger where it is cooled and sent back to the absorber. Fresh reagent is added as make up for losses incurred in the process.

6.6 PC O&M Cost Estimate

O&M costs for the evaluated PC plants are shown in the Summary Table. General assumptions for fixed and variable O&M costs are listed in Section 2.0. Additional assumptions are listed in the scope matrix in Appendix A.

Major maintenance costs include costs for work typically conducted during plant outages, steam turbine overhauls, major boiler replacements, fabric filter bag replacements, SCR catalyst replacements and water treatment system replacements. Scheduled outages for PC technology assume a 2 week outage each year for the boiler. Additionally, the entire facility will undergo an outage of approximately 6 weeks every 5 years, during which time, steam turbine major maintenance will be performed. Additional staff is assumed to be included to operate and maintain carbon capture equipment.

7.0 NUCLEAR TECHNOLOGY – APWR

This Assessment includes a nuclear power option based on an advanced pressurized water reactor (APWR).

7.1 Nuclear APWR Technology Description

In an APWR, water is heated by the nuclear fuel but the water is kept under pressure to prevent it from boiling. Instead, the hot water is pumped from the reactor pressure vessel to a steam generator. There the heat of the water is transferred to a second, separate supply of water, which boils to produce steam. The coolant in the APWR is contained in the pressurized primary loop and does not pass through the steam turbine. The plant will utilize a dual, spherical design containment building with larger maintenance areas. Also, redundancy and diversity will exist in the electrical distribution and support systems.

7.2 Nuclear Technology Trends

The status of the nuclear plant as a low carbon emitter in its respective generation portfolio is a key issue in the industry. The greatest market challenge to any nuclear plant, new or existing, is the relative cost of natural gas, solar, and wind generated power. Almost all the existing nuclear units at risk of closure are in un-regulated merchant markets. As is currently demonstrated in Illinois, the recognition of the nuclear plant as a low carbon/high reliability source of generation with the ability to gain additional revenue is key to the business case for the station.

The projected vs. actual construction schedules have a significant impact on total construction cost, in-service dates, and interest costs. Updated modular construction techniques are expected to create improvements in construction schedules, but steep learning curves are still evident in both the module fabrication and field assembly. All the plants currently under construction have had significant schedule delays. Capitalizing on lessons learned from these delays is important for future schedule accuracy, but the opportunities for streamlined construction will be more difficult to realize if there is a significant time lag before the next wave of nuclear development.

7.3 Nuclear APWR Emissions Controls

The APWR design is essentially a zero-discharge site. All radioactive wastes are processed before release. The nuclear fuel cycle is subject to government regulation. While there is currently no long-term federal storage site identified for spent nuclear fuel, this may change with the political leadership in Washington.

7.4 Nuclear APWR Performance

Performance is based on BMcD experience and vendor information.

7.5 Nuclear APWR Cost Estimate

Capital cost estimate results are shown in the Summary Table. The project cost includes all equipment procurement, construction, and indirect costs. Cost assumptions in Section 2.0 and Appendix A apply to Nuclear APWR plants. Note that the costs are based on wet cooling for heat rejection.

7.6 Nuclear APWR O&M Estimates

Nuclear O&M costs are based on BMcD experience and industry research. The results of the O&M evaluations are shown in the Summary Table. The assumptions in Section 2.0 and Appendix A apply to APWR plants.

8.0 NUCLEAR TECHNOLOGY – SMR

This Assessment includes an option for small modular nuclear reactors (SMR).

8.1 Nuclear SMR Technology Description

Manufacturers are designing small modular reactors (SMR) to create a smaller scale, completely modular nuclear reactor. The conceptual technologies are similar to APWR and the entire process and steam generation is contained in one, modular vessel. Energy from the nuclear reaction heats the primary reactor fluid, which then creates steam via an integral heat exchanger, so the steam is isolated from possible contamination. The steam generated in this vessel drives a turbine for electric generation, and the design is based on one turbine per reactor.

According to these manufacturers, the primary benefits of SMR units are as follows: the smaller unit size will allow more resource generation flexibility and the modular design will reduce overall project costs while providing increased benefits in the areas of safety, waste management, and the utilization of resources. Modular designs allow increased levels of factory fabrication when compared to larger scale reactors. The goal is to reduce field labor and construction schedule.

Currently, SMRs are considered conceptual in design and are developmental in nature. Several manufacturers, most notably NuScale and X-Energy, have completed conceptual design of these modular units to target lower output and costs and are in various stages of permitting applications with the Department of Energy. NuScale expects to have an operational SMR unit by 2029 as part of the Western Initiative for Nuclear, a collaborative program that includes the DOE Idaho National Laboratory and stakeholders in several western U.S. states. However, there is currently no industry experience outside of product development and testing. The information provided in this Assessment for the SMR option is presented as a range to represent the leading technology options and is based on BMcD studies and manufacturer information.

8.2 Nuclear SMR Emissions Controls

Like the APWR option, the emissions at an SMR facility are plant are limited to cooling tower particulates and any emergency system emissions.

8.3 Nuclear SMR Performance Estimate

There is a range of SMR capacity sizes and number of modules. The standard configuration is 1x1, which includes a steam turbine for each module. Performance estimates are based on vendor information. The units are intended for very high capacity factors (~95%) so cycling and low load operation is not expected. Reliability and availability information is not available but is assumed to be similar to existing nuclear plants. The reactors are designed for a 60-year life.

8.4 Nuclear SMR Cost Estimate

The nuclear SMR cost results are shown as a range in the Summary Table. The project cost includes all equipment procurement, construction, and indirect costs. The cost is based on BMcD experience, vendor information, and industry research.

8.5 Nuclear SMR O&M Estimate

The SMR O&M costs are based on industry research and vendor information. The results of the O&M estimates are included in the Summary Table.

9.0 RENEWABLE TECHNOLOGY – ONSHORE WIND ENERGY

9.1 Wind Energy Technology Description

Wind turbines convert the kinetic energy of wind into mechanical energy, which can be used to generate electrical energy that is supplied to the grid. Wind turbine energy conversion is a mature technology and is generally grouped into two types of configurations:

- Vertical-axis wind turbines, with the axis of rotation perpendicular to the ground.
- Horizontal-axis wind turbines, with the axis of rotation parallel to the ground.

Over 95 percent of turbines over 100 kW in operation are horizontal-axis. Subsystems for either configuration typically include the following: a blade/rotor assembly to convert the energy in the wind to rotational shaft energy; a drive train, usually including a gearbox and a generator; a tower that supports the rotor and drive train; and other equipment, including controls, electrical cables, ground support equipment and interconnection equipment.

Wind turbine capacity is directly related to wind speed and equipment size, particularly to the rotor/blade diameter. The power generated by a turbine is proportional to the cube of the prevailing wind, that is, if the wind speed doubles, the available power will increase by a factor of eight. Because of this relationship, proper siting of turbines at locations with the highest possible average wind speeds is vital. According to the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL), Class 3 wind areas (wind speeds of 14.5 mph) are generally considered to have suitable wind resources for wind generation development.

9.2 Wind Energy Emission Controls

No emission controls are necessary for a wind energy installation.

9.3 Wind Performance

This Assessment includes a 200 MW onshore wind generating facility in North Dakota. BMcD relied on publicly available data and proprietary computational programs to complete the net capacity factor characterization.

Annual losses for a wind energy facility were estimated at approximately 15 percent, which is a common assumption for screening level estimates in the wind industry. This loss factor was applied to the gross capacity factor estimate to derive a net annual capacity factor (NCF) for the potential site. Ideally, a utility-scale generation project should have an NCF of 30 percent or better. The NCF estimate for North Dakota was 38.9%.

9.4 Wind Cost Estimate

The wind energy cost estimate is shown in the Summary Table. The cost estimate assumes an EPC contracting methodology. Typical Owner's costs are also shown. Costs are based on a 200 MW plant with 5 MW turbines (40 total turbines).

9.5 Wind Energy O&M Estimates

O&M costs for the evaluated wind site are shown in the Summary Table. The O&M costs are derived from in-house information based on BMcD project experience and vendor information. Fixed costs include all annual service and maintenance agreements. Therefore, variable O&M falls within the fixed cost figure rather than a $/MWh estimate commonly associated with fossil fuel plants. It is assumed that 20% of annual fixed O&M expenses are set aside for unscheduled maintenance not covered by the service agreements.

9.6 Wind Energy Production Tax Credit

Tax credits such as the production tax credit (PTC) and investment tax credit (ITC) are not factored into the cost or O&M estimates in this Assessment, but an overview of the PTC and ITC is included below for reference.

The recently passed Inflation Reduction Act allows wind projects to receive either the ITC or the PTC. The ITC is a one-time credit based on the upfront cost of a project that is earned when the equipment is placed into service. The ITC is now 30% for projects that begin construction before 2025. The PTC is awarded annually for the first 10 years of a wind facility's operation. Unlike the ITC, there is no upfront incentive to offset capital costs. The PTC value is calculated by multiplying the $/MWh credit times the total energy sold during a given tax year. At the end of the tax year, the total value of the PTC is applied to reduce or eliminate taxes that the owners would normally owe. If the PTC value is greater than the annual tax bill, the excess credits can potentially go unused unless the owner has a suitable tax equity partner. For a wind project to be eligible for the 100% PTC, it must satisfy specific prevailing wage and apprenticeship requirements. If these requirements are not met, the wind project would be eligible only for the base rate (i.e., 20% PTC). Bonus credits are available for meeting domestic content thresholds and/or locating facilities in fossil fuel dependent "energy communities". The PTC is $0.0275/kWh for 2023 and will rise with inflation.

10.0 RENEWABLE TECHNOLOGY – SOLAR PHOTOVOLTAIC

This Assessment includes solar photovoltaic (PV) options for a single axis tracking system at 50 MW, and a single axis tracking system at 100 MW.

10.1 PV Technology Description

The conversion of solar radiation to useful energy in the form of electricity is a mature concept with extensive commercial experience that is continually developing into a diverse mix of technological designs. PV cells consist of a base material (most commonly silicon), which is manufactured into thin slices and then layered with positively (i.e. phosphorus) and negatively (i.e. boron) charged materials. At the junction of these oppositely charged materials, a "depletion" layer forms. When sunlight strikes the cell, the separation of charged particles generates an electric field that forces current to flow from the negative material to the positive material. This flow of current is captured via wiring connected to an electrode array on one side of the cell and an aluminum back-plate on the other. Approximately 15% of the solar energy incident on the solar cell can be converted to electrical energy by a typical silicon solar cell. As the cell ages, the conversion efficiency degrades at a rate of approximately 2% in the first year and 0.5% per year thereafter. At the end of a typical 30 year period, the conversion efficiency of the cell will still be approximately 80% of its initial efficiency.

10.2 PV Emission Controls

No emission controls are necessary for a PV system.

10.3 PV Performance

The capacity factor for single axis tracking systems in North Dakota was assumed to be 24%, with an Inverter Loading Ratio (ILR) of 1.3.

Single-axis tracking systems have better capacity factors when compared to fixed tilt systems, but costs are higher for similar ILR ratios. Panel technologies may also exhibit different performance characteristics depending on the site. Thin film technologies are typically cheaper per panel, but they are also less energy dense, so it is likely that more panels would be required to achieve the same output. Further analysis would be required to select which mounting system is best suited for a given site.

10.4 PV Cost Estimates

PV cost estimates are based on recent BMcD experience and vendor information. Cost estimates are included in the Summary Table. Note that the system assumes a 1.3 DC-AC ratio with a 50 MWac output option, and a 100 MWac output option. The project scope includes a GSU with 34.5 kV at the high side and a circuit breaker.

PV installed costs were steadily declining through 2019. Since then, increase in demand, supply constraints, and general market volatility have led to increasing prices. US tariffs on PV panels and steel imports also impact PV prices. The Biden administration has extended the Section 201 tariffs on imported solar panels. However, they no longer apply to bifacial modules, and the tariff on monofacial solar panels was reduced from 18% to 15%. There have been several petitions to expand the antidumping and anti-circumvention tariffs to apply to a large portion of the module market. Over the last few years, there has been uncertainty around this tariff that would greatly impact US module supply chain, making it difficult to plan and finance projects. In 2022, Biden signed an Executive Order stating that no antidumping and anti-circumvention tariffs would be applied for at least 24 months, allowing some certainty to come back to the market. Recently, trade and supply chain headwinds have caused considerable delays in upcoming solar installations. Federal policy also affects PV costs and in recent years has spurred growth in renewable technologies. The recently passed Inflation Reduction Act allows solar projects to receive either the ITC or the PTC. The ITC, which is based on the upfront cost of a solar project, is 30% from now until 2032. Incentives can go up to 50% if the project meets prevailing wage and apprenticeship requirements, and depending on provisions for site location, local workforce, and USA material content. One of the adders to the ITC is a 10% additional credit if the solar project is sited in an "energy community," meaning places with brownfield sites or coal plant closures. The PTC is $0.0275/kWh for 2023 and will rise with inflation. For taxable entities, tax credits will be tradeable, allowing simpler monetization of tax benefits and reducing the reliance on tax equity partners.

10.5 PV O&M Cost Estimate

O&M costs for PV systems are shown in the Summary Table. O&M costs are derived from BMcD project experience and vendor information. The following assumptions also apply to PV O&M:

- O&M costs assume that the system is remotely operated and that all O&M activities are performed through a third-party contract. Therefore, all O&M costs are modeled as fixed costs, shown in terms of $MM per year.
- The capital replacement allowance is a sinking fund for inverter replacements, assuming they will be replaced once during the project life. It is a 15-year levelized cost based on the current inverter capital cost.
- O&M costs account for annual panel cleaning, security monitoring, grounds maintenance, inverter maintenance, and other routine activities.

11.0 BATTERY STORAGE TECHNOLOGY

This Assessment includes 5 MW / 20 MWh; 10 MW / 40 MWh; 50 MW / 200 MWh; and 100 / 400 MWh storage options, using lithium ion technology.

11.1 Battery Storage Description

Electrochemical energy storage systems utilize chemical reactions within a battery cell to facilitate electron flow, converting electrical energy to chemical energy when charging and generating an electric current when discharged. Electrochemical technology is continually developing as one of the leading energy storage and load following technologies due to its modularity, ease of installation and operation, and relative design maturity.

As renewable penetration increases, the variability of wind and solar resources will make energy storage pairings more attractive to utilities, developers, and customers with one or more renewable resources. Lithium-ion has been the leading technology for hybrid projects due to relative capital cost advantages. OEMs providing non-lithium technologies are continuously performing research and development activities to reduce costs through increased manufacturing scale, improved supply chain, and streamlined designs. As non-lithium costs decline, there will be more opportunities for technologies such as redox flow batteries, hybrid flow batteries, molten salt batteries, and zinc based batteries to compete directly with lithium-ion technologies. Applications that may be most competitive for non-lithium technologies may be those that require durations beyond 4-hours, or potentially 2–4-hour duration projects that call for higher cycling. For longer duration applications (> 4 hours), current lithium-ion technologies do not exhibit significant improvements in incremental capital cost ($/kWh) compared to 4-hour applications. However, technologies like flow batteries generally have considerable reductions in incremental cost efficiency for longer durations. Also, non-lithium technologies with low/minimal capacity fade will not require augmentation to maintain annual capacity guarantees, and the lower annual costs could result in lower life cycle costs compared to lithium-ion. Owners should be careful to observe capital cost, O&M cost, and the impacts of round-trip efficiency on charging costs when considering the lifetime comparisons of various technologies.

11.1.1 Conventional Batteries

A conventional battery contains a cathodic and an anodic electrode and an electrolyte sealed within a cell container than can be connected in series to increase overall facility storage and output. During charging, the electrolyte is ionized such that when discharged, a reduction-oxidation reaction occurs, which forces electrons to migrate from the anode to the cathode thereby generating electric current. Batteries are designated by the electrochemistry utilized within the cell; the most popular conventional batteries are lead acid and lithium ion batteries.

Lead acid batteries are the most mature and commercially accessible battery technology, as their design has undergone considerable development since conceptualized in the late 1800s. Although lead acid batteries require relatively low capital cost, this technology has inherently high maintenance costs and handling issues associated with toxicity, as well as low energy density (yields higher land and civil work requirements). Lead acid batteries also have a relatively short life cycle at 5 to 10 years, especially when used in high cycling applications.

Lithium ion (Li-ion) batteries contain graphite and metal-oxide electrodes and lithium ions dissolved within an organic electrolyte. The movement of lithium ions during cell charge and discharge generates current. Li-ion technology has seen a resurgence of development in recent years due to its high energy density, low self-discharge, and cycling tolerance. Many Li-ion manufacturers currently offer 15-year warranties or performance guarantees. Consequently, Li- ion has gained traction in several markets including the utility and automotive industries.

11.1.2 Flow Batteries

Flow batteries utilize an electrode cell stack with externally stored electrolyte material. The flow battery is comprised of positive and negative electrode cell stacks separated by a selectively permeable ion exchange membrane in which the charge-inducing chemical reaction occurs. Liquid electrolyte storage tanks hold the stored energy until discharge is required. Various control and pumped circulation systems complete the flow battery system in which the cells can be stacked in series to achieve the desired voltage difference.

The battery is charged as the liquid electrolytes are pumped through the electrode cell stacks, which serve as a catalyst and transport medium to the ion-inducing chemical reaction. The excess positive ions at the anode are allowed through the ion-selective membrane to maintain electroneutrality at the cathode, which experiences a buildup of negative ions. The charged electrolyte solution is circulated back to storage tanks until the process is repeated in reverse for discharge when necessary.

In addition to external electrolyte storage, flow batteries differ from traditional batteries in that energy conversion occurs as a direct result of the reduction-oxidation reactions occurring in the electrolyte solution itself. The electrode is not a component of the electrochemical fuel and does not participate in the chemical reaction. Therefore, the electrodes are not subject to the same deterioration that depletes electrical performance of traditional batteries, resulting in high cycling life of the flow battery. Flow batteries are also scalable such that energy storage capacity is determined by the size of the electrolyte storage tanks, allowing the system to approach its theoretical energy density. Flow batteries are typically less capital intensive than some conventional batteries but require additional installation and operation costs associated with balance of plant equipment.

11.1.3 High Temperature Batteries

High temperature batteries operate similarly to conventional batteries, but they utilize molten salt electrodes and carry the added advantage that high temperature operation can yield heat for other applications simultaneously. The technology is considered mature with ongoing commercial development at the grid level. The most popular and technically developed high temperature option is the Sodium Sulfur (NaS) battery.

The NaS battery is typically a hermetically sealed cell that consists of a molten sulfur electrolyte at the cathode and molten sodium electrolyte at the anode, separated by a Beta-alumina ceramic membrane and enclosed in an aluminum casing. The membrane is selectively permeable only to positive sodium ions, which are created from the oxidation of sodium metal and pass through to combine with sulfur resulting in the formation of sodium polysulfides. As power is supplied to the battery in charging, the sodium ions are dissociated from the polysulfides and forced back through the membrane to re-form elemental sodium. The melting points of sodium and sulfur are approximately 98°C and 113°C, respectively. To maintain the electrolytes in liquid form and for optimal performance, the NaS battery systems are typically operated and stored at around 300°C, which results in a higher self-discharge rate of 14 percent to 18 percent. For this reason, these systems are usually designed for use in high-cycling applications and longer discharge durations. NaS systems are expected to have an operable life of around 15 years and are one of the most developed chemical energy storage technologies.

11.2 Battery Emissions Controls

No emission controls are currently required for battery storage facilities. However, lead acid batteries may produce hydrogen off-gassing via electrolysis when charging and Li-ion batteries can release large amounts of gas during a fire event. This area is being further studied and the commercial and regulatory environment are responding to determine best practices for safe operation and mitigation of fire risks.

11.3 Battery Storage Performance

This Assessment includes the performance of a 5 MW / 20 MWh; 10 MW / 40 MWh; 50 MW / 200 MWh; and 100 MW / 400 MWh storage system, based on lithium ion batteries. Lithium ion systems can respond in seconds and exhibit excellent ramp rates and round-trip cycle efficiencies. Because the technology is rapidly advancing, there is uncertainty regarding estimates for cycle life, and these estimates vary greatly depending on the application and depth of discharge. The systems in this Assessment are assumed to perform on full cycle per day, and capacity factors are based on the duration of full discharge for 365 days.

GADS performance statistics do not cover battery storage applications, so the availability was estimated based on BMcD experience and research.

11.4 Battery Storage Cost Estimate

The estimated costs of the lithium ion battery systems are included in the Summary Tables and are based on BMcD experience and vendor correspondence. Costs are indicative of the general market trend toward modular battery designs, which include battery racks inside a purpose-built enclosure with integrated controls. The key cost elements of a battery system are the inverter, the battery cells, the interconnection, and the installation. The capital costs reflect recent trends for overbuild capacity to account for short term degradation. The battery enclosures include space for future augmentation, but the costs associated with augmentation are covered in the O&M costs. It is assumed that the system will operate at 480 V, and the scopes includes a transformer to connect at 34.5 kV.

Over the last decade, lithium-ion battery pack prices (battery modules, battery racks, and battery management system (BMS)) have declined almost 90%. Projections originally predicted that costs would continue to decline, but raw material prices and supply chain impacts are being reflected in pricing. Observed battery pricing for stationary storage projects is currently volatile, with increases seen from approximately 10%-30% year over year in 2022. Total EPC (including BESS procurements) costs are more akin to what was seen in 2020. Many in the industry believe that this a temporary environment and anticipate that the market will return to some level of normalcy within the next year or two.

Even with prices increasing, lithium-ion batteries are still the dominant technology in the energy storage market. As renewable penetration increases, the need for longer duration storage technologies is expected to increase. There are numerous technologies competing for the longer duration market, where lithium-ion's cost efficiency is expected to be weaker (note that "long duration" is an undefined term, but for this discussion is broadly characterized as greater than 4-hour discharge duration). Still, lithium-ion has been successful in longer duration bid events. In January and March of 2022, lithium-ion systems were selected for two different 8-hour long duration projects over other technologies in California. Other storage technologies have experienced slower growth than lithium-ion, partially because they lack the horsepower of the automotive and consumer products industries supporting them. However, in today's volatile pricing environment, the market is ripe for rival technologies to compete.

11.5 Regulatory Trends

Two FERC Orders provide clarity on the role of storage in wholesale markets and potentially drive continued growth. FERC Order 841, upheld in July 2020, requires RTOs and ISOs to develop clear rules regulating the participation of energy storage systems in wholesale energy, capacity, and ancillary services markets, which includes batteries as small as 100 kW connected behind-the-meter. Prior to the final release of FERC 841, the California Public Utilities Commission introduced 11 rules to determine how multi-use storage products participate in CAISO. FERC Order 842 addresses requirements for some generating facilities to provide frequency response, including accommodations for storage technologies. The recently passed Inflation Reduction Act includes extensions for popular renewable tax incentives including the PTC and ITC. It also includes an ITC for standalone storage projects that is expected to drive growth in the stationary energy storage market. Previously, storage projects needed to be paired with solar projects to achieve ITC benefits, but they can now receive them on their own. Incentives can range from approximately 6% to 50% depending on provisions for site location, local workforce, and USA material content, but further guidance from the Internal Revenue Service (IRS) may be required for additional clarity.

11.6 Battery Storage O&M Cost Estimate

O&M estimates for the lithium ion battery system are shown in the Summary Tables, based on BMcD experience and recent market trends. The battery storage system is assumed to be operated remotely. The technical life of a battery project is expected to be 15 years but overbuild and augmentation philosophies can vary between projects. Because battery costs are expected to fall, many installers/integrators are aiming for lower initial overbuild percentages to reduce initial capital costs, which means guarantees and service contracts will require more future augmentation (i.e. battery replacements or additions) to maintain capacity. Because costs should be lower in the future, the project economics should favor this approach.

O&M costs are modeled to represent the fixed and variable portions of performance guarantees and augmentation from recent BMcD project experience. Variable O&M costs also include the cost of parasitic load to run HVAC during charging cycles. During discharge, parasitic loads are treated like auxiliary loads in conventional plants and therefore are not included in VOM estimates.

12.0 FUEL CONVERSION OPTIONS

12.1 Coal to Gas Technology Description

As coal fired steam generators get older and emissions control regulations become tighter, converting the boilers to burn natural gas is a potential way to utilize the asset as a peaking power source. Most coal fired boilers can be converted to burn natural gas with few modifications. However, each boiler is unique and may present different challenges. Typically, the main components that need to be replaced or modified are the burners. Depending on the boiler type and the specific burner, the existing boilers may be convertible using gas guns or new burners. A new burner management system will control the boilers and needs to be retrofitted into the existing control system.

Natural gas must also be supplied to the site. Depending on the site location and its proximity to an existing gas pipeline, this can be a costly addition. The gas will be brought onsite into the gas yard where it will be metered and regulated. It is then piped to the boiler house and undergoes additional stages of regulation. From there it is piped to each burner.

The boiler combustion and thermodynamic characteristics will change when compared to burning coal. Depending on the original fuel design and the type of boiler, firing natural gas will have different impacts. This study assumes these impacts are minimal, but BMcD recommends that the boiler OEM or a third party develop a boiler model to confirm steam production parameters and metallurgical limitations when firing natural gas. This study provides typical cost and performance values, but these may differ depending on a more detailed boiler model. The economics presented in this report are adequate for high level screening of options, but if a coal to gas conversion looks favorable, more detailed studies should be performed to confirm these results.

Gas conversion cost and performance estimates for the four Basin plants listed below have been developed.

- Antelope Valley Station, Units 1-2
- Dry Fork Station, Unit 1
- Leland Olds Station, Units 1-2
- Laramie River Station, Units 1-3

12.2 Coal to Gas Emissions Controls

NO_x emissions are difficult to predict without a boiler model, but this study assumes 20-30% reduction from the base uncontrolled coal NO_x emissions. Typically, NO_x emissions will be lower on natural gas and the plant can "net out" when comparing past emissions to future potential emissions. This assumes no additional controls such as over fire air, flue gas recirculation, SNCR or SCR will be required for the conversion.

CO emissions can be the most problematic when permitting a coal to gas conversion. CO emissions may increase when firing natural gas depending on the burners and type of boiler. This study assumes that the CO emissions will be the same on natural gas as what they were on coal. Even if the CO emissions increase, the plant may still "net out" for CO as the units will typically operate at a lower capacity factor on natural gas.

SO_2 emissions are greatly reduced when firing natural gas as the fuel has little to no sulfur content.

Particulate emissions will also be greatly reduced when firing natural gas. Typically, any back end particulate control equipment can be decommissioned when firing natural gas. The control equipment may be operated for the initial firing of natural gas to assure that any remaining particulate in the system is removed. Past this initial startup period, the equipment can be removed from operation. CO_2 emissions will be reduced by approximately half compared to coal fired operation.

12.3 Coal to Gas Performance

Burning natural gas will be less efficient than burning PRB or Bituminous coal. Burning natural gas can actually be more efficient than burning ND Lignite, however. The main impact on boiler efficiency is from hydrogen losses due to the higher hydrogen content of the natural gas fuel. The byproduct of combusting hydrogen is water vapor, and additional heat is needed to vaporize this water and heat it to the internal boiler temperature. This heat is lost in the flue gas rather than absorbed in the boiler's water walls to create steam.

Natural gas is more efficient than coal when it comes to dry gas losses due to less combustion air and excess air. Approximately 10% excess air is needed for proper combustion of natural gas vs. 20% excess air for coal. Less flue gas flow for burning natural gas equates to smaller losses for heating the flue gas.

While the reduced natural gas-fired boiler efficiency (compared to PRB or Bituminous coal) reduces net plant output, the reduction in auxiliary power requirements for a gas-fired boiler increases the net plant output accordingly. This study assumes a 20% savings in auxiliary loads for pulverizers, coal handling, soot blowers, particulate emission controls, etc. that will not be operated on 100% natural gas.

The 100% natural gas performance impact varies depending on the design coal and type of boiler. The ND Lignite plants will actually see an improvement in performance due to higher boiler efficiencies and lower auxiliary loads. The Bituminous plants will see a small decrease in performance due to boiler efficiency impacts. Other impacts include assumed changes in steam temperature and flow. This study assumes a small decrease in steam turbine heat rate and gross output due to a change in steam flow or temperature when firing natural gas. This is a conservative assumption that must be confirmed with additional boiler studies.

12.4 Coal to Gas Cost Estimates

The fuel conversion cost results are included in the Summary Table. The project cost includes all equipment procurement, construction, and indirect costs. The project costs were developed assuming the conversion scope below.

- New natural gas burners and burner management system.
- New flame scanners.
- New gas yard and piping to boiler house and burners
- New offsite gas line based on routings provided by Basin.

The cost estimates assume no major boiler surface modifications, over fire air conversion, flue gas recirculation, or additional back end emission controls. Additional detailed studies must be performed to fully characterize the boiler modifications required for each plant.

12.5 Coal to Gas O&M Cost Estimate

O&M costs for the evaluated plants are shown in the Summary Table. The fixed O&M costs will be lower than the base coal plant costs due to reduced staffing. Staffing can be reduced significantly due to fewer systems to maintain and overall ease of operation for natural gas compared to coal.

Major maintenance costs will also be reduced from the base coal plant. The boiler will require very little maintenance while firing a gaseous fuel due to absence of erosion or slagging from ash. Back end emission controls systems will not be operated either. Steam turbine maintenance is expected to remain unchanged.

Variable O&M cost will be reduced as well. The natural gas plant will have no waste streams other than water. Water usage will be reduced as ash removal and soot blowers are no longer needed. General maintenance will also be reduced due to coal specific systems being decommissioned.

13.0 CONCLUSIONS

This Generation Technology Assessment provides information to support Basin's power supply planning efforts. Information provided in this Assessment is preliminary in nature and is intended to highlight indicative, differential costs associated with each technology. BMcD recommends that Basin use this information to update production cost models for comparison of generation alternatives and their applicability to future resource plans. Basin should pursue additional engineering studies to define project scope, budget, and timeline for technologies of interest.

Of all greenfield technologies evaluated, the simple cycle HA class plant exhibits the lowest capital cost per kW generated. The HA class turbine is a mature product, but it continues to evolve as OEMs improve the rated output and heat rate.

Aeroderivative turbines generally exhibit low heat rates, fast start and ramp rates, and reliable operation, but they also tend to be more expensive than frame units on a $/kW scale.

Reciprocating engine plants offer the lowest heat rates and fastest start times among simple cycle options. Reciprocating engine plants are also likely to exhibit the greatest capacity range among simple cycle options, with a minimum load of a single engine at 25% - 50% load. Variable O&M for engine plants is higher than frame GTs and should be considered in an analysis. It is expected that reciprocating engine plants will require SCR systems and CO catalysts to control emissions.

Combined cycle plants offer better heat rates than all other combustion plants evaluated, and the advanced class combined cycles have the lowest heat rates of those evaluated. Of the evaluated greenfield plants, the 2x1 J class option shows the lowest capital cost per kW.

PC boilers are reliable and mature coal technologies with available emissions control options. Concern over emissions from coal plants is driving permitting challenges and technology developments. Carbon capture systems have been demonstrated to reduce coal-fired CO_2 emissions to levels similar to natural gas and Basin should continue to monitor these technologies as they mature.

The future applicability of nuclear generation in this country will likely depend upon streamlined construction timelines and environmental/regulatory drivers. An emerging small modular nuclear technology offers a smaller footprint and standardized construction compared to traditional nuclear systems, which are expected to reduce overall project costs. This technology should be monitored for future technical and financial feasibility.

Renewable options include PV and wind systems. PV is a proven technology for daytime peaking power and a viable option to pursue renewable goals. Wind energy generation is a proven technology that does not depend on specific time of day.

Utility-scale battery storage systems are being installed in varied applications from frequency response to arbitrage, and cost reduction trends are expected to continue once supply chain issues settle. Lithium ion technology is achieving the greatest market penetration, aided in large part by its dominance in the automotive industry.

The fuel conversion options present relatively low-cost opportunities to leverage existing assets according to market needs and regulatory conditions. These options can be compared to the costs and performance estimates of the greenfield options to guide the focus of further studies.

APPENDIX A - SCOPE MATRIX

BASIN TECHNOLOGY ASSESSMENT UNIT ASSUMPTIONS

	Simple Cycle	Reciprocating Engine	Combined Cycle	Wind	PV	Battery Storage	PC Supercritical	Fuel Conversions	Nuclear
Project Description									
Plant Size(s):	1x ~50MW Aeroderivative GT	6x 9MW Engines	1x1 with Duct Firing (F, G/H, and J class)	200 MW Wind Farm	50 MW (Single Axis Tracking)	5 MW / 20 MWh; 25 MW / 100 MWh; 50 MW / 200 MWh (Lithium ion)	700 MW Net with 90% Carbon Capture, PRB	100% Gas Conversion in Existing Boiler	1100 MW Net APWR
	1x E, 1x F, 1x HA class GT	6x 18MW Engines	2x1 with Duct Firing (F, G/H, and J class)		100 MW (Single Axis Tracking)	100 MW / 400 MWh; 200 MW / 800 MWh (Lithium ion)	700 MW Net with Carbon Capture, ND Lignite	50% Gas Conversion in Existing Boiler	Small Modular Reactor
Fuel:	Natural Gas (Fuel Oil option)	Natural Gas (Fuel Oil option)	Natural Gas (Fuel Oil option, Hydrogen blend option)	N/A	N/A	N/A	PRB or Lignite	Natural Gas or Co-fired	Uranium
Project Location:	Greenfield Site North Dakota	Greenfield Site North Dakota	Greenfield in ND; 2x1 F at DGC	Greenfield Site North Dakota	Greenfield Site North Dakota	Greenfield Site North Dakota	Greenfield Site North Dakota	AVS, DFS, LOS, LRS Stations	Greenfield Site North Dakota
Contract Philosophy:	EPC Methodology	EPC Methodology	EPC Methodology	EPC Methodology	EPC Methodology	EPC Methodology	EPC Methodology	EPC Methodology	EPC Methodology
Project COD:	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$	No Escalation, 2023$
Labor Type:	Union Labor	Union Labor	Union Labor	Union Labor	Union Labor	Union Labor	Union Labor	Union Labor	Union Labor
Labor Incentives:	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem	50 hrs / week & $70 per day per diem
Site Description:	Greenfield	Greenfield	Greenfield	Greenfield	Greenfield	Greenfield	Greenfield	Existing	Greenfield
Scope Basis / Assumptions:									
Redundancy:	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU.	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU.	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU. 2 x 50% boiler feed pumps and ID/FD/ PA fans	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU.	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU.	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU.	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU. 2 x 50% boiler feed pumps and ID/FD/ PA fans	Existing	Reflective of typical utility service. Redundant installed components (2 x 100%, 3 x 50%) where component failure could cause outage of the plant. No spare GSU. 2 x 50% boiler feed pumps and ID/FD/ PA fans
Site Condition:	Flat, minimal rock, major foundations will require piling. No dewatering required.	Flat, minimal rock, major foundations will require piling. No dewatering required.	Flat, minimal rock, major foundations will require piling. No dewatering required.	Flat, minimal rock, major foundations will require piling. No dewatering required.	Flat, minimal rock, major foundations will require piling. No dewatering required.	Flat, minimal rock, major foundations will require piling. No dewatering required.	Flat, minimal rock, major foundations will require piling. No dewatering required.	Existing	Flat, minimal rock, major foundations will require piling. No dewatering required.
Site Elevation:	1660 ft.	1660 ft.	1660 ft.	1660 ft.	1660 ft.	1660 ft.	1660 ft.	1660 ft.	1660 ft.
Site ISO Conditions:	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH	59°F / 60% RH
Site Annual Average Conditions:	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH	41.3°F / 65.1% RH
Site Summer Peak Conditions:	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH	69.0°F / 61.7% RH
Site Winter Peak Conditions:	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH	14.2°F / 73.8% RH
Site 1% Dry Bulb Conditions:	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH	87.0°F / 43.2% RH
Water Supply:	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.	Existing	Water is available at site boundary from wells or surface water. Cost for wells or intake are excluded.
Waste Water Disposal:	Discharge offsite.	Discharge offsite.	Discharge offsite.	Discharge offsite.	Discharge offsite.	Discharge offsite.	Discharge offsite.	Existing	Discharge offsite.
Performance Basis									
Steam Design Pressure:	N/A	N/A	2400 Psia	N/A	N/A	N/A	3690 Psia (Super Critical)	Existing	Subcritical
Steam Design Temperature:	N/A	N/A	1050F/ 1050F	N/A	N/A	N/A	1080 F/ 1080 F	Existing	540 F
Inlet cooling	Evaporative Coolers	N/A	Evaporative Coolers	N/A	N/A	N/A	N/A	N/A	N/A
Heat Rejection Design:	Fin Fan Heat Exchanger	Fin Fan Heat Exchanger	Air Cooled Condenser	N/A	N/A	N/A	Air Cooled Condenser	Existing	Wet Cooling Tower
Availability Metrics	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.	GADS data for EFOR, FOF, AF, as applicable.
Fuel, Sorbent, and Ash Landfill									
Back-up Fuel:	Option for Ultra-low Sulfur Diesel	Option for Ultra-low Sulfur Diesel	Option for Ultra-low Sulfur Diesel.	N/A	N/A	N/A	N/A	Existing	N/A
Start-up Fuel:	Nat Gas / Oil	Nat Gas / Oil	Nat Gas / Oil	N/A	N/A	N/A	Fuel Oil	Existing	N/A
Fuel for Duct Burners:	N/A	N/A	Natural Gas Only	N/A	N/A	N/A	N/A	Existing	N/A
Unloading System:	N/A	N/A	N/A	N/A	N/A	N/A	Rotary Gondola Car Unloading system	Existing	N/A
Live Storage:	N/A	N/A	N/A	N/A	N/A	N/A	Open uncovered pile storage	Existing	N/A
Long-term storage:	N/A	N/A	N/A	N/A	N/A	N/A	Dead outdoor, open pile storage using mobile equipment	Existing	N/A
Fuel Oil Delivery and unloading:	Delivered by truck. Unloading station included.	Delivered by truck. Unloading station included.	Delivered by truck. Unloading station included.	N/A	N/A	N/A	Delivered by truck. Unloading station included on site	Existing	N/A
Fuel Oil Storage:	Fuel oil option includes 20 hour storage	Fuel oil option includes 20 hour storage	Fuel oil option includes 20 hour storage	N/A	N/A	N/A	500,000 gallons for coal startup	Existing	N/A
SO_2 Control Reagent:	N/A	N/A	N/A	N/A	N/A	N/A	Limestone	Existing	N/A
SO_2 Control Reagent Delivery:	N/A	N/A	N/A	N/A	N/A	N/A	Truck	Existing	N/A
SO_2 Control Reagent Storage:	N/A	N/A	N/A	N/A	N/A	N/A	Outdoor, uncovered pile	Existing	N/A
Ammonia:	19% Aqueous Ammonia delivered by truck	19% Aqueous Ammonia delivered by truck	19% Aqueous Ammonia delivered by truck	N/A	N/A	N/A	Anhydrous Ammonia delivered by truck	Existing	N/A
Mercury Sorbent Storage:	N/A	N/A	N/A	N/A	N/A	N/A	Silo	Existing	N/A
Fly Ash Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	Onsite Landfill	Existing	N/A
Scrubber Sludge / Byproduct Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	Onsite Landfill (No Gypsum Sales)	Existing	N/A
Bottom Ash Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	Onsite Landfill	Existing	N/A
Landfill Size:	N/A	N/A	N/A	N/A	N/A	N/A	5 Year cell in capital cost, balance in O&M	Existing	N/A
Landfill delivery:	N/A	N/A	N/A	N/A	N/A	N/A	Truck	Existing	N/A
Enclosures:									
Gas Turbine or Engine:	Indoors	Indoors in common engine hall	Indoors	N/A	N/A	N/A	N/A	N/A	N/A
Steam Turbine:	N/A	N/A	Indoors	N/A	N/A	N/A	Indoors	Existing	Indoors
Boiler or HRSG:	N/A	N/A	Indoors	N/A	N/A	N/A	Indoors	Existing	Indoors
Scrubber:	N/A	N/A	N/A	N/A	N/A	N/A	Outdoors	Existing	N/A
Buildings:									
Administration Building	Included	Included	Included	N/A	N/A	N/A	Included	Existing	Included
Warehouse	Included	Included	Included	N/A	N/A	N/A	Included	Existing	Included
Maintenance	Included	Included	Included	N/A	N/A	N/A	Included	Existing	Included
Misc. Equipment Enclosures	Minimal included for electrical, CEMS, etc.	Minimal included for electrical, CEMS, etc.	Minimal included for electrical, CEMS, etc.	Minimal included.	Minimal included.	Minimal included.	Minimal included for electrical, CEMS, etc.	Existing	Minimal included for electrical, CEMS, etc.

BASIN TECHNOLOGY ASSESSMENT UNIT ASSUMPTIONS

<table>
<tr><th></th><th>Simple Cycle</th><th>Reciprocating Engine</th><th>Combined Cycle</th><th>Wind</th><th>PV</th><th>Battery Storage</th><th>PC Supercritical</th><th>Fuel Conversions</th><th>Nuclear</th></tr>
<tr><td colspan="10">Emissions and Emissions Controls*</td></tr>
<tr><td>NOx Control:</td><td>DLN combustors for gas and water injection for fuel oil.</td><td>SCR</td><td>SCR</td><td>N/A</td><td>N/A</td><td>N/A</td><td>SCR (SNCR for ND Lignite)</td><td>Existing</td><td>N/A</td></tr>
<tr><td>CO Control:</td><td>Good combustion practices.</td><td>CO catalyst</td><td>CO Catalyst</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Combustion control / good combustion practice</td><td>Existing</td><td>N/A</td></tr>
<tr><td>SO_2 Control:</td><td>Low Sulfur Fuel</td><td>Low Sulfur Fuel</td><td>Low Sulfur Fuel</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Wet Limestone Forced Oxidation Scrubber</td><td>Existing</td><td>N/A</td></tr>
<tr><td>PM10 Control (filterable & condensable particulate):</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Baghouse</td><td>Existing</td><td>N/A</td></tr>
<tr><td>Mercury Control:</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Activated carbon injection into exhaust gas</td><td>Existing</td><td>N/A</td></tr>
<tr><td>VOC Control:</td><td>Good combustion practices.</td><td>Good combustion practices.</td><td>Good combustion practices.</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Good combustion practices.</td><td>Existing</td><td>N/A</td></tr>
<tr><td>CO2 Capture/Compression</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Advanced Amine Carbon Capture System</td><td>Existing</td><td>N/A</td></tr>
<tr><td colspan="10">Transmission/Interconnection:</td></tr>
<tr><td>Onsite Switchyard:</td><td>Included with positions for generators & 2 outgoing lines.</td><td>Included with positions for generators & 2 outgoing lines.</td><td>Included with positions for generators & 2 outgoing lines.</td><td>Included with positions for generators & 2 outgoing lines.</td><td>Included with positions for generators & 2 outgoing lines.</td><td>Excluded</td><td>Included with positions for generators, 2 outgoing lines and 1 additional space for startup power.</td><td>Existing</td><td>Included</td></tr>
<tr><td>Transmission:</td><td>15 miles of transmission</td><td>15 miles of transmission</td><td>15 miles of transmission</td><td>5 miles of transmission</td><td>5 miles of transmission</td><td>5 miles of transmission</td><td>15 miles of transmission</td><td>Existing</td><td>Excluded</td></tr>
<tr><td>Transmission Interconnect:</td><td>Excluded</td><td>Excluded</td><td>Excluded</td><td>Excluded</td><td>Excluded</td><td>Excluded</td><td>Excluded</td><td>Existing</td><td>Excluded</td></tr>
<tr><td>Interconnection Voltage:</td><td>345 kV</td><td>345 kV</td><td>345 kV</td><td>345 kV</td><td>34.5 kV (Distribution Voltage)</td><td>34.5 kV (Distribution Voltage)</td><td>345 kV</td><td>Existing</td><td>345 kV</td></tr>
<tr><td colspan="10">Coal Receipt:</td></tr>
<tr><td>Receiving System:</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Rail w/ on-site loop track sized for 150 car unit train</td><td>Existing</td><td>N/A</td></tr>
<tr><td>Rail Siding to Site:</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Excluded</td><td>Existing</td><td>N/A</td></tr>
<tr><td colspan="10">Miscellaneous Equipment:</td></tr>
<tr><td>Fire protection:</td><td>New Fire Pump and Emergency Diesel Backup for dedicated onsite storage</td><td>New Fire Pump and Emergency Diesel Backup for dedicated onsite storage</td><td>New Fire Pump and Emergency Diesel Backup for dedicated onsite storage</td><td>N/A</td><td>N/A</td><td>N/A</td><td>New Fire Pump and Emergency Diesel Backup for dedicated onsite storage</td><td>Existing</td><td>Excluded</td></tr>
<tr><td>Emergency Generator:</td><td>New Diesel Generator</td><td>New Diesel Generator</td><td>New Diesel Generator</td><td>N/A</td><td>N/A</td><td>N/A</td><td>New Diesel Generator</td><td>Existing</td><td>Excluded</td></tr>
<tr><td>Auxiliary Boiler:</td><td>N/A</td><td>N/A</td><td>Included</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Included</td><td>Existing</td><td>Included</td></tr>
<tr><td>Black Start:</td><td>Excluded</td><td>Excluded</td><td>Excluded</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Excluded</td><td>Existing</td><td>Excluded</td></tr>
<tr><td colspan="10">Miscellaneous Contract Costs:</td></tr>
<tr><td>Startup Spare Parts:</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Construction Indirects:</td><td colspan="9">Construction Mgmt, Engineering, Performance testing and start-up, initial fills and consumables, startup, surveys, and site security Included</td></tr>
<tr><td>Performance Bonds:</td><td colspan="9">Included</td></tr>
<tr><td colspan="10">Indirect / Owner's Indirect Costs:</td></tr>
<tr><td>Project Development</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Owner Operations Personnel Prior to COD</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Owner's Project Management</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Owner Engineering</td><td colspan="9">Excluded</td></tr>
<tr><td>Owner Legal Council</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Operator Training</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Permitting & License Fees</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Land</td><td colspan="9">Excluded</td></tr>
<tr><td>Water Supply to Site</td><td colspan="9">Excluded</td></tr>
<tr><td>Natural Gas Supply to Site</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Onsite Switchyard</td><td colspan="9">345 kV Interconnection Voltage, configuration depends on technology type. Distribution voltage for PV and battery storage options.</td></tr>
<tr><td>Transmission Interconnection</td><td colspan="9">Excluded</td></tr>
<tr><td>Labor Camp</td><td colspan="9">Assumed to not be required. Plant has local towns/ housing</td></tr>
<tr><td>Construction Power</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Fuel Consumed during Commissioning</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Power generated & sold during commissioning</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Initial Fuel Inventory</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Builder's Risk Insurance</td><td colspan="9">Allowance Included</td></tr>
<tr><td>Operating Spare Parts</td><td colspan="9">Allowance Included for critical equipment only & minor parts, as applicable. No spare GSU included.</td></tr>
<tr><td>Train Cars</td><td colspan="9">Excluded</td></tr>
<tr><td>Workshop Tools & Test Equipment</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Warehouse Shelves</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Mobile Equipment, Vehicles</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Laboratory Equipment & Furniture</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Kitchen Furniture</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Locker Room Furniture</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Building Furniture</td><td colspan="9">Allowance Included, as applicable</td></tr>
<tr><td>Owner's Contingency:</td><td colspan="9">Included @ 10% to reflect anticipated spent contingency for screening purposes. Additional contingency is recommended for budgetary estimate.</td></tr>
<tr><td>Financing Fees</td><td colspan="9">Excluded</td></tr>
<tr><td>Interest During Construction</td><td colspan="9">Excluded</td></tr>
<tr><td>Sales Tax:</td><td colspan="9">Excluded</td></tr>
<tr><td></td><td colspan="9"></td></tr>
</table>

BASIN GENERIC OPERATING COST ASSUMPTIONS

	Simple Cycle - Aero	Simple Cycle - Frame	Reciprocating Engines	Combined Cycle	Wind	PV	Battery Storage
General							
Staffing:							
Number of Personel (1st Unit):	5	5	6	1x1: 22 2x1: 25	0	0	0
Number of Personel (Incremental Units):	1	1	N/A	2x(1x1): 27	N/A	N/A	N/A
Labor Cost:	$150,000 per person per year (all in including burdens, benefits, bonuses, and overtime.)						
Operating Hours Considered:	876	876	876 & 4380	4380	N/A	N/A	N/A
Start-up / Standby Power Demand Costs:	Excluded.	Excluded.	Excluded.	Excluded.	Excluded.	Excluded.	Excluded.
Standby Power:	Included For Non-Operating Hours	Included For Non-Operating Hours	Included For Non-Operating Hours	Included For Non-Operating Hours	Included For Non-Operating Hours	Included For Non-Operating Hours	Included For Non-Operating Hours
Standby Power Cost:	$45/MWh	$45/MWh	$45/MWh	$45/MWh	$45/MWh	$45/MWh	$45/MWh
Land Lease Cost:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Property Insurance:	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
Property Tax:	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
Maintenance Considerations							
Gas Turbine / Engine Maintenance Basis	LTSA w/ OEM	LTSA w/ OEM	LTSA w/ OEM	LTSA w/ OEM	N/A	N/A	N/A
Service Director Included:	No	Yes	No	Yes	N/A	N/A	N/A
Engine Lease Agreement Included (Engine Swap)	No	N/A	N/A	N/A	N/A	N/A	N/A
SCR Replacements:	Allowance Included for 6 year life.	Allowance Included for 6 year life.	Allowance Included for 6 year life.	Allowance Included for 6 year life.	N/A	N/A	N/A
Fuel / Ash Handling Mobile Equipment:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scope Basis / Assumptions							
Water Supply Demand Cost:	Excluded						
Water Supply Cost:	Raw water assumes $0.10 / kgal. Demin water for aero simple cycle assumes $100/kgal for demin trailer.						
Water Quality Assumptions:	Suitable for use in evaportive coolers / cooling towers with 4 cycles and without any pretreatment. Standard chemical treatment for corrosion / biological growth only.						
Demineralizer System	Rental Portable Demin Trailers	Rental Portable Demin Trailers (if required)	Rental Portable Demin Trailers (if required)	Permanent On-Site RO w/ Mixed Bed Polisher	N/A	N/A	N/A
Water Discharge Treatment:	Neutralize Only for Off-Site Discharge, as applicable. ZLD option for Combined Cycles.						
Water Discharge Demand Cost:	None						
Water Discharge Cost:	None						
Fuel, Sorbent, and Ash Landfill							
SO2 Control:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limestone Costs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lime Costs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NOx Control:	DLN Combustors SCR Option Fuel Oil Operation Requires Water Injection	DLN Combustors SCR Option Fuel Oil Operation Requires Water Injection	SCR	DLN and SCR Fuel Oil Operation Requires Water Injection	N/A	N/A	N/A
Ammonia Type:	Aqueous	Aqueous	Urea	Aqueous	N/A	N/A	N/A
Mercury Sorbent Type:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercurty Sorbent Cost:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CO2 Control	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fly Ash Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Ash / Slag Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scrubber Sludge / Sulfur Byproduct Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fly Ash Disposal:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
On-Site Landfill Cost:	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CREATE AMAZING.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
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F 816-333-3690
www.burnsmcd.com

APPENDIX D – HOUSING AND LABOR STUDY

Workforce Housing Assessment Report

Basin Electric

January 10, 2025

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List of Tables

1. Introduction

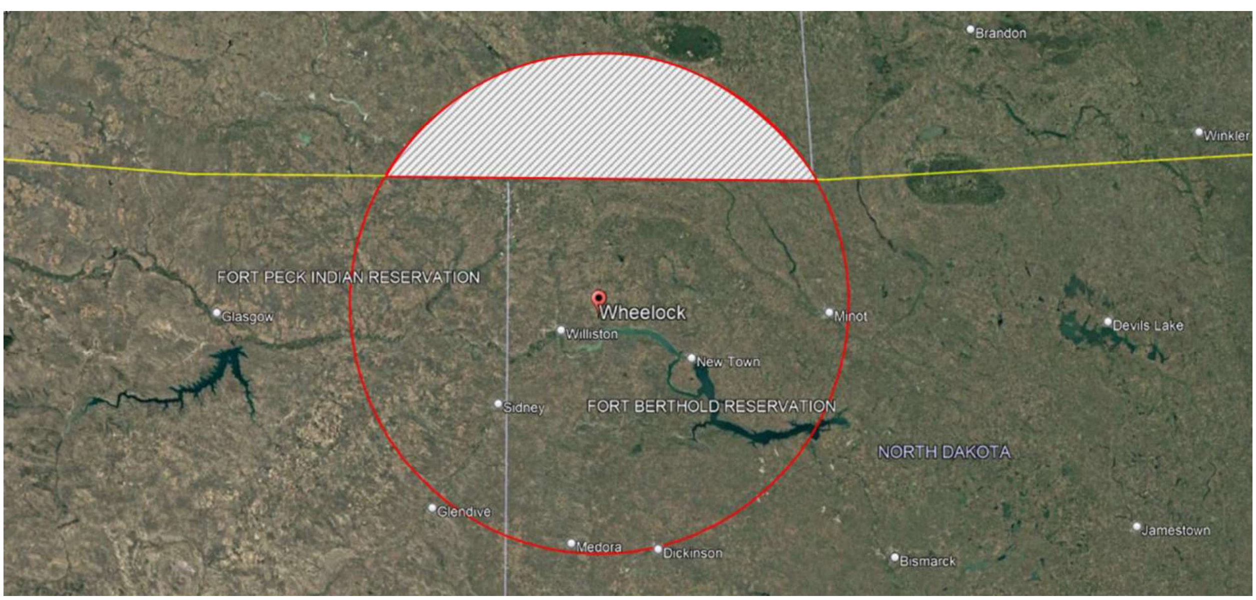
HDR was engaged by Basin Electric Power Cooperative ("Basin Electric") to conduct a housing market assessment on the current and future temporary housing inventory levels around the Williston Load Pocket Generation Project ("the Project"). The Project area is defined as a 100-mile radius from Wheelock, ND, within the U.S. border, where Basin Electric is currently pursuing to construct the facility between 2025 and 2030. Figure 1 outlines the study area.

The Project is expected to employ close to 800 craft labor workers and up to 200 field engineers and managers during construction. While it is anticipated to create significant job opportunities, it could put upward pressure on the housing demand in the region. The objective of the study is to help Basin Electric understand the current temporary housing inventory within the Project area, and identify future real estate developments, and upcoming industrial projects that could impact short term rental demand and supply during the Project development phase. The insights gained from this report can assist Basin Electric in developing an effective housing strategy for their construction and floor workers.

The rest of the report is structured as follows:

- Section 2 summarizes the existing housing inventory within the defined Project area;
- Section 3 provides an overview of planned and ongoing housing developments in the Project area, specifically focusing on temporary housing options;
- Section 4 outlines near-term industrial projects in Western North Dakota and Eastern Montana that may be built concurrently with the Project's timeframe; and,
- Section 5 concludes and offers recommendations for Basin Electric.

Figure 1: Study Area



Source: Google Earth.

2. Current Housing Inventory Overview

This section provides a review of current housing levels within 100 miles of the Project area. The analysis is split between temporary accommodations (hotels, motels, campgrounds, RV sites etc.) and single/multi-family homes.

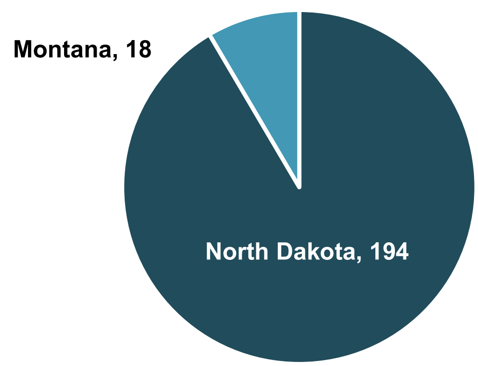
Analysis of single-family and multi-family homes are included because some construction workers might bring over their family and look to rent an apartment, condo, or house, to stay until the end of their assignment. Further, landlords of multi-residential properties may choose to split out portions of their property, such as individual rooms, to rent through short-term rental platforms (such as Airbnb). Therefore, single/multi-family home rentals could also provide alternative accommodation options for the Project construction workforce.

2.1 Temporary Housing Inventory

Temporary housing includes purpose built short-term accommodations such as hotels, RV parks, campgrounds and corporate lodging etc. As shown in Figure 2, there are **212 facilities** within the project area.

Within the Project Area, North Dakota has three cites with a population over 25,000 (Minot, Williston, and Dickinson), while Sidney, the largest city in the Montana Project Area, has a population of around 6,000[1]. Thus, due to the comparatively rural nature of Eastern Montana, around **92 percent** of temporary housing operations is situated in North Dakota.

Figure 2: Temporary Housing Facilities by State



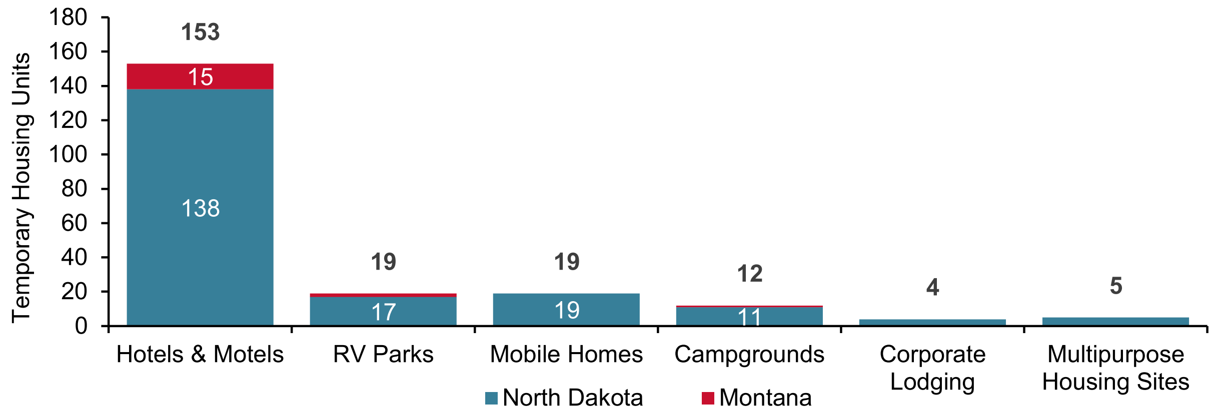
Source: Data Axle; HDR Analysis.

Figure 3 illustrates the composition of temporary housing options in the Project area. For both states, hotels and motels make up over 72 percent the total accommodation share, and is composed of hotels, motels, resorts and bed & breakfasts. This is followed by 19 RV parks and 19 mobile home sites, and 12 campgrounds[2] in the Project area. Note that while most hotels and motels offer longer-term rental options, corporate lodging caters exclusively to longer-term rentals, therefore may have additional amenities such as cooking or laundry facilities that better serve the Project's workforce.

Multipurpose housing sites are sites with a mix of the above categories. Specifically, they are exclusively in North Dakota and includes two hotels with RV parks; a hotel with a campground; a combined campground with a mobile home site; and a mobile home with a RV park site.

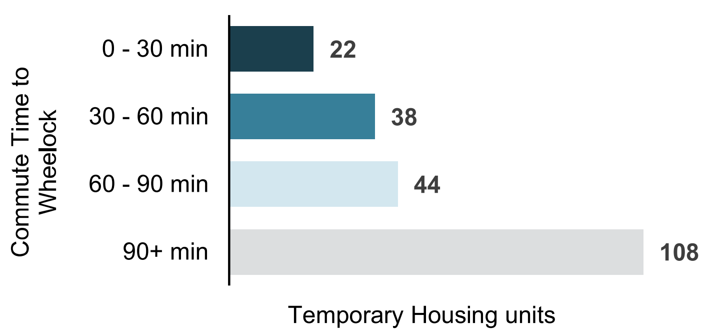
[1] United States Census Bureau. (2024, May). *City and Town Population Totals: 2020-2023.* https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-cities-and-towns.html
[2] Campgrounds in ND State Parks is limited to brief stays only as they impose a 14-night limit in any 30-day period.

Figure 3: Temporary Housing Facilities by Accommodation Type



Source: Data Axle; HDR Analysis.

Figure 4: Temporary Housing Facilities by Commute Time



Source: Data Axle; HDR Analysis.

Since two major cities (Minot and Dickinson) and a major tourist attraction (Theordore Roosevelt National Park) are located within but on the outer bounds the Project area, most of the temporary housing accommodations (around 72 percent) are situated more than an hour's drive away from the Project. Further, the South of Wheelock is surrounded by Lake Sakakawea, with only one bridge at New Town, access to areas such as Watford require substantial detours through Williston, limiting the area with commutes less than an hour. Accommodations within an hour drive are clustered in Williston and Tioga, making up 60 percent of the total accommodations in this criterion.

Figure 5 depicts the current temporary housing options identified in the Project area, denoted by the non-shaded part of the dotted area. The color of each bubble represents the accommodation type, and the size denotes the count of the specified facilities. Three contour lines orbiting around Wheelock illustrate the driving distance to the Project site, at 30-minute intervals. The table to the right shows the count of accommodations for each location.

Parkview Mobile Home Park, located in Minot, is excluded from the temporary housing analysis. Due to a nearby flood prevention project, the site with 136 lots[3] is slated to close in late 2025 to 2026. The city is negotiating with the lot for a specific closure date and relocation assistance.[4]

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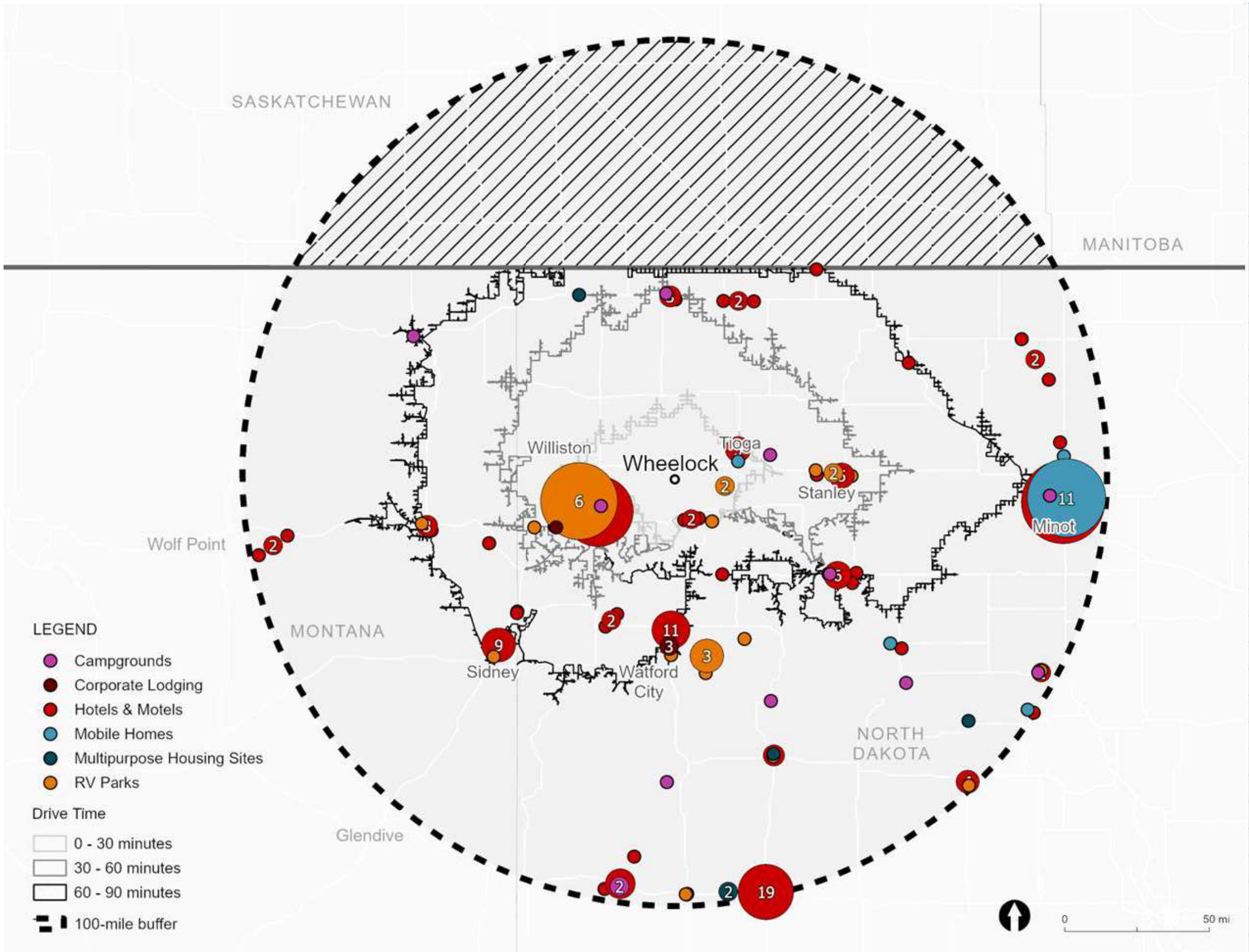
[3] MH Village. (n.d.). *Parkview Mobile Home Park.* https://www.mhvillage.com/parks/17929
[4] Kwaw, C. (2024, May 13). *Residents of Minot's Parkview Mobile Home notified of future closure for flood project.* https://www.kfyrtv.com/2024/05/13/residents-minots-parkview-mobile-home-notified-future-closure-flood-project/

Figure 5: Temporary Housing Facilities by Accommodation Type and Location



City/Town/Locality	Total
Minot	45
Williston	39
Dickinson	20
Watford City	17
Medora	9
New Town	8
Sidney	8
Tioga	7
Killdeer	6
Beulah	6
Stanley	5
Garrison	5
Crosby	4
Culbertson	4
Ray	3
Belfield	3
Fairview	2
Ross	2
Alexander	2
Parshall	2
Bainville	1
Wolf Point	1
Fairfield	1
Plentywood	1
White Earth	1
Columbus	1
Mohall	1
Lansford	1
Poplar	1
Kenmare	1
Pick City	1
Fortuna	1
Portal	1
Noonan	1
Hazen	1

Source: Data Axle; Esri GIS Mapping; HDR Analysis.

2.2 Single-Family and Multi-family House Inventory

Permanent houses include detached houses, townhouses, multiplexes, apartments and condominiums, but exclude temporary accommodation such as mobile homes. These units might be suitable for construction workers hoping to relocate with their family closer to the jobsite for the duration of their contract.

Table 1 shows the permanent housing units by occupancy status within the Project area in 2020. 82 percent of the housing units are occupied, while **18 percent** of the housing units are vacant. The above vacancy rate is above the national average of 9.7 percent for the same census year.[5]

Table 1: Permanent Housing Units by Occupancy Status

Housing Units by Occupancy Status	Census 2020	
	Number	Percent
Occupied	78,873	82%
Owner	*45,791*	*48%*
Renter	*33,082*	*35%*
Vacant	16,913	18%
Total	**95,786**	**100%**

Source: 2020 United States Census; HDR Analysis.

Of the housing units that are occupied, around 58 percent of the housing units are occupied by the owner, and 42 percent are occupied by the renter, suggesting a higher rate of ownership.

Table 2: Vacant Housing

Vacant Housing Units by Status	Census 2020	
	Number	Percent
For Rent	7,031	42%
Rented - Not Occupied	533	3%
For Sale Only	1,170	7%
Sold - Not Occupied	594	4%
Seasonal/Recreational/Occasional	3,301	20%
For Migrant Workers	414	2%
Other Vacant	3,870	23%
Total	**16,913**	**100%**

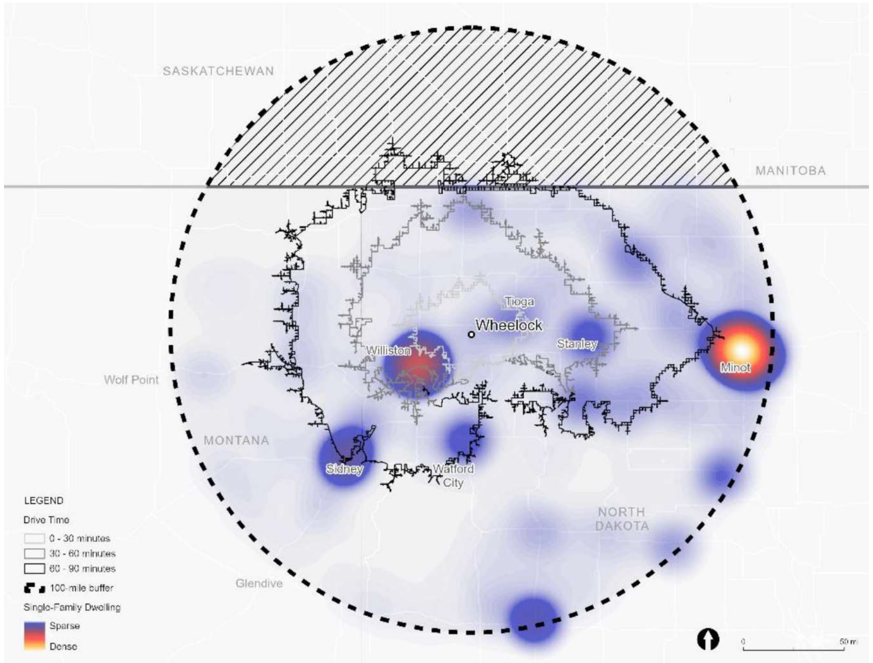
Source: 2020 United States Census; HDR Analysis.

Table 2 further splits the vacant housing into seven categories. Most of the vacant housing is for rent, which accounts for 42 percent of the total vacant units. The second source of vacancy arises from seasonal/recreational/occasional use, owning to higher tourism, farming, and construction activities in the summer months, this also applies to housing units for migrant workers, albeit at a much lower percentage of 2 percent as opposed to a-fifth of the vacant housing units for the former.

"Other vacant" mainly encompasses vacant units where the owners are currently undergoing repairs, does not want to rent nor sell, using the unit for storage purposes, or is elderly and is currently living in a nursing home or with family elsewhere.

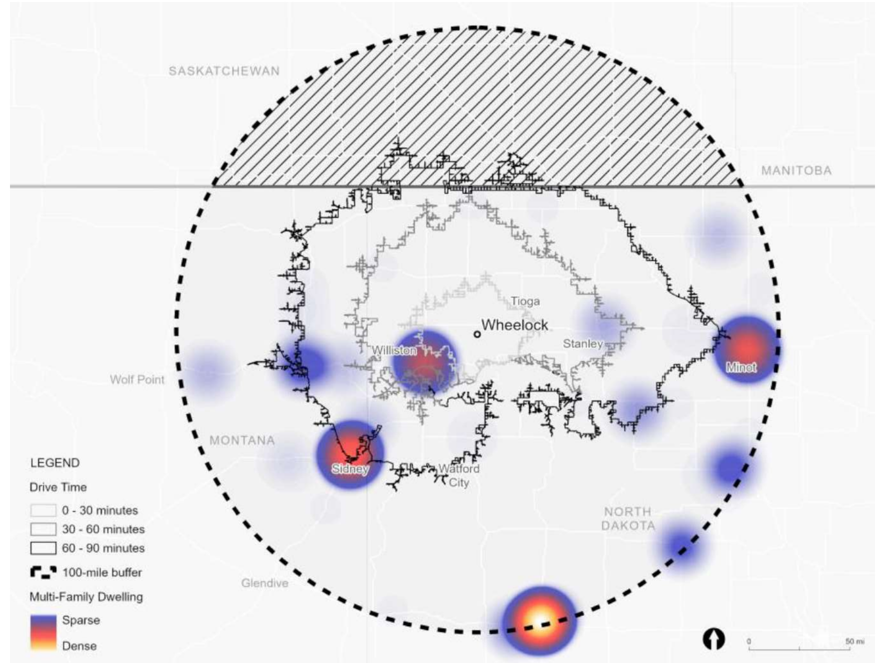
[5] Brassell, E. (2021, August 12). *In 2020, 9.7% of Housing Was Vacant, Down From 11.4% in 2010.* https://www.census.gov/library/stories/2021/08/united-states-housing-vacancy-rate-declined-in-past-decade.html#:~:text=The%20decennial%20census%20collects%20information,was%20in%202000%20(9.0%25).

Figure 7: Density of Single-Family Dwellings by Location



Source: FEMA; Esri GIS Mapping; HDR Analysis.

Figure 6: Density of Multi-Family Dwellings by Location



Source: FEMA; Esri GIS Mapping; HDR Analysis.

Single-family dwellings include fully detached, semi-detached, duplexes, quadruplexes and townhouses where units are separated by a ground-to roof wall, have separate heading systems, have individual utility meters, and have no units above or below. If a dwelling does not fall under this definition, such as condominium and apartment buildings, it will be considered a multiple-family dwelling.[6]

Figure 7 maps the density of single-family dwellings in the Project area, where blue to bright orange, represents the density of single-family house dwellings from most sparse to most dense. The contour lines of driving times are given in the same manner as Figure 5. Areas of high density largely mirror the availability of temporary housing in Figure 5, with the areas centering in the cities of Minot, Williston, Dickinson and Sidney. Only a few denser areas, such as Williston, Stanley and Tioga, are located within an hour's drive.

[6] United States Census Bureau. (n.d.). *Definitions - Survey of Construction.* https://www.census.gov/construction/chars/definitions/index.html

Figure 6 shows a similar heatmap, but for multi-family dwellings. The areas of high-density remain similar to larger cities in the region, except for Culbertson, MT, just within the 90 min-drive border, which has a relatively higher density for multi-family dwellings compared to single-family dwellings in the area. Outside of major cities or towns, there are virtually no multi-family dwellings, further highlighting the rural nature of Eastern Montana and Western North Dakota.

Multi-family dwellings, especially condos and apartments, might provide a better gauge of rental availability for construction workers, especially if they are moving temporarily. There is usually a higher rental availability for condos and apartments compared to houses, and these units are typically more affordable and best suited for their needs. Just like the temporary accommodations summarized in Section 2.1 and single-family dwellings described above, most multi-family dwellings are situated beyond a 90-minute drive from Wheelock.

3. Temporary Housing Supply Outlook

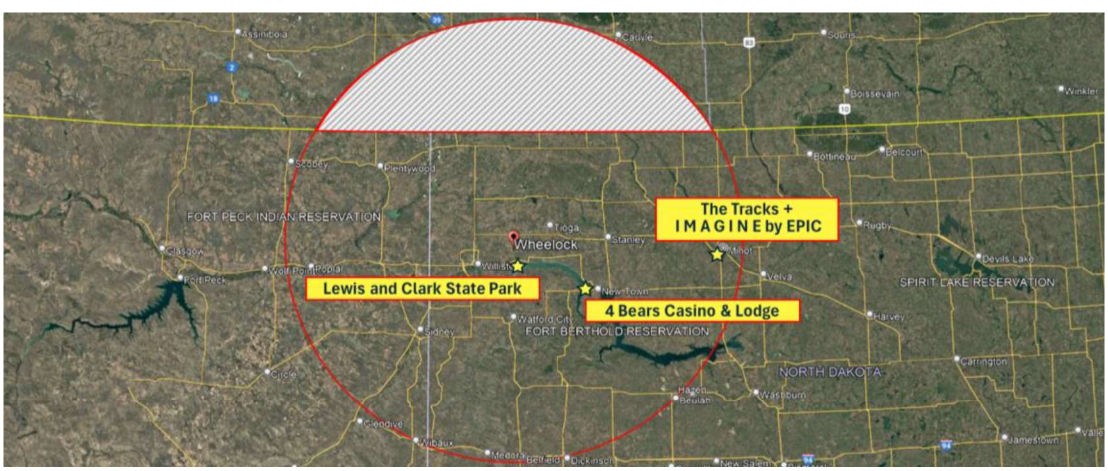
This section provides an overview of future housing developments within the Project area, including their location, size, and construction timeframes, if available, as outlined in Table 3. The remainder of this section provides a detailed overview for each of the facilities. These upcoming housing developments could expand the temporary housing inventory in the Project area, and provide additional accommodation options for the Project workforce.

Due to the rural location of the Project, and the bankruptcy of one of the largest developers of the state (EPIC Companies), there are limited temporary housing developments in the Northwestern North Dakota and Northeastern Montana area, with an expansion of an existing Native American casino and hotel complex, and utility upgrades to state park campgrounds. Figure 8 depicts the location of each future development.

Table 3: Housing Developments Summary

Facility	Location	Distance to Wheelock[7]	Description	Current Status
4 Bears Casino & Lodge	New Town	67 mi	Demolition and construction of larger facility with 90 additional guest rooms	Started construction, expected completion in June 2025
The Tracks	Southwest Minot	98 mi	7 mixed-use buildings with 367 apartment/condo units	Developer filed for bankruptcy; work stalled; planned reactivation
I M A G I N E by Epic	Southwest Minot	98 mi	110-140 room hotel	Developer filed for bankruptcy; work stalled; planned reactivation
Lewis and Clark State Park	Williams County	13 mi	Electric and water upgrades	Reduced campsite availability starting 9/9/2024

Figure 8: Locations of Neighboring Hosing Developments



Source: Google Earth.

[7] Google Maps.

3.1 4 Bears Casino & Lodge

Location

The 4 Bears Casino & Lodge is located within the Fort Berthold Reservation in New Town, ND. Due to its proximity to the intersections of highway ND 23 and ND 1804, it is about a 67-mile or 75-minute drive to the Project site. Around the site, there is a park with RV spaces with over 84 full-service hookups available on a seasonal basis. There are restaurants, gas stations and grocery stores across the bridge closer to the center of New Town.

Figure 9: 4 Bears Casino & Lodge Construction Progress

Source: 4 Bears Casino & Lodge.

Development Description

In the $95 million expansion, the current two-story hotel will be demolished to make way for the new **7-story hotel with 90 guest rooms**. Along with the hotel, the new complex will feature new gaming areas, office space, meeting rooms, wellness facilities, and a sports bar with dining rooms.[8]

Current Status

Demolition has begun as of March 2023, with construction beginning in June of the same year and a scheduled completion in the summer of 2025.[9]

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[8] Brovold, A. (2023, February 28). *4 bears casino starts renovation to add 7-story hotel.* https://www.valleynewslive.com/2023/02/28/4-bears-casino-starts-renovation-add-7-story-hotel/

[9] Minot Daily News. (2023, March 2). *4 Bears Casino & Lodge's $95M project includes new hotel tower.* https://www.minotdailynews.com/news/local-news/2023/03/4-bears-casino-lodges-95m-project-includes-new-hotel-tower/

3.2 The Tracks and I M A G I N E by Epic

Location

The Tracks is in southwest Minot, across the street from the new Trinity Hospital.[10] To get to the project site, it is approximately 98 miles or 1h 40min drive through highway ND2.

Figure 10: One of the Buildings as Part of The Tracks First Phase

Source: EPIC Companies.

Development Description

The Tracks project consists of over seven buildings with **367 apartment/condo units**, commercial business space and public plaza space.[11] The Tracks project is scheduled to be completed in 2026.[10]

The I M A G I N E hotel will also have a planned opening date of 2026 and will be situated on the same site as the Tracks. The hotel will have between **110 to 140 rooms**, and feature fitness, dining and conference amenities.[12]

Current Status

Development of the Tracks and the adjoining I M A G I N E site stopped following a sudden closure and bankruptcy filings of EPIC companies, with the future of the projects remaining unknown.[13] Some completed EPIC managed properties are taken over by other companies and

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[10] Stewart, J. (2022, February 25). *The Tracks Development Coming to Minot.* https://mydakotan.com/2022/02/the-tracks-development-coming-to-minot/
[11] Schramm, J. (2023, January 4). *City council approves tax incentive for The Tracks.* https://www.minotdailynews.com/news/local-news/2023/01/city-council-approves-tax-incentive-for-the-tracks/
[12] Minot Daily News. (2023, June 16). *EPIC Companies plans to build Minot hotel.* https://www.minotdailynews.com/news/local-news/2023/06/epic-companies-plans-to-build-minot-hotel/
[13] Crane, C. (2024, October 26). *Lawsuit filed against former EPIC CEO.* https://www.minotdailynews.com/news/local-news/2024/10/lawsuit-filed-against-former-epic-ceo/

continue to be operational.[14] However, as of December 2024, a group of developers overseeing other ex-EPIC developments, obtained a building permit in hopes of reactivating and advancing the project.[15]

3.3 Lewis and Clark State Park

Location

The Lewis and Clark State Park is situated in Williams County, 13 miles south of Wheelock by 119th Ave NW and by the upper bay of Lake Sakakawea. Driving time to the Project site takes approximately 20 minutes.

Figure 11: Lewis and Clark State Park

Source: North Dakota Parks & Recreation

Project Scope

The North Dakota Parks and Recreation department is adding individual water hydrants and upgrading the current rating of power systems for select campgrounds. Specifically, campsites 1-73 (Sandstone and Limestone Loops) will undergo upgrades, with campsites 1-12 (Sandstone Loop) experiencing electrical upgrades in addition.[16]

Current Status

According to the State Park website, upgrade works for selected parks, including the Lewis and Clark State Park, start on September 9th, 2024. Which could result in reduced availability during this time. No timeframe of completion is given as of yet. The park is anticipated to be fully upgraded before the Project construction starts in 2025, with an enhanced appeal to the Project workforce.

Duration of Stay Limitations

For campsites operated by North Dakota Parks and Recreation, campsite and cabin stays are limited to 14 nights in any 30-day period. Thus, North Dakota State Parks are only a viable option for very-short-term situations.[17]

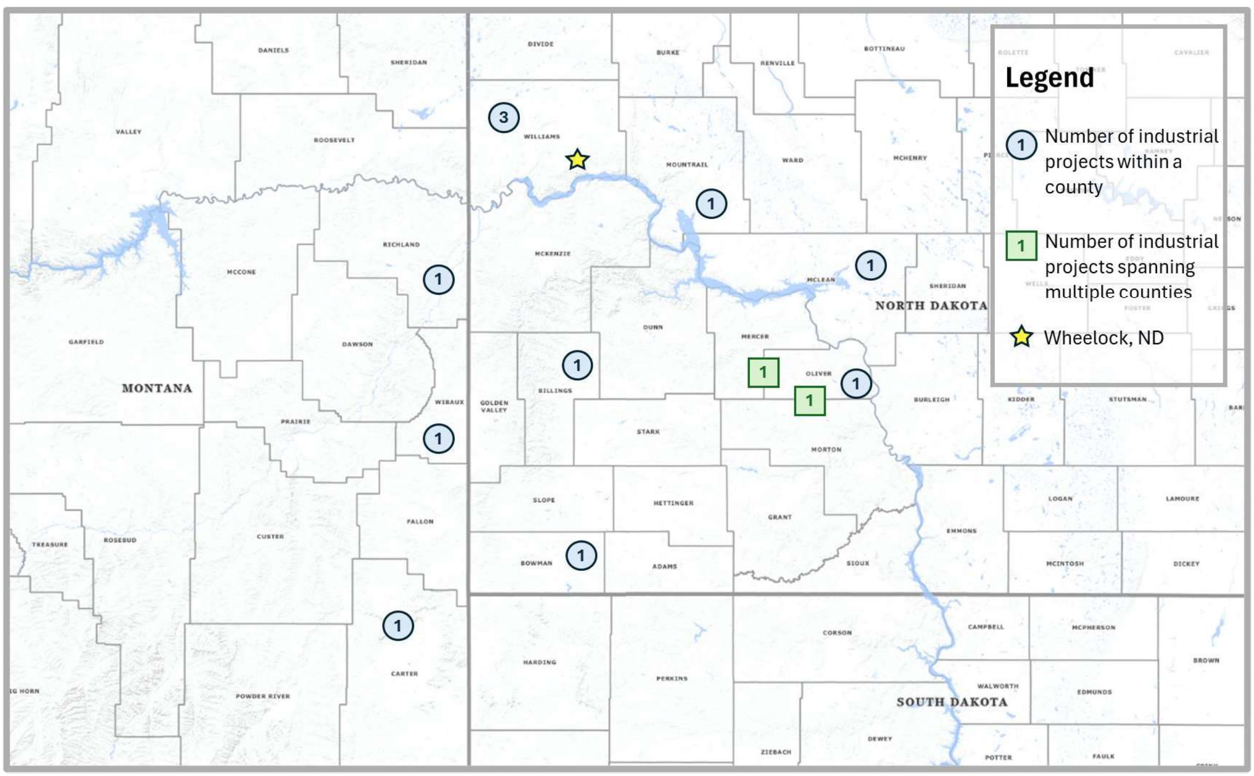
[14] Brown, K. (2024, July 9). *EPIC Companies files for bankruptcy, declaring assets & liabilities up to $50M.* https://www.kxnet.com/news/state-news/epic-companies-files-for-bankruptcy-declaring-assets-liabilities-up-to-50m/
[15] Schramm, J. (2024, December 21). *Efforts underway to keep EPIC projects alive.* https://www.minotdailynews.com/news/local-news/2024/12/efforts-underway-to-keep-epic-projects-alive/
[16] North Dakota Parks & Recreation. (2024, June 28). *Electrical and water upgrades at select state parks coming this fall.* https://www.parkrec.nd.gov/news/electrical-and-water-upgrades-select-state-parks-coming-fall/
[17] North Dakota Parks & Recreation. (2024, June 28). *Common Questions.* https://www.parkrec.nd.gov/faq

4. Upcoming Industrial Projects Overview

This section provides an overview of industrial projects in the planning or construction phase, that are in either Western North Dakota or Eastern Montana. These industrial projects are likely to come online before 2030, putting upward pressure on the temporary housing demand in the Project area.

Due to the prevalence of Green Energy grants and the electrical transmission line upgrades, such as the upcoming North Planes Connector in Montana and North Dakota, which bridges the Eastern and Western power grids[18], the majority of new projects center around solar, wind, natural gas and carbon storage.

Figure 12: Map of New Industrial Projects in Eastern Montana and Western North Dakota



Source: United States Census Bureau, 2022 Economic Census Reference Map.

Table 4 outlines upcoming industrial projects, including each facility's location, category, scope, status, and facility capacity if available. The remainder of this section provides a detailed overview for each of the projects.

[18] Wolfe, S. (2024, December 16). *NorthWestern Energy joins 420-mile North Plains Connector transmission project.* https://www.power-grid.com/td/transmission/northwestern-energy-joins-420-mile-north-plains-connector-transmission-project/

Table 4: New Industrial Projects Summary

Facility	Location	Category	Scope	Current Status	Capacity
Discovery Wind Farm	McLean County, ND	Power Generation Plant	Wind	Permit denied, seeking for next steps	426 megawatts
Flat Rock Wind Project	Morton & Oliver Counties, ND		Wind	In development, pre-construction	300 megawatts
Homestead Wind Farm	Williams County, ND		Wind	Currently undergoing feasibility studies	255 megawatts
Mountrail Wind Project	Mountrail County, ND		Wind	In development, pre-construction	300 megawatts
Wibaux Wind Farm	Wibaux County, MT		Wind	Construction is proposed to start early as spring 2025	235 megawatts
Sundog Solar Project	Bowman County, ND		Solar	Plans to start construction in 2026 and finish in 2027	250 megawatts
Fairview 1 Solar Project	Richland County, MT		Solar	Earliest completion between Mar 2026 to Dec 2026	74.5 megawatts
BLM Oil and Gas Lease Sale	ND and MT BLM Lands	Oil & Gas Plant	Oil and Gas Drilling	Announced	N/A
EOR Etc.	Williams County, ND		Enhanced Oil Recovery	Ongoing research	1,300 extra barrels/injection
Davis Refinery Project	Billings County, ND		Clean Transport Fuels	Field Construction underway in 2025	49,500 barrels per day
Cerilon GTL Project	Williams County, ND	Natural Gas Processing	GTL[19] Refinery and CCS[20]	Targeted startup in 2028, full operations of Phase 1 in 2029	24,000 barrels per day
Project Tundra	Oliver County, ND		CCS	Awaiting final construction decision	4M tons CO_2/year
Summit Carbon Solutions	Mercer & Oliver Counties, ND		CCS	Construction of the project would occur between 2026 and 2027	352M tons CO_2/ 20 years
Snowy River Project	Carter County, MT		CCS	Under environmental review by the Bureau of Land Management	150M tons CO_2/ 20 years

[19] Gas to Liquids
[20] Carbon Capture and Storage

4.1 Power Generation Plant - Wind

Discovery Wind Farm

The Discovery Wind Farm is being developed by Apex Clean Energy, in rural Mclean County, ND. Apex Clean Energy is planning to hire hundreds of jobs during construction, and up to 8 full-time jobs when the farm is operational for over 30+ years.[21] In the proposal, the wind farm has over 94 turbines with a combined potential output of 426-megawatts. However, in April 2024, the McLean County Commission had a unanimous decision to deny a preliminary project area permit. The Apex spokesperson stated that they are evaluating their next steps for the siting process.[22]

Flat Rock Wind Project

The Flat Rock Wind Project is in the pre-construction phase, and is being developed by Enel Green Power, in Morton and Oliver counties, ND. The proposed facility has an estimated output of 300-megawatts.[23]

Figure 13: Rendering of the Flat Rock Wind Project

Source: Enel Green Power.

Homestead Wind Farm

Homestead Wind Farm is currently undertaking feasibility studies by Apex Clean Energy. In rural Williams County, ND. It has an energy generation potential of 255-megawatts and like the Discovery Wind Farm, they are planning to hire hundreds of jobs during construction and have a 30+ year operation period. Apex will hire approximately 15 full-time jobs for operations and maintenance work.[24]

Mountrail Wind Project

The Mountrail Wind Project is a 300 megawatt currently in-development by Enel Green Power. The proposed wind project is located in Mountrail County, ND.[25]

Wibaux Wind Farm

The AES Corporation is proposing to construct the Wibaux Wind Farm, 1.5 miles west of the town of Wibaux, Montana. Alongside the 235-megawatt wind farm, a 50-megawatt battery

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[21] Discovery Wind. (n.d.). *Discovery Wind Project Profile.* https://www.discoverywindenergy.com/about_discovery
[22] Harris, J. (2024, April 18). *Permit for large wind farm near Coal Creek rejected; project was part of effort to save plant.* https://bismarcktribune.com/news/state-regional/zoning-permit-wind-farm-coal-creek-turned-down/article_eef39cec-fc01-11ee-a22d-f7426ca72325.html
[23] Enel Green Power. (n.d.). *Flat Rock Wind Project, USA.* https://www.enelgreenpower.com/our-projects/in-development/flat-rock-wind-project
[24] Homestead Wind. (n.d.). *About Homestead Wind.* https://www.homesteadwind.com/about_homestead
[25] Enel Green Power. (n.d.). *Mountrail Wind Project, USA.* https://www.enelgreenpower.com/our-projects/in-development/mountrail-wind-project

energy storage system is slated to be constructed on the same site. During the two-year construction phase, proposed to occur between 2025-2027, up to 200 jobs are expected to be created during the peak construction period. The facility is planned to be operational in 2027 and hire up to five permanent personnel for operations.[26]

4.2 Power Generation Plant - Solar

Sundog Solar Project

The Sundog Solar Project is a planned 250-megawatt solar farm in Bowman County, ND. It is being developed by the AES corporation, with a planned construction date in 2026, and is projected to commence commercial operations the following year. The corporation plans to generate hundreds of jobs during peak construction and several full-time operations jobs following the opening of the farm.[27]

Fairview 1 Solar Project

The Fairview 1 Solar Project is located west of Fairview, Richland County, Montana. The 74.5-megawatt solar farm and a 25-megawatt battery storage project is being undertaken by Stellar Renewable Power.[28] Stellar indicates that they expect 100 construction jobs to be created, and the earliest possible completion of the project is in the March 2026 to December 2026 timeframe.[29]

4.3 Oil and Gas Plant

BLM Oil and Gas Lease Sale

The Bureau of Land Management (BLM) announced in November 2024 it is seeking to lease over 13 oil and gas parcels totaling 1,324 acres across North Dakota and Montana.[30] The parcel leasing opportunity could attract developers to North Dakota and Montana, sparking a surge in oil and gas extraction projects.

EOR Etc.

EOR Etc., a startup enhanced oil recovery (EOR) company, is running pilot programs on their EOR technology in Tioga, ND. The company was able to recover an extra 1,300 barrels per injection cycle. Other companies such as Continental Resources, XTO, and Hess, who all have operations in North Dakota, are experimenting with similar technologies. The technology has great potential in the Bakken shale formation, and the lowered costs from this technology can

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[26] AES. (n.d.). *Wibaux wind farm.* https://www.aes.com/montana/project/wibaux-wind-farm
[27] AES. (n.d.). *Sundog Solar.* https://www.aes.com/north-dakota/project/sundog-solar
[28] Western Area Power Administration. (n.d.). *Fairview 1 Solar Project.* https://www.wapa.gov/about-wapa/regions/ugp/fairview-solar-project/
[29] RoundupWeb (2024, November 13). *Stellar Renewable Resources Outlines Fairview 1 Solar Project To Richland County Commissioners.* https://www.roundupweb.com/story/2024/11/13/news/stellar-renewable-resources-outlines-fairview-1-solar-project-to-richland-county-commissioners/21531.html
[30] Bureau of Land Management. (2024, November 6). *BLM announces January 2025 oil and gas lease sale in Montana and North Dakota.* https://www.blm.gov/announcement/blm-announces-january-2025-oil-and-gas-lease-sale-montana-and-north-dakota

increase the competitiveness of North Dakota oil fields, ultimately stimulating an increase in industrial projects in the coming years, much like the 2000s horizontal drilling boom.[31]

Davis Refinery Project

The Davis Refinery, a net-zero crude oil refinery that is being built in west of Belfield, Billings County, North Dakota by Meridian Energy Group. It has a throughput of 49,500 barrels-per-day and utilize eco-friendly technology to produce ultra clean transportation fuels. Meridian is currently improving roads, to prepare for heavy equipment, process modules, and construction materials delivery by Spring 2025.[32]

4.4 Natural Gas Processing

Cerilon GTL Project

Cerilon Inc. is developing a gas-to-liquids plant in Trenton, Williams County, ND. The company received regulatory approval on the final citing permit for the facility that converts the state's natural gas supplies, into 24,000 barrels of synthetic products per day, such as ultralow-sulfur diesel (ULSD), naphtha, and Group III+ lubricant base oils. The project also includes a carbon capture and sequestration (CCS) facility and have the option of producing sustainable aviation fuel.

Figure 14: Rendering of the Cerilon GTL Project

Source: Cerilon.

The plant is scheduled to start-up in 2028, and full operations is planned to commence in 2029. Once the plant is operational, the plant has potential to produce and supply excess electricity to the power grid.

A second phase of the GTL project is in the regulatory approval stage, and the company forecasts that a final investment decision for the next phase will be made in mid-2026.[33]

Project Tundra

Project Tundra is a CCS project led by Minnkota Power Cooperative, along with Mitsubishi Heavy Industries, Kiewit and EERC. It is planning to develop ways to capture 4 million metric

[31] Beach, J. (2024, November 6). *Pilot projects seek to unlock enhanced oil recovery in North Dakota.* https://northdakotamonitor.com/2024/05/14/pilot-projects-seek-to-unlock-enhanced-oil-recovery-in-north-dakota/
[32] GlobeNewswire. (2024, October 29). *Meridian Energy Group Inc. Announces Field Construction Resumed at Davis Refinery Site in North Dakota.* https://www.globenewswire.com/news-release/2024/10/29/2970859/0/en/Meridian-Energy-Group-Inc-Announces-Field-Construction-Resumed-at-Davis-Refinery-Site-in-North-Dakota.html
[33] Brelsford, R. (2024, October 1). *North Dakota approves permit for Cerilon's proposed GTL complex.* https://www.ogj.com/refining-processing/gas-processing/new-plants/article/55172830/north-dakota-approves-permit-for-cerilons-proposed-gtl-complex

tons of carbon dioxide from their Milton R. Young coal-fired power station close to Center, Oliver County, ND. A 2025 initial start date for construction and an operational date of 2029 is listed on their website.[34] In late 2024, TC Energy Corporation, one of the main developers of the project, withdrew from the project, prompting speculations of the project experiencing further delays. According to Minnkota Power Cooperative's spokesperson, progression heavily depends on funding and passing the economic and regulatory hurdles the project faces.[35]

Summit Carbon Solutions

Partnering with 57 ethanol plants in North Dakota, South Dakota, Iowa, Minnesota and Nebraska, Summit Carbon Solutions is planning to build a 2,500-mile pipeline system that connects the plants to three underground carbon dioxide storage facilities in Mercer and Oliver counties, ND. The North Dakotan regulators recently approved the three proposed storage sites, and the company is in the process of securing approval for their pipelines.

The storage facilities could hold up to 352 million metric tons of carbon dioxide over 20 years, and the project is expected to start construction in 2026, and be operational in 2027.[36]

Snowy River Project

The Snowy River Carbon Dioxide Sequestration Project by ExxonMobil is currently in its fourteenth year of development, and has a subsurface footprint of around 110,000 subsurface acres from Ekalaka and the MT-WY border in Carter County, MT. The CCS facility is planned to pump around 150 million tones of carbon dioxide over 20 years. The project is currently under environmental review by the Bureau of Land Management.[37]

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[34] Project Tundra. (n.d). *The Heartland's Solution for Decarbonization - Project Tundra. https*://www.projecttundrand.com/
[35] Zacks Equity Research. (2024, December 3). *TC Energy Exits North Dakota's $2 Billion Carbon Capture Project.* https://finance.yahoo.com/news/tc-energy-exits-north-dakotas-122700772.html
[36] Dura J. & Karnowski S. (2024, December 12). *North Dakota regulators OK underground storage for proposed Midwest carbon dioxide pipeline.* https://apnews.com/article/north-dakota-minnesota-carbon-capture-pipeline-397e372772ed7b4204274fc443a02e60#:~:text=December%2012%2C%202024-,BISMARCK%2C%20N.D.,drawn%20fierce%20opposition%20from%20landowners.
[37] Lutey, T. (2024, February 19). *Massive ExxonMobil carbon capture project in Eastern Montana Reviewed.* https://billingsgazette.com/news/state-regional/government-politics/exxonmobile-carbon-capture-southeast-montana/article_99230f12-cfa3-11ee-8dc7-df9e6254865f.html

5. Conclusions and Recommendations

Within the 100-mile radius from the Williston Load Pocket Generation Project, there are over two hundred temporary housing options, with the majority being hotels & motels. In 2020, the census stated that over seven thousand vacant housing units are listed for rent in the same studied area. Most of the temporary and permanent housing units lie within North Dakota, and cluster in major cities such as Williston, Dickinson and Minot. Owning to geographical features, settlement patterns and highway layouts, most of the housing options are over a 60-minute drive from the Project site, with two of the three major cities of the area (Dickinson and Minot) lying just within the radial boundary. Williston, alongside Tioga and Stanley are population centers with significant housing offerings within an hour's drive from the Project.

For future housing supply, there are no substantial changes in the near term apart from the opening of the expanded 4 Bears Casino & Lodge in the summer of 2025. Providing an additional 90 guest rooms 75 minutes away from Wheelock. However, this could be offset by the closure of the Parkview Mobile Home Park in Minot, where 136 existing mobile homes are being vacated for a flood prevention project from late 2025 to 2026.

According to the North Dakota Tourism & Marketing Commerce, the average statewide hotel occupancy rate was 57.6 percent as of 2023.[38] Even though the short-term temporary housing inventory is expected to remain relatively stable, hotels are far from reaching full-capacity and are anticipated to accommodate additional demand. Nonetheless, it is important to note that many construction and tourism activities in the state might be seasonal, with peak activity in the summer months. Therefore, the Project's workforce is recommended to start searching for accommodations at least six months in advance, or as soon as they receive a specified contract start date, to secure their place for the duration of their stay.

In addition to hotels, there are currently over seven thousand vacant homes for rent and four hundred units for migrant workers. Workforce with longer contract terms (6 months or longer) could consider seeking out these alternative accommodation options through online platforms such as Airbnb, or rental classifieds advertisements through local newspapers or online webpages.

Finally, in Eastern Montana and Western North Dakota, there are 14 industrial projects, located within or in close vicinity of the Project area, that are in the pre-construction or construction phases. The majority of these projects are wind and solar farms, which are located in both states and are likely to employ over a hundred employees during peak construction, and create a few operations jobs for each facility. Other major projects include the Davis Refinery, Cerilon GTL, Project Tundra, and Summit Carbon CCS projects, which are all in North Dakota and have a project scope of over a billion dollars each. The construction workforce brought in by these projects might put upward pressure on the local housing demand, and drive up rental prices.

[38] North Dakota Department of Commerce. (2023). Annual Report 2023. https://www.medialibrary.nd.gov/assetbank-nd/assetfile/138899.pdf

However, the extent of impacts largely depends on the timeframes of these projects. Specifically, a sudden surge or influx of workers can strain the local housing market. This can arise when construction work for multiple projects occurs concurrently or when there is an unexpected increase in new projects in the future.

Despite that, through the observations of the housing market during the Bakken Oil Boom[39], the real estate market is expected to respond quickly to the increased demand. Motivated by the robust demand and high rental prices, real estate developers are likely to build new hotels, RV parks, mobile homes and man-camps, and property owners might consider renting out their existing properties to facilitate the influx.

[39] Melby, T. & Sisk A. (2018, October 23). *Rent and Frozen Pillows: How Bakken Housing Evolved with the Oil Boom.* https://news.prairiepublic.org/oil-boom/2018-10-23/rent-and-frozen-pillows-how-bakken-housing-evolved-with-the-oil-boom

Appendix A: Project Area Temporary Housing Inventory

Please refer to “*Basin Electric_Temp Housing Inventory.xlsx*”

Labor Supply and Demand Study

Final Report

Basin Electric Power Cooperative

January 16, 2025

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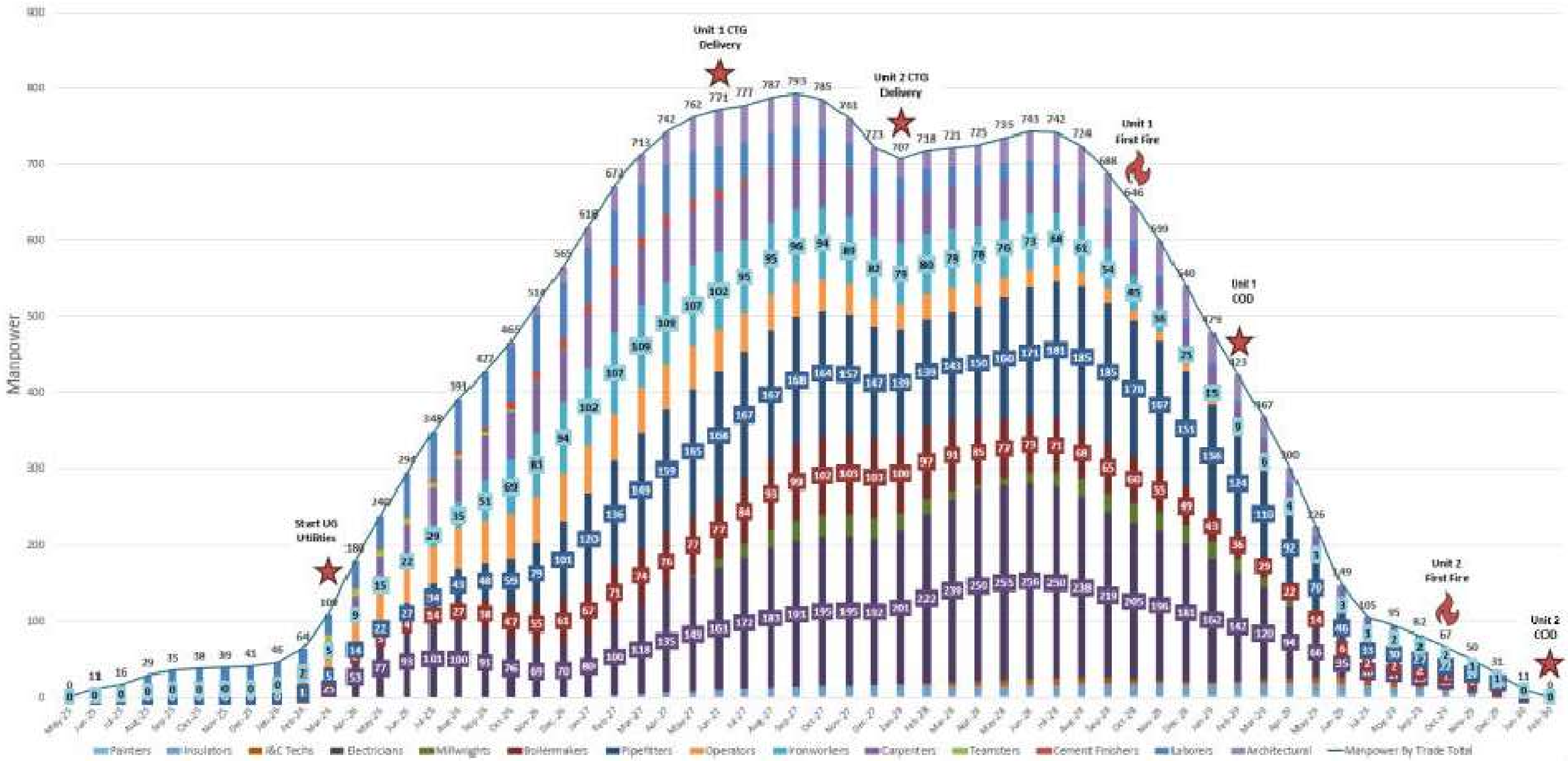
1. Introduction

Basin Electric Power Cooperative ("Basin Electric") is a not-for-profit generation and transmission cooperative incorporated in 1961. Core business operations include the generation and transmission of wholesale bulk electric power primarily to their 140-member rural electric systems located in nine states including Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. As of 2023, Basin Electric owned 4,274 megawatts (MW) and operated 5,217 MW of electric generating capacity.

To enhance electric generation capacity, Basin Electric is pursuing the Williston Load Pocket Generation Project (the Project), an approximately 1,400 MW natural gas combined-cycle generation plant located in western North Dakota. Pending project development, regulatory review and approvals, construction could start in 2025, with substantial completion by 2030. The Project is expected to support up to 800 well-paid craft labor and 200 field engineer and manager positions throughout the construction lifecycle. The estimated distribution of the required craft labor force by trade is presented in **Figure 1** on the next page.

Given the high volume of industrial projects planned within the study area, HDR Engineering, Inc. (HDR) has prepared a labor study in order to outline the current state of labor supply and demand to assess workforce availability within the region, understand labor force characteristics, and to identify potential labor gaps for targeted occupations.

Figure 1: Construction Manpower by Trade



Source: Basin Electric. November 2024.

1.1. Study Area

The Williston Load Pocket Generation Project is located about 25 miles east of Williston, North Dakota. To provide a comprehensive overview of the existing labor market conditions and occupational supply and demand outlook for the region, the study area was expanded beyond North Dakota to also include South Dakota, Montana, Minnesota, and Wyoming. All labor force characteristics to be discussed in subsequent sections are analyzed for each of the States highlighted in **Figure 2**.

Figure 2: Study Area

1.2. Occupations of Interest

Labor requirements were determined based on knowledge of similar types of construction projects, as well as communication with Basin Electric. It was determined that the labor study would focus solely on roles related to the construction phase of the Project, and exclude roles needed in the planning and operation phases. Labor statistics and employment data for relevant roles were extracted from the U.S. Bureau of Labor Statistics' Occupational Employment and Wage Statistics (OEWS) database.[1] The occupations to be analyzed throughout the rest of this report are presented in **Table 1**.

Table 1: Relevant Occupations

Relevant OEWS Occupations
Boilermakers
Carpenters
Cement Masons and Concrete Finishers
Construction Equipment Operators
Construction Laborers
Electrical power-Line Installers and Repairers
Electricians

[1] U.S. Bureau of Labor Statistics. (n.d.). *Occupational Employment and Wage Statistics (OEWS).* https://www.bls.gov/oes/

Relevant OEWS Occupations
Insulation Workers (wall, ceiling etc., for temperature)
Painters, Construction and Maintenance
Plumbers, Pipefitters and Steamfitters
Reinforcing Iron and Rebar Workers
Structural Iron and Steel Workers

Source: U.S. Bureau of Labor Statistics. Occupational Employment and Wage Statistics.

The balance of this report is structured as follows: **Section 2** analyzes the existing labor market and associated labor supply and demand for the relevant occupations in each of the five states included in the study area, **Section 3** assesses the future occupational supply and demand outlook and explores similar upcoming projects and investments and potential education and training programs in each state to evaluate the potential of the region to attract and prepare new talent for the workforce. Finally, **Section 4** presents a summary of conclusions drawn from subsequent sections.

2. Existing Labor Market Analysis

An assessment of regional labor market profiles for the study area was conducted to help Basin Electric understand the workforce availability of the Project. Specifically, labor market data and trends for the identified occupations were examined. Labor market data was collected from publicly available sources such as the U.S. Census Bureau and Bureau of Labor Statistics (BLS) to present an overview of existing labor force conditions for occupations commonly needed in oil refinery, natural gas processing, and power generation projects. State-level labor statistics were supplemented through secondary research to determine the size of the labor force by occupation. Labor supply was then compared against labor demand to identify potential gaps for targeted occupations and to provide insights into workforce dynamics.

2.1. Labor Force Characteristics

This section presents an overview of the existing labor market for identified occupations for each of the five states considered in the analysis. Key variables include population, labor force participation, unemployment rates, and income. These variables contribute to the labor supply and demand analysis in subsequent sections.

2.1.1. Population

Population growth is a key input in determining how a region can expect its labor force to grow, all else equal. Historical annual population data from 2013 to 2023 were obtained from the U.S. Census Bureau's American Community Survey[2] (ACS) for the geographies considered in this analysis. Population projections for 2025 to 2035 were obtained from various sources, including the Minnesota State Demographic Center, the Montana Department of Commerce, North Dakota Chamber of Commerce, South Dakota State Data Center, and Wyoming Department of Administration & Information.

Between 2013 and 2023, each of the five states saw an increase in total population levels. Most notably, the population of Montana grew by 11.6 percent over the period of analysis. As can be seen from **Table 2**, in percentage terms, all of the states with the exception of Wyoming grew at a pace above that of the national average.

Table 2: Population Growth, 2013-2023

Region	2013	2023	Total Change
Minnesota	5,420,380	5,737,915	5.9%
Montana	1,015,165	1,132,812	11.6%
North Dakota	723,393	783,926	8.4%
South Dakota	844,877	919,318	8.8%
Wyoming	582,658	584,057	0.2%
United States	**316,128,839**	**334,914,896**	**5.9%**

Source: U.S. Census Bureau

[2] United States Census Bureau. (2023). *American Community Survey | S1501 | Educational Attainment.* https://data.census.gov/table/ACSST5Y2023.S1501?t=Educational%20Attainment

Given that the Project is expected to be substantially complete by 2030, population forecasts were only analyzed through 2035, as this labor study is focused on the construction phase rather than the operations phase.

Between 2025 and 2035, North Dakota and South Dakota are expected to experience the highest rate of population growth, each increasing at a projected compound annual growth rate (CAGR) of 0.8 and 0.6 percent, respectively. Notably, each of the five states are expected to experience positive growth in population over the study period, once more all at the same or higher rate than the national average, with the exception of Wyoming.

Table 3: Population Projections, 2025-2035

Region	2025	2035	CAGR
Minnesota	5,804,400	6,016,749	0.4%
Montana	1,160,666	1,217,232	0.5%
North Dakota	796,989	865,397	0.8%
South Dakota	922,748	977,574	0.6%
Wyoming	586,950	606,390	0.3%
United States	**338,016,000**	**350,861,000**	**0.4%**

2.1.2. Labor Force Participation and Unemployment

The labor force participation rate is defined as the percentage of the civilian population aged 16 years and older that is working, or actively looking for work. It represents a measure of the amount of labor resources available in a given region. **Table 4** compares the labor force participation rate (for all occupations) in the states of interest against the national average in selected years. As can be seen, the labor force participation rate has fallen in each of the five states considered, as well as at the national level. This is largely due to the fact that the baby-boom population is continuously moving into age groups which typically display lower labor force participation rates.[3] Despite this decline, as of 2023, each of the five states considered exhibited participation rates well above the national average, led by North Dakota with a participation rate of 69.2 percent.

Table 4: Labor Force Participation Rate, Selected Years

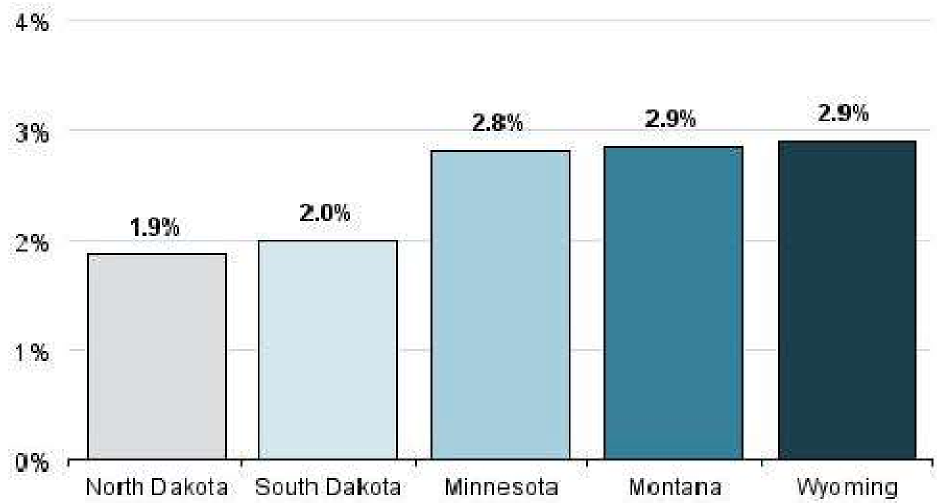
Region	2013	2018	2023
Minnesota	70.2%	69.6%	68.4%
Montana	64.0%	63.3%	63.1%
North Dakota	71.9%	69.8%	69.2%
South Dakota	70.1%	69.2%	68.2%
Wyoming	67.4%	65.6%	64.0%
United States	**63.3%**	**62.9%**	**62.6%**

Source: Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey.

[3] Bureau of Labor Statistics. (September, 2016). *Labor force participation: what has happened since the peak?* https://www.bls.gov/opub/mlr/2016/article/labor-force-participation-what-has-happened-since-the-peak.htm

The unemployment rate measures the percentage of the labor force that is unemployed. As a result of the higher-than-average labor force participation rates seen in each of the five states, from **Figure 3** it can be seen that as of 2023, the unemployment rate was extremely low in each of the states considered, most notably in North and South Dakota, which each saw unemployment rates of just 1.9 and 2.0 percent, respectively. As a point of reference, the unemployment rate for the United States as a whole was 3.7 percent in 2023, nearly double that of North Dakota.

Figure 3: Unemployment Rates by State, 2023



Source: Bureau of Labor Statistics. Local Area Unemployment Statistics (LAUS).

The resulting total employment figures for each state are shown in **Table 5**. Given that the total employed labor force aged 16 and older is related to population growth, it can be seen that the total employment growth rate trend has closely followed that of the population growth rate trend over the same period, slightly dampened by declining labor force participation rates over the same period.

Table 5: Total Employment, Seasonally Adjusted (Selected Years)

Region	2013	2018	2023	CAGR
Minnesota	2,812,495	2,981,974	3,012,708	0.6%
Montana	483,869	515,092	557,394	1.5%
North Dakota	389,944	402,170	408,912	0.3%
South Dakota	431,002	446,372	470,722	0.9%
Wyoming	287,870	280,732	286,706	-0.1%

Source: Bureau of Labor Statistics. Local Area Unemployment Statistics (LAUS).

2.1.3. Wages

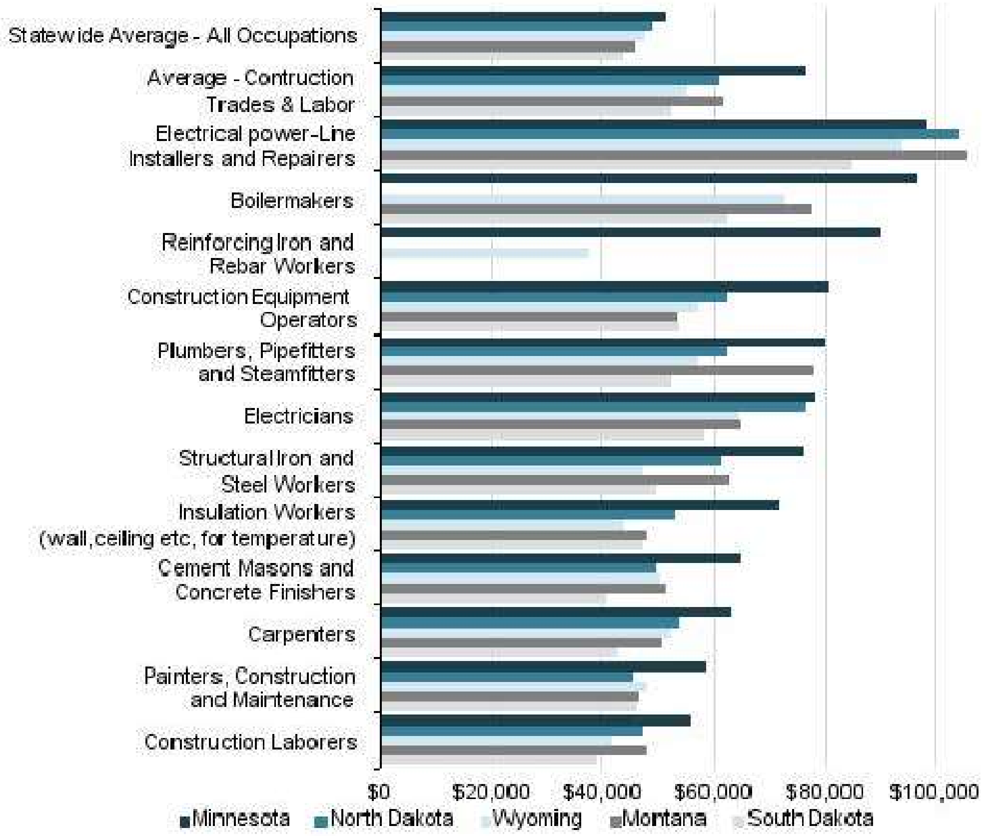
Median wages for each of the occupation groups highlighted in **Table 1** were extracted from the BLS' Occupational Employment and Wage Statistics (OEWS) database for each of the five states considered. **Table 6** lists the wages by state for each occupation group, while **Figure 4** presents a visual representation of the wages.

Table 6: Wages, by Occupation (2023)

Occupation Group	Minnesota	Montana	North Dakota	South Dakota	Wyoming	Average
Electrical Power-Line Installers and Repairers	$98,360	$105,560	$104,100	$84,320	$93,470	$97,162
Boilermakers	$96,210	$77,200	N/A	$62,030	$72,750	$77,048
Electricians	$78,050	$64,590	$76,120	$57,750	$64,440	$68,190
Plumbers, Pipefitters and Steamfitters	$79,930	$77,520	$62,280	$51,990	$57,070	$65,758
Reinforcing Iron and Rebar Workers	$90,030	N/A	N/A	N/A	$37,440	$63,735
Construction Equipment Operators	$80,517	$53,230	$62,020	$53,340	$57,067	$61,235
Structural Iron and Steel Workers	$75,800	$62,560	$61,100	$49,070	$46,890	$59,084
Insulation Workers (wall, ceiling etc., for temperature)	$71,620	$47,830	$52,600	$46,975	$43,625	$52,530
Carpenters	$62,660	$50,340	$53,600	$42,480	$52,000	$52,216
Cement Masons and Concrete Finishers	$64,740	$50,940	$48,990	$40,550	$49,670	$50,978
Painters, Construction and Maintenance	$58,310	$46,310	$45,270	$45,980	$47,550	$48,684
Construction Laborers	$55,640	$47,590	$47,000	$39,050	$41,510	$46,158
Average - Construction Trades & Labor	**$76,301**	**$61,408**	**$60,516**	**$51,835**	**$54,749**	**$60,962**
Statewide Average - All Occupations	**$50,880**	**$45,690**	**$48,830**	**$43,680**	**$47,250**	**$47,266**

Source: Bureau of Labor Statistics. Occupational Employment and Wage Statistics (OEWS) database.

Figure 4: Wages, by Occupation (2023)



Source: Bureau of Labor Statistics. Occupational Employment and Wage Statistics (OEWS) database.

As can be seen from the two figures, with the exception of general construction laborers, painters and general maintenance workers, all of the identified occupations typically pay well above the statewide average in terms of annual median wages for each of the states examined. The median annual wages scale quickly for more specialized roles, such as electric power-line workers, who earned an average annual median wage of $97,162 across the five states. Wages also scale with the population size of a state, most likely due to the fact that wages are typically higher in larger metropolitan centers due to higher labor demand associated with the delivery of larger scale projects resulting in more competitive wages. This is reflected by Minnesota having wages roughly 25 percent higher than the combined average, with respect to average construction trades and labor wages. Overall, Basin Electric's Williston Load Pocket Generation Project will support up to 800 well-paying jobs at the peak of its construction phase (not including project management and design).

2.2. Labor Supply and Demand

To understand the availability of labor in the occupations needed to construct Basin Electric's Williston Load Pocket Generation Project, existing regional occupational supply was compared to demand to assess potential areas where labor surpluses, or gaps exist for each of the occupations. This section presents an overview of occupational supply and demand as of 2023.

2.2.1. Existing Labor Supply by Occupation

Total labor force was only available at the state level from the Bureau of Labor Statistics' Local Area Unemployment Statistics database. Existing employment by occupation was available. As such, HDR assumed labor supply by occupation should closely mirror the employment distribution within a state. Specifically, occupations with higher demand are more likely to attract a larger share of the workforce seeking opportunities in those fields. As such, total labor force in each state was multiplied by the percent share of employment within each respective occupation type to yield an estimate of labor supply by occupation. This measure of labor supply includes the total labor force that is either currently employed in, or actively seeking employment in each relevant occupation group. Total labor supply for each occupation is presented in **Table 7**.

Table 7: Labor Supply by Occupation (2023)

Occupation	Minnesota	Montana	North Dakota	South Dakota	Wyoming	Total
Construction Laborers	26,412	4,952	3,414	1,989	3,171	39,938
Carpenters	17,479	4,952	2,475	4,669	2,740	32,315
Electricians	12,141	3,305	3,174	2,864	2,556	24,040
Construction Equipment Operators	8,718	4,403	3,873	2,194	4,444	23,632
Plumbers, Pipefitters and Steamfitters	10,871	2,081	1,557	1,535	1,208	17,252
Cement Masons and Concrete Finishers	3,638	1,247	1,647	2,367	539	9,438
Painters, Construction and Maintenance	3,541	1,269	439	703	431	6,384
Electrical power-Line Installers and Repairers	1,776	663	589	1,027	507	4,562
Insulation Workers (wall, ceiling etc., for temperature)	1,797	423	429	422	518	3,589
Structural Iron and Steel Workers	560	263	269	886	86	2,065
Reinforcing Iron and Rebar Workers	387	0	0	0	54	441
Boilermakers	97	114	0	54	65	330
Total - Construction Trades & Labor	**87,417**	**23,674**	**17,866**	**18,708**	**16,319**	**163,984**
Statewide Total - All Occupations	**3,100,914**	**573,808**	**416,713**	**480,295**	**295,266**	**4,866,997**

Source: Calculated using Bureau of Labor Statistics. Local Area Unemployment Statistics (LAUS). Seasonally Adjusted.

2.2.2. Existing Labor Demand by Occupation

Labor demand was estimated by assessing the total number of individuals in each of the five states that is currently employed in a given occupation. It does not include individuals that are actively seeking work (as the supply side does) and is representative of the existing number of jobs in each of the relevant occupations. **Table 8** highlights the existing number of jobs available across the five states for selected occupations as of 2023.

Table 8: Labor Demand by Occupation (2023)

Occupation	Minnesota	Montana	North Dakota	South Dakota	Wyoming	Total
Construction Laborers	25,661	4,810	3,350	1,949	3,079	38,849
Carpenters	16,982	4,810	2,429	4,576	2,660	31,457
Electricians	11,795	3,211	3,115	2,807	2,482	23,410
Construction Equipment Operators	8,470	4,277	3,800	2,150	4,315	23,013
Plumbers, Pipefitters and Steamfitters	10,561	2,022	1,528	1,504	1,173	16,788
Cement Masons and Concrete Finishers	3,534	1,211	1,616	2,320	524	9,205
Painters, Construction and Maintenance	3,440	1,233	431	688	419	6,212
Electrical power-Line Installers and Repairers	1,725	644	578	1,006	492	4,446
Insulation Workers (wall, ceiling etc, for temperature)	1,746	411	421	413	503	3,494
Structural Iron and Steel Workers	544	256	264	869	84	2,016
Reinforcing Iron and Rebar Workers	376	0	0	0	52	429
Boilermakers	94	111	0	53	63	321
Total - Construction Trades & Labor	**84,930**	**22,997**	**17,532**	**18,335**	**15,846**	**159,640**
Statewide Total - All Occupations	**3,012,708**	**557,394**	**408,912**	**470,722**	**286,706**	**4,736,442**

Source: Calculated using Bureau of Labor Statistics. Local Area Unemployment Statistics (LAUS). Seasonally Adjusted.

2.3. Labor Gap Analysis

This section compares the above labor supply and demand for each identified occupation to assess whether there is a labor surplus, or gap for each given occupation. Occupations with a labor surplus indicate that there are currently individuals working in selected occupations in the labor market who are not currently in the labor force but are ready to take on employment if the opportunity arose. **Table 9** presents the aggregate regional labor supply and demand across the full study area. A breakdown by each individual state can be found in **Table 10** below.

As can be seen, across the five states there is a surplus of labor in each of the identified occupations. As expected, the largest labor surplus' are found in more general occupation groups, such as general laborers and carpenters. The labor surplus shrinks rapidly as roles become more specialized, as they typically require increased levels of education, training, or experience, creating a barrier to entry. Several roles such as structural iron and steel workers, reinforcing iron and rebar workers, and boilermakers have quite small labor surpluses, especially given that these figures include all five states. It is highly probable that the majority of construction trades are currently employed by construction companies (such as Wanzek Construction Inc.). Despite being listed as employed, they may still be available to undertake contracts through their respective employers. Overall, at present there is adequate labor within the region to facilitate the construction of the Project, however, as will be seen in subsequent sections, rapid increases in demand for these roles, paired with shrinking labor forces for certain occupations may reduce these surpluses, or even result in labor gaps.

Table 9: Labor Supply and Demand Overview, by Occupation – Total (2023)

Occupation	Total		
	Labor Supply	Labor Demand	Labor Surplus
Construction Laborers	39,938	38,849	1,088
Carpenters	32,315	31,457	858
Electricians	24,040	23,410	631
Construction Equipment Operators	23,632	23,013	619
Plumbers, Pipefitters and Steamfitters	17,252	16,788	464
Cement Masons and Concrete Finishers	9,438	9,205	233
Painters, Construction and Maintenance	6,384	6,212	172
Electrical power-Line Installers and Repairers	4,562	4,446	116
Insulation Workers (wall, ceiling etc., for temperature)	3,589	3,494	95
Structural Iron and Steel Workers	2,065	2,016	49
Reinforcing Iron and Rebar Workers	441	429	13
Boilermakers	330	321	9
Total - Construction Trades & Labor	**163,984**	**159,640**	**4,344**
Statewide Total - All Occupations	**4,866,997**	**4,736,442**	**130,555**

Source: Bureau of Labor Statistics. Occupational Employment and Wage Statistics (OEWS) database.

Table 10: Labor Supply and Demand Overview, by Occupation – by State (2023)

Occupation	Minnesota			Montana			North Dakota			South Dakota			Wyoming		
	Labor Supply	Labor Demand	Labor Surplus	Labor Supply	Labor Demand	Labor Surplus	Labor Supply	Labor Demand	Labor Surplus	Labor Supply	Labor Demand	Labor Surplus	Labor Supply	Labor Demand	Labor Surplus
Construction Laborers	26,412	25,661	751	4,952	4,810	142	3,414	3,350	64	1,989	1,949	40	3,171	3,079	92
Painters, Construction and Maintenance	3,541	3,440	101	1,269	1,233	36	439	431	8	703	688	14	431	419	13
Carpenters	17,479	16,982	497	4,952	4,810	142	2,475	2,429	46	4,669	4,576	93	2,740	2,660	79
Cement Masons and Concrete Finishers	3,638	3,534	103	1,247	1,211	36	1,647	1,616	31	2,367	2,320	47	539	524	16
Insulation Workers (wall, ceiling etc., for temperature)	1,797	1,746	51	423	411	12	429	421	8	422	413	8	518	503	15
Structural Iron and Steel Workers	560	544	16	263	256	8	269	264	5	886	869	18	86	84	3
Electricians	12,141	11,795	345	3,305	3,211	95	3,174	3,115	59	2,864	2,807	57	2,556	2,482	74
Plumbers, Pipefitters and Steamfitters	10,871	10,561	309	2,081	2,022	60	1,557	1,528	29	1,535	1,504	31	1,208	1,173	35
Construction Equipment Operators	8,718	8,470	248	4,403	4,277	126	3,873	3,800	73	2,194	2,150	44	4,444	4,315	129
Reinforcing Iron and Rebar Workers	387	376	11	0	0	0	0	0	0	0	0	0	54	52	2
Boilermakers	97	94	3	114	111	3	0	0	0	54	53	1	65	63	2
Electrical power-Line Installers and Repairers	1,776	1,725	51	663	644	19	589	578	11	1,027	1,006	20	507	492	15
Total - Construction Trades & Labor	**87,417**	**84,930**	**2,487**	**23,674**	**22,997**	**677**	**17,866**	**17,532**	**334**	**18,708**	**18,335**	**373**	**16,319**	**15,846**	**473**
Statewide Total - All Occupations	**3,100,914**	**3,012,708**	**88,205**	**573,808**	**557,394**	**16,414**	**416,713**	**408,912**	**7,801**	**480,295**	**470,722**	**9,574**	**295,266**	**286,706**	**8,560**

3. Labor Market Outlook

To assess the future occupational supply and demand outlook for targeted occupation groups typically needed for the construction of oil refinery, natural gas processing, and power generation projects, three key areas were examined. Firstly, the Bureau of Labor Statistics' Occupational Employment Projections database was extracted for relevant occupations related to construction trades and labor to analyze expected labor market trends at the national level. Secondly, secondary research regarding expected upcoming power generation projects in each of the five states considered was done to understand to what extent there may be upwards pressure on demand for construction related occupations over the same time horizon that Basin Electric seeks to employ individuals in similar fields. Finally, potential education and training programs in each state were evaluated to understand the potential of the region to attract and prepare new talent for the workforce.

3.1. National Occupational Employment Forecast

The National Occupational Employment Forecast presents a ten-year forecast for over 800 occupation groups, and includes information related to factors contributing to projected employment change, expected changes in median wages, and education or on-the-job training requirements needed to enter a given occupation. Although it is not specific to the five states examined in this study, to an extent, state level occupational projections can be expected to follow those seen nationwide.

Table 11 displays the ten-year forecast for occupations relevant to this labor study. As can be seen, the construction trades and labor sector as a whole is expected to grow at an annual rate of 0.6 percent per year, slightly above all occupations growth rate of 0.4 percent. This is driven by the third largest occupation group (within the construction industry); electricians. Between 2023 and 2033, the United States is expected to add over 84,000 electricians, representing a 1.0% annual increase over the period of analysis. The only two occupation groups expected to experience infinitesimal contractions in their total labor forces are boilermakers and cement masons and concrete finishers, identifying a potential area where there may be labor shortages in the future.

Table 11: National Occupational Employment Forecast, Selected Occupations (2023-2033)

Occupation	2023	2033	CAGR
Boilermakers	**11,300**	**11,200**	**-0.1%**
Carpenters	**923,100**	**961,600**	**0.4%**
Cement Masons and Concrete Finishers	**211,800**	**210,300**	**-0.1%**
Construction Laborers	**1,401,200**	**1,516,600**	**0.8%**
Construction Equipment Operators	**515,600**	**537,200**	**0.4%**
Paving, Surfacing, and Tamping Equipment Operators	44,500	46,300	0.4%
Pile Driver Operators	3,100	3,300	0.6%
Operating Engineers and Other Construction Equipment Operators	468,000	487,600	0.4%
Electricians	**779,800**	**864,100**	**1.0%**
Insulation Workers (wall, ceiling etc., for temperature)	**62,500**	**64,800**	**0.4%**

Occupation	2023	2033	CAGR
Insulation Workers, Floor, Ceiling, and Wall	39,100	40,200	0.3%
Insulation Workers, Mechanical	23,400	24,600	0.5%
Painters, Construction and Maintenance	**338,900**	**352,400**	**0.4%**
Plumbers, Pipefitters and Steamfitters	**473,400**	**499,700**	**0.5%**
Reinforcing Iron and Rebar Workers	**21,900**	**22,900**	**0.4%**
Structural Iron and Steel Workers	**66,100**	**68,900**	**0.4%**
Electrical power-Line Installers and Repairers	**123,400**	**132,800**	**0.7%**
Total - Construction Trades & Labor	**4,929,000**	**5,242,500**	**0.6%**
Total - All Occupations	**167,849,400**	**174,588,900**	**0.4%**

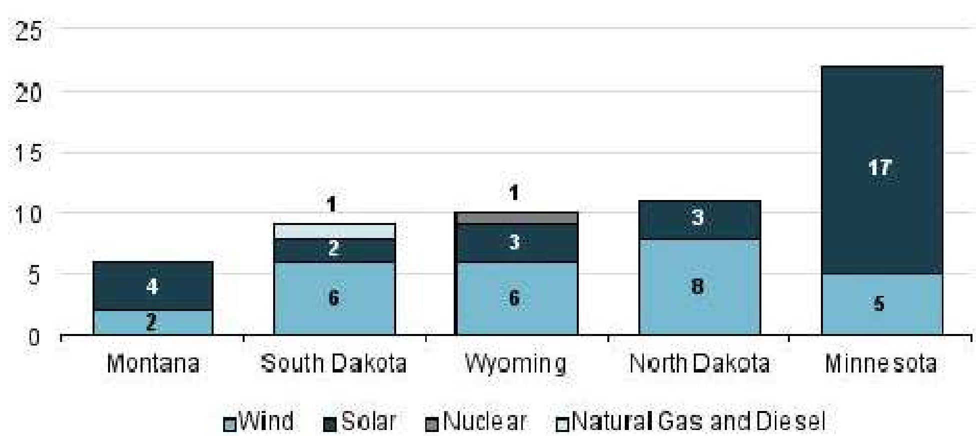
Source: Bureau of Labor Statistics. Occupational Employment Projections, 2023-2033.

3.2. Analysis of Competing Investments

This section provides an overview of expected future power generation projects in the planning or construction phase located in Minnesota, Montana, North Dakota, South Dakota, and Wyoming. All projects included are expected to come online before 2030. Given that the typical labor force required to construct these projects is similar to that needed by Basin Electric for the Williston Load Pocket Generation Project, it presents a high-level estimate of the level of demand for construction related roles can be expected between 2025 and 2030. It should be noted that since this information was obtained through secondary research rather than stakeholder engagement, HDR relied on information provided by state economic development agencies and project developers estimates where available on their websites.

In 2023, the state of Minnesota signed into law legislation requiring that Minnesota adopt a carbon-free electricity standard by 2040.[4] Paired with Minnesota being the most populous of the five states examined, this results in Minnesota having by far the most planned upcoming power generation projects, with 22 wind and solar projects planned. The number of upcoming projects across all states is presented in **Figure 5**. A full list of projects with sources is included in **Appendix A**.

Figure 5: Expected Future Power Generation Projects

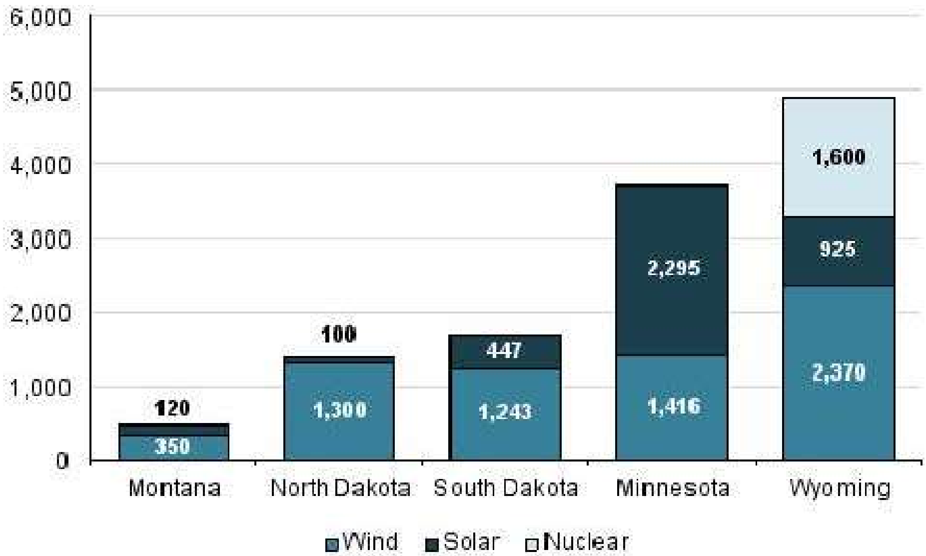


Source: Various project developers' websites and news articles.

[4] Minnesota Department of Commerce. (2023, February 7). *Governor Walz Signs Bill Moving Minnesota to 100 Percent Clean Energy by 2040.* https://mn.gov/commerce/news/?id=17-563384

In total, these 58 planned or in-development power generation projects are expected to create approximately 12,000 construction-related jobs over their combined lifecycles.[5] In some cases, a range of estimated jobs was presented. In these cases, the lower-bound value was used to ensure that estimates were conservative in nature to avoid overstating occupational employment demand. Overall, there is expected to be significant upwards pressure on construction related jobs in the region between 2025 and 2030.

Figure 6: Expected Construction Jobs Created by Future Power Generation Projects*



Source: Various project developers' websites and news articles.

* Where information was available.

3.3. Workforce Development Opportunities

3.3.1. Overview of Training and Apprenticeship Programs

This section provides an overview of available training and apprenticeships programs available for relevant occupations within the five states studied. The majority of the training programs offered are part of the Workforce Innovation and Opportunity Act (WION), which is a federal program that requires states to coordinate their workforce development programs with the employment needs of the state[6]. WION, alongside state-sponsored initiatives, also cover apprenticeship programs. **Table 12** summarizes the state-entities responsible in offering workforce services.

[5] Number sourced from various project developers' websites and news articles. Full list in Appendix A.
[6] U.S. Department of Labor. (n.d.). *Workforce Innovation and Opportunity Act.* https://www.dol.gov/agencies/eta/wioa

Table 12: State-Level Administration in Charge of Workforce Programs

State	Department
Minnesota	Minnesota Department of Employment and Economic Development (DEED)
Montana	Montana Department of Labor & Industry (DLI)
North Dakota	Job Service North Dakota (JobsND)
South Dakota	South Dakota Department of Labor and Regulation (DLR)
Wyoming	Wyoming Department of Workforce Services (DWS)

3.3.2. Training Programs

Table 13 lists the training programs offered across five states in the construction and trades sector. Training programs are taken from the state administration for workforce programs and recoded into their respective fields. In general, a wide range of training programs are offered, covering a wide range of skills, including construction, electrical, plumbing and utilities.

Table 13: Training Programs Offered in the Region

Training Programs – Construction & Trades	
Architecture	Heavy Equipment Operation
Bricklayer	HVAC
Building and Construction Management	Industrial Technology
Building and Construction Technology	Machinist
Carpentry	Maintenance
Construction Safety	Metal Work
Electrical	Painting and Coating
Electrical Installation	Pipefitting
Electrical Technician	Plumbing
Energy Management	Vehicle Maintenance
Engineering	Water Utilities
Facility Management	Welding
General Building and Construction	Wind Energy
Glass Manufacturing and Installation	

Source: DEED (MN), DLI (MT), JobsND, DLR (SD), DWS (WY), HDR Analysis.

Training Programs vary in length, ranging from a few hours to several years. Costs also vary substantially, from few hundred dollars to upwards of thirty-thousand dollars. The number of programs offered largely mirror the population size of the states. With over a hundred programs listed, Minnesota[7] and Montana[8] have the highest number of available training programs. This is followed by North Dakota[9], Wyoming[10] and South Dakota[11], all of which have dozens of training programs listed on their website.

Some states, such as North and South Dakota also offer a list of in-demand occupations using their employment projections, to guide their focus around areas with potential labor shortfalls. Most of the occupations in **Table 13** are listed in the "Skilled Trade" section of the North Dakota

[7] Minnesota Department of Employment and Economic Development (n.d.). *Education Search.* https://apps.deed.state.mn.us/cee/Education/Search
[8] Montana Department of Labor & Industry. (n.d.). *Training and Education.* https://wsd.dli.mt.gov/job-seeker/training-education
[9] JobsND. (n.d.). *Training Opportunities.* https://www.jobsnd.com/job-seeker/training-opportunities
[10] South Dakota Department of Labor & Regulation (n.d.). *Adult Education & Training Opportunities.* https://dlr.sd.gov/workforce_services/individuals/training_opportunities/default.aspx
[11] Wyoming Workforce Services. (n.d.). *Resources for Job Seekers and Workers.* https://dws.wyo.gov/job-seekers/

in-demand occupation list, indicating a high demand for construction and trades labor in the region, and consequently, the focus on this sector in training programs.[12]

3.3.3. Apprenticeship Programs

In Registered Apprenticeship Programs, the state government partners with a firm, who will provide a hands-on learning approach for workers. Consequently, as noted in **Table 14**, the scope of apprenticeships, which includes jobs that require on-the-job training, such as cement, roofing and scaffoldings, extend further than training programs listed above.

Since apprenticeships are provided by the firm, the amount and fields offered each year is dependent with the needs of the participating firms and fluctuate with market conditions.

Table 14: Apprenticeship Programs Offered in the Region

Apprenticeship Programs – Construction & Trades	
Bricklayer	HVAC
Carpenter	Machinist
Cement	Maintenance
Drywall and Insulation	Management
Electrical	Metal Work
Electrical Installation	Millwright
Electrical Technician	Operations
Energy	Painting and Coating
Engineering	Pipefitting
Floors	Piping
General Building and Construction	Plumbing
Glass	Roofing and Scaffolding
Heavy Equipment Installer	Solar Technician
Heavy Equipment Manufacturing	Utilities
Heavy Equipment Operation	Wind Technician
Heavy Material Operation	

Source: DEED (MN), DLI (MT), JobsND, DLR (SD), DWS (WY), HDR Analysis.

Due to construction trades being in high demand in the region recently, there are many apprenticeships being offered, that will provide a relatively large pool of potential workers in construction and trades fields the near-term. In addition, most apprentices not only do not need to pay tuition but get paid for their work. This lowers the barriers to entry for individuals searching for training and re-training opportunities, and encourages more people to apply, especially displaced workers on the State's Trade Adjustment Assistance programs.[13]

Registered apprenticeships are prevalent in all five states in the construction industry, with some programs offering a joint apprenticeship and training committee program which includes classroom instruction in addition, curating theoretical knowledge with practical experience.

[12] JobsND. (2023, July 1). *In-Demand Occupations*. https://www.jobsnd.com/sites/www/files/documents/jsnd-documents/In%20demand%20occupations%20list%2007.01.2023-PY24.pdf

[13] Working For America Institute (2021, December). Registered Apprenticeship for Dislocate Workers: Case Study of the Electrolux/Machinists Industrial Manufacturing Technician Program. https://www.workingforamerica.org/system/files/electrolux_appren_final_wai_dec2021.pdf

Apprenticeships also offer opportunities for firms to fill their labor supply gaps by registering as a sponsor, allowing firms to recruit potential workers with state assistance.

4. Conclusion

The labor markets in North Dakota, South Dakota, Montana, Minnesota, and Wyoming were assessed at a broad level, and more specifically for construction occupations related to oil refinery, natural gas processing, and power generation projects to understand the forces driving current and future supply and demand in these fields in support of staffing initiatives for the construction of the Williston Load Pocket Generation Project.

From a macroeconomic perspective, the labor forces in four of the five states, with the exception of Wyoming are expected to grow at a rate above that of the United States as a whole. Despite this, shifting labor force dynamics (aging workforce) is putting downwards pressure on total labor force participation rates. Consequentially, the unemployment rate in all of the states examined is extremely low, specifically in the well-paying construction-related occupations considered in this study.

For each state, the existing labor supply for relevant occupations was derived by multiplying the Bureau of Labor Statistics' total available workforce dataset by the share of employment within each occupation group to yield the total labor force for each occupation group, which measures the total number of individuals that are either currently employed in or are actively seeking employment. This was then compared to the labor demand for each occupation group, that being the number of individuals actively employed in their occupation of choice. The result of this analysis is the identification of either a labor gap, or surplus in each of the examined occupations.

At present, there is a labor surplus in each of the examined occupations, which diminishes as roles become more specialized; requiring additional training and years of experience. However, elevated average annual wages in the construction trades and labor industries compared to the statewide averages across all occupations, paired with increasing demand for these roles as a result of the large number of planned power generation projects in the region has the potential to dimmish this labor surplus over time, perhaps even to the extent that specialized roles can expect to see a regional shortage (labor gap) in the near to mid future. To combat this, each of the states considered have implemented numerous subsidized training and apprenticeship programs designed to incentivize individuals and businesses to attract and develop new talent for the workforce. In summary, in its current state, there are available workers in all of the occupations of interest as they relate to the construction of power generation projects, however the market will continue to tighten for these roles as demand increases, which will put upwards pressure on wages.

5. Appendix

Appendix A: Future Power Generation Projects

Project Name	State	Plant Type	Expected Completion	Expected Capacity (MW)	Expected Jobs (Peak Construction)	Expected Jobs (Operations)	Source
Cheyenne River Ranch Wind & Solar Project	SD	Wind + Solar	Unknown, Pre-Construction Stage	53 (Wind) + 89 (Solar)	-	-	https://www.newunderwood.com/vertical/sites/%7BB653AB5C-04F0-492E-AC0F-BF250324C8ED%7D/uploads/Cheyenne_River_Ranch_Wind__Solar_QA.pdf
Lange 2 Power Plant Project	SD	Natural Gas and Diesel	July 2026	100	-	3	https://puc.sd.gov/commission/dockets/electric/2024/EL24-026/LTR080224.pdf
TerraPower Nuclear Plant	WY	Nuclear	Unknown, Pre-Construction Stage	345	1600	250	https://www.terrapower.com/terrapower-begins-construction-in-wyoming
Benton Solar Project	MN	Solar	End of 2026	100	150	2	https://www.nexteraenergyresources.com/benton-solar/project-overview.html
Birch Coulee Solar	MN	Solar	2028	125	300	-	https://www.aes.com/minnesota/project/birch-coulee-solar
Boswell Solar	MN	Solar	Mid-2027	85	-	-	https://power.greenvolt.com/2024/04/30/goshen-solar/
Byron Solar	MN	Solar	2027	200	-	-	https://www.businesswire.com/news/home/20241209566624/en/Otter-Tail-Power-Company-Advances-Plans-to-Add-345-Megawatts-of-Solar
Coneflower Solar	MN	Solar	2027	235	-	-	https://www.nordakpublishing.com/articles/utility-sized-solar-farm-near-casselton-takes-step-forward/
Elk Creek Solar project	MN	Solar	Fall 2026	160	225	4	https://www.dglobe.com/news/local/rock-county-solar-project-receives-state-approval
Fillmore County Solar Project	MN	Solar	2025	45	150		https://nationalgridrenewables.com/projects/fillmore-county-solar-project/
Gopher State Solar Project	MN	Solar	2029	200	200	3	https://www.agweek.com/news/policy/second-large-solar-project-seeking-permit-in-minnesotas-renville-county
Iron Pine Solar Project	MN	Solar	Unknown, Pre-Construction Stage	325	>100	-	https://www.pinecountynews.com/communities/north_pine_county/news/solar-energy-hopes-to-shine-some-light-on-rising-electricity-rates-in-pine-county/article_27fbe5c2-49cc-11ef-a329-c74370a7ed07.html

Project Name	State	Plant Type	Expected Completion	Expected Capacity (MW)	Expected Jobs (Peak Construction)	Expected Jobs (Operations)	Source
Lake Wilson Solar	MN	Solar	2026	150	250	5	https://www.marshallindependent.com/news/local-news/2024/03/lake-wilson-solar-farm-approved-by-utilities-commission/#:~:text=Those%20impacts%20included%20increased%20tax,was%20operational%2C%20the%20PUC%20said.
Louise Solar Project	MN	Solar	2024	50	150	-	https://nationalgridrenewables.com/projects/louise-solar-project/
Northern Crescent Solar Facility	MN	Solar	2026	150	200	-	https://www.primergysolar.com/our-projects/northern-crescent
Plummer Solar Project	MN	Solar	Unknown, Final Project Decision Expected in 2025	130	-	-	https://lptv.org/enbridge-in-early-stages-of-solar-power-project-near-plummer/
Redrock Solar	MN	Solar	2026	60	-	-	https://www.pinecountynews.com/communities/north_pine_county/news/solar-energy-hopes-to-shine-some-light-on-rising-electricity-rates-in-pine-county/article_27fbe5c2-49cc-11ef-a329-c74370a7ed07.html
Regal Solar	MN	Solar	Mid-2027	120	-	-	https://www.agweek.com/news/policy/second-large-solar-project-seeking-permit-in-minnesotas-renville-county
Sherco Solar and Energy-Storage Facility	MN	Solar	2026	710	400	18	https://mn.my.xcelenergy.com/s/renewable/developers/sherco-solar-project
Solway Solar	MN	Solar	2026	50	70	2	https://www.otpco.com/about-us/energy-generation/solar/solway-solar/
Fairview 1 Solar Project	MT	Solar	March 2026 to December 2026	74.5	>100	-	https://headlightherald.com/2024/02/21/commissioners-a-tough-audience-for-box-cars-solar-plans/
Glacier Solar Park	MT	Solar	End of 2026	100	70	-	https://www.krtv.com/neighborhood-news/hi-line/bhe-montana-begins-construction-on-glacier-battery-system
Opportunity Solar Project	MT	Solar	2025	200	-	-	https://www.businesswire.com/news/home/20241209566624/en/Otter-Tail-Power-Company-Advances-Plans-to-Add-345-Megawatts-of-Solar
St Regis Solar	MT	Solar	Unknown, Pre-Construction Stage	-	-	-	https://dailyinterlake.com/news/2023/oct/22/st-regis-tapped-take-part-1-billion-hydrogen-proje/
Flickertail Solar Project	ND	Solar	2028	295	300	-	https://markets.ft.com/data/announce/detail?dockey=600-202412091800BIZWIRE_USPRX____20241209_BW566624-1
Harmony Solar	ND	Solar	Q4 2027	200	-	12	https://docs.casscountynd.gov/WebLink/0/edoc/4669681/02.%20Harmony%20Solar%20update%20and%20letter%20of%20support.pdf

Project Name	State	Plant Type	Expected Completion	Expected Capacity (MW)	Expected Jobs (Peak Construction)	Expected Jobs (Operations)	Source
Sundog Solar	ND	Solar	2027	250	>100	-	https://www.roundupweb.com/story/2024/11/13/news/stellar-renewable-resources-outlines-fairview-1-solar-project-to-richland-county-commissioners/21531.html
Lookout Solar	SD	Solar	Unknown, Pre-Construction Stage	140	50	3	https://www.wapa.gov/wp-content/uploads/2023/04/FinalEA_LookoutSolar.pdf
Cowboy Solar	WY	Solar	August 2027	771	375	-	https://www.yahoo.com/news/billion-dollar-cowboy-solar-project-150000918.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNhLw&guce_referrer_sig=AQAAAMqxv8UCH3kizQgexwsKiHNLZYko58Dq-RXcvYKy9bgEQ-872JhW_ZL-YvFfESjbDIOv1qTs6BDXXifPwRTq5GRA5Z_zhSrDmqXlKjQQbn7i8naHXUnWTfTKhhWUJRYs8JKYa-1-H-SVy5nmqzOzyJo1S-H-jubEYU7VLq_jYaL3
Dutchman Solar Project	WY	Solar	July 2028	500	447	26	https://brightnightpower.com/dutchman/
Goshen Solar	WY	Solar	End of 2026	163	250	8	https://power.greenvolt.com/2024/04/30/goshen-solar/
Bent Tree North Wind Farm	MN	Wind	Q4 2027	260	200	-	https://www.albertleatribune.com/2024/05/alliant-energy-proposing-2nd-wind-farm-in-northwestern-freeborn-county/
Big Bend Wind	MN	Wind	Unknown, Pre-Construction Stage	300	316	14	https://mn.gov/oah/assets/2500-37376-application-of-big-bend-wind_tcm19-527587.pdf
Deer Creek Wind Project	MN	Wind	December 2025	200	200	3	https://www.nexteraenergyresources.com/deer-creek-wind/project-overview.html
Dodge County Wind Project	MN	Wind	Late 2026	252	400	5	https://www.nexteraenergyresources.com/dodge-county-wind/project-overview.html
Three Waters Wind Project	MN	Wind	2027	160	300	4	https://www.nexteraenergyresources.com/three-waters-wind/project-overview.html
Beaver Creek Wind Farm	MT	Wind	2025	248	150	10	https://www.renewableenergymagazine.com/wind/puget-sound-energy-announces-clean-energy-wind-20231212
Wilbaux Wind Farm	MT	Wind	Spring 2025	235	200	5	https://www.aes.com/montana/project/wibaux-wind-farm
Badger Wind Farm	ND	Wind	Unknown, Pre-Construction Stage	250	200	-	https://badgerwindfarm.com/#:~:text=With%20200%E2%80%93300%20construction%20jobs,workforce%20and%20stimulate%20economic%20growth.

Project Name	State	Plant Type	Expected Completion	Expected Capacity (MW)	Expected Jobs (Peak Construction)	Expected Jobs (Operations)	Source
Dicovery Wind Farm	ND	Wind	Unknown, Pre-Construction Stage	426	>100	8	https://www.discoverywindenergy.com/about_discovery
Flat Rock Wind Project	ND	Wind	Unknown, Pre-Construction Stage	300	-	-	https://www.kxnet.com/news/local-news/badger-wind-farm-is-approved-with-warning-from-public-service-commission/
Glendive Wind Project	ND	Wind	2026	800	400		https://www.nexteraenergyresources.com/glendive-wind.html
Homestead Wind Farm	ND	Wind	Unknown, Pre-Construction Stage	255	100	15	https://www.homesteadwind.com/about_homestead
Mountrail Wind Project	ND	Wind	Unknown, Pre-Construction Stage	300	-	-	https://www.enelgreenpower.com/our-projects/in-development/mountrail-wind-project
North Dakota III Wind Farm Project	ND	Wind	2026	800	300	8	https://www.jamestownsun.com/news/project-includes-installing-up-to-285-wind-turbines-in-stutsman-lamoure-counties
OLIVER WIND IV	ND	Wind	End of 2024	202	200	6	https://www.nexteraenergyresources.com/oliver-wind/project-overview.html
Great Places Wind Energy Center	SD	Wind	Unknown, Pre-Construction Stage	250	-	-	https://www.bigbendwind.com/
North Bend Wind Project	SD	Wind	2025	200	400	8	https://www.energy.gov/sites/default/files/2023-03/draft-ea-2161-north-bend-wind-2023-03.pdf#:~:text=creating%20additional%20employment%2C%20income%2C%20and%20tax%20revenue.,would%20be%20onsite%20at%20any%20given%20time.
Philip Wind Energy Center	SD	Wind	Unknown, Pre-Construction Stage	300	200	20	https://philipwind.invenergy.com/
South Deuel Wind Energy Center	SD	Wind	Q4 2026	260	243	8	https://deuelwind.invenergy.com/index
Swan Lake Wind	SD	Wind	December 2027	248	400	3	https://intuviosolutions.blob.core.windows.net/templator-uploads/Uploads/documents/25/06-06-2024%20Commission%20Meeting%20Packet%20Part%202.pdf

Project Name	State	Plant Type	Expected Completion	Expected Capacity (MW)	Expected Jobs (Peak Construction)	Expected Jobs (Operations)	Source
Rail Tie Wind Farm	WY	Wind	Unknown, Pre-Construction Stage	504	113	23	https://cityoflaramie.org/AgendaCenter/ViewFile/Item/8581?fileID=11284
Boswell Springs Wind Farm	WY	Wind	End of 2024	330	150	10	https://www.innergex.com/en/sites/boswell-springs
Chokecherry and Sierra Madre Wind Energy Project	WY	Wind	June 2029	3550	1000	114	https://eplanning.blm.gov/public_projects/nepa/70695/93597/112850/CCSM_Factsheet.pdf
Jackalope Wind Energy Project	WY	Wind	Unknown, Pre-Construction Stage	600	450	20	https://www.nexteraenergyresources.com/jackalope-wind/project-overview.html
Lucky Star Wind Project	WY	Wind	Unknown, Pre-Construction Stage	500	400	14	https://bluearthrenewables.com/projects/lucky-star-wind-project/
Settler Wind Farm	WY	Wind	End of 2026	150	200	5	https://www.aes.com/wyoming/project/settler-wind-project
Two Rivers Wind	WY	Wind	2028	280	170	10	https://bluearthrenewables.com/projects/two-rivers-wind-project-2/
Cheyenne River Ranch Wind & Solar Project	SD	Wind + Solar	Unknown, Pre-Construction Stage	53 (Wind) + 89 (Solar)	-	-	https://www.newunderwood.com/vertical/sites/%7BB653AB5C-04F0-492E-AC0F-BF250324C8ED%7D/uploads/Cheyenne_River_Ranch_Wind__Solar_QA.pdf

Appendix B: Future Oil and Gas Projects

Project Name	State	Category	Plant Type	Construction Timeline	Source
Snowy River Carbon Dioxide Sequestration Project	MT	Natural Gas Processing	CCS	Under environmental review by the Bureau of Land Management	https://billingsgazette.com/news/state-regional/government-politics/exxonmobile-carbon-capture-southeast-montana/article_99230f12-cfa3-11ee-8dc7-df9e6254865f.html
Project Tundra	ND	Natural Gas Processing	CCS	Awaiting final construction decision	https://finance.yahoo.com/news/tc-energy-exits-north-dakotas-122700772.html
Summit Carbon Solutions	ND	Natural Gas Processing	CCS	Construction of the project would begin in 2026 with operations beginning in 2027	https://www.msn.com/en-us/news/us/north-dakota-regulators-ok-underground-storage-for-proposed-midwest-carbon-dioxide-pipeline/ar-AA1vl9Z3?ocid=TobArticle&apiversion=v2&noservercache=1&domshim=1&renderwebcomponents=1&wcseo=1&batchservertelemetry=1&noservertelemetry=1
LaBarge Facility Expansion	WY	Natural Gas Processing	CCS	Aimed to be operational in 2025	https://corporate.exxonmobil.com/news/news-releases/2022/0225_exxonmobil-to-expand-carbon-capture-and-storage-at-labarge-wyoming-facility
Sweetwater Carbon Storage Hub	WY	Natural Gas Processing	CCS	Set to complete its first Class VI well by Q2 2025	https://www.yourcentralvalley.com/business/press-releases/cision/20241211DA77055/frontier-carbon-solutions-announces-expected-offering-of-co2-removal-credits-in-connection-with-carbon-capture-storage-project/
Ceralon	ND	Natural Gas Processing	Gas-to-Liquids and CCS	Targeted for startup in 2028, Phase 1 of the GTL complex is anticipated to reach full operations in 2029	https://www.ogj.com/refining-processing/gas-processing/new-plants/article/55172830/north-dakota-approves-permit-for-cerilons-proposed-gtl-complex
Babcock & Wilcox Hydrogen Generating Facility	WY	Natural Gas Processing	Hydrogen Generation Facility	The plant cost and construction start date were not disclosed in the application	https://www.enr.com/articles/58173-babcock-and-wilcox-utility-gain-16m-for-blue-hydrogen-at-wyo-plant
MountainWest Overthrust Westbound Compression Expansion	WY	Natural Gas Processing	Natural Gas Production	Expansion aimed to be operational by Q4 2025	https://www.williams.com/expansion-project/mountainwest-overthrust-westbound-compression-expansion/
Naughton Power Plant Conversion	WY	Natural Gas Processing	Power Plant Conversion	Natural gas conversion will begin June 2025, fully stop using coal by the end of 2025	https://www.wyomingpublicmedia.org/natural-resources-energy/2024-12-06/coal-to-natural-gas-conversions-are-full-steam-ahead-in-southwest-wyoming

Project Name	State	Category	Plant Type	Construction Timeline	Source
Davis Refinery Project	ND	Oil & Gas Plant	Clean Transportation Fuels	Field Construction (e.g. roads, utility relocation) under way for heavy equipment and construction material delivery in 2025	https://www.globenewswire.com/news-release/2024/10/29/2970859/0/en/Meridian-Energy-Group-Inc-Announces-Field-Construction-Resumed-at-Davis-Refinery-Site-in-North-Dakota.html
EOR Etc.	ND	Oil & Gas Plant	Enhanced Oil Recovery	Ongoing research, source of revival of oil industry	https://northdakotamonitor.com/2024/05/14/pilot-projects-seek-to-unlock-enhanced-oil-recovery-in-north-dakota/
BLM Oil and Gas Lease Sale	MT	Oil & Gas Plant	Oil and Gas Drilling	Announced	https://www.blm.gov/announcement/blm-announces-july-2024-oil-and-gas-lease-sale-montana-and-north-dakota
BLM Oil and Gas Lease Sale	ND	Oil & Gas Plant	Oil and Gas Drilling	Announced	https://www.blm.gov/announcement/blm-announces-july-2024-oil-and-gas-lease-sale-montana-and-north-dakota
Converse County Oil and Gas Project	WY	Oil & Gas Plant	Oil and Gas Drilling	Halted by the Federal District Court	https://www.westernwatersheds.org/2024/09/court-ruling-halts-5000-well-oil-and-gas-drilling-project-in-eastern-wyoming/
Minnesota SAF Hub	MN	Oil & Gas Plant	Sustainable Aviation Fuel Refinery	Work is expected to be completed in the Q4 of 2025	https://www.businesswire.com/news/home/20240910858359/en/Plans-for-Minnesota%E2%80%99s-First-Sustainable-Aviation-Fuel-SAF-Blending-Facility-Revealed-by-GREATER-MSP-Partnership-led-Coalition
MaxSAF facility	MT	Oil & Gas Plant	Sustainable Aviation Fuel Refinery	Expansion aimed to be completed by 2026	https://www.spglobal.com/commodity-insights/en/news-research/latest-news/crude-oil/101724-us-doe-approves-gevo-montana-renewables-saf-project-loans
Gevo SAF Facility	SD	Oil & Gas Plant	Sustainable Aviation Fuel Refinery	Construction is expected to begin in 2025 and ramp-up of the facility is slated for 2027	https://www.canarymedia.com/articles/air-travel/doe-makes-3b-commitment-to-two-sustainable-aviation-fuel-projects

APPENDIX E – COUNTY ZONING APPROVAL

Williams
COUNTY

January 14, 2025

Basin Electric Power Cooperative
1717 East Interstate Ave
Bismarck ND 58503

RE: LU-0089-24 Basin Electric Power Cooperative is requesting a Zone Change to Heavy Industrial for a proposed +/- 239.92-acre parcel.
Location: NE, NW, & SW of Section 20, T156N, R98W, Williams County, ND
Township: Wheelock

Dear Applicant:

On January 7, 2025, the Williams County Board of County Commissioners approved this request provided you comply with the following special conditions and restrictions:

1. Adhere to the Williams County Zoning Ordinance and Subdivision Regulations.
2. Approval from the Williams County Water Resource District Board must be obtained prior to construction beginning.
3. Work with Township and County Highway to obtain all necessary approach permits.
4. Recordation of the plat.

Please contact the Planning and Zoning Division should you have any questions.

Thank you,

Kameron Hymer
Development Services Director

APPENDIX F – NWRWD WATER APPLICATION

NORTHWEST RURAL WATER DISTRICT
FUTURE HOOK-UP APPLICATION
5091 142nd Avenue NW, P.O. Box 1285, Williston, ND 58802-1285 - Phone: (701) 774-8915 - E-mail: melissa@northwestruralwater.com

Date Application Received: ______
Date Application Fee Paid: ______
Amount: ______
Check Number: ______
Date Hook-up Fee Paid: ______
Amount: ______
Check Number: ______

Date of Application: 10/15/2024

Name of Applicant: Basin Electric Power Cooperative

If Applicant is Entity, Name of Contact Person: Owen McGregor-Mechanical Engineer

Mailing Address: 1717 E Interstate Ave. Bismarck, ND 58503

Home/Office Phone: (701) 557-5118 Cell Phone: (____) ______

E-mail: omcgregor@bepc.com

Physical Address of Property to be Served: 63rd St 121st Ave NW
Ray, ND 58849

Legal Description of Property to be Served: Township 156 North, Range 98 West of the 5th P.M.
Section 20: NE1/4

It is the responsibility of the applicant to install, at the applicant's own expense, the service pipeline from the District's main distribution pipeline to the intended place of use of the applicant. The installation shall comply with the Rules and Regulations of the District, which includes hiring an approved contractor and approved plumber.

Type of Hook-up

______ Single Family Home	______ Farm & Ranch	______ Apartment/Duplex/Townhouse	______ Hotel
______ Commercial	X Industrial	______ Temp Housing/Man Camp	______ RV Park/Units

For anything other than a single family home:
Explanation: Basin Electric is considering building a new natural gas fired power generation facility on the property. Anticipate water delivery point along the east edge of the property.

Number of Anticipated Units: 1 Estimated Usage per Unit: 223 GPM (52 Ave.)(625 Peak)

Approval from N.D. Dept. of Health Attached: Yes / No (circle one)
Map or Survey Attached: Yes / No (circle one)
Attach map in order to avoid delay in review of Application
Preliminary Design Site Plan Attached: Yes / No (circle one)
Design plans are required prior to approval

Contractor: To be determined Phone: ______

Engineer: To be determined Phone: ______

Plumber: To be determined Phone: ______

Applicant Signature: ______

Application Approval: ______ **Date:** ______ **Zone:** ______

Requirements (if any): ______

NORTHWEST RURAL WATER DISTRICT

SUMMARY OF CERTAIN FEES AND CHARGES FOR APPLICATION AND MEMBERSHIP (Current as of 1/1/2023)

The following is an explanation of some of the fees and charges associated with application for membership and membership with Northwest Rural Water District ("the District"). The following are currently in force, but they are subject to change by the District in accordance with the By-Laws and the Rules and Regulations of the District.

1. **Application Fee**

   a. The application fee is a flat fee for engineering and processing costs.

   b. Every applicant shall pay a non-refundable application fee to the District at the time of submitting a completed application.

   c. The application fee is non-refundable.

   d. **The application fee is $250.00 for all applications.**

2. **Hook-up Fee and Meter Assembly Fee**

   a. Every applicant shall pay the hook-up fee *plus* the additional charge for the meter assembly and all underground parts before construction begins along with a completed water users agreement to the District.

   b. **The hook-up fees are as follows:**

Meter Assembly Size	**Total Hook-up Fee**
¾"	$5,000.00
1"	$5,000.00
2"	$7,500.00
3"	$10,000.00
4"	$12,500.00
5"	$15,000.00
6"	$17,500.00

3. **<u>Monthly Minimum Charges</u>**

   a. Each member shall pay the monthly minimum charge on the member's account for the hook-up, regardless if water is being used by the member.

   b. The monthly minimum charge is based on the size of the meter assembly associated with the hook-up.

   c. **The monthly minimum charges are as follows:**
      i. **¾" meter assembly: $45.00 per month**
      ii. **1" meter assembly: $110.00 per month**
      iii. **2" meter assembly: $210.00 per month**
      iv. **3" meter assembly: $310.00 per month**
      v. **4" meter assembly: $410.00 per month**
      vi. **5" meter assembly: $510.00 per month**
      vii. **6" meter assembly: $610.00 per month**

4. **<u>Water Rates</u>**

   a. Each member shall pay for water based on usage each month.

   b. The rate is based on the thousands of gallons per month that each member uses.

   c. The current water rates are available from the District.

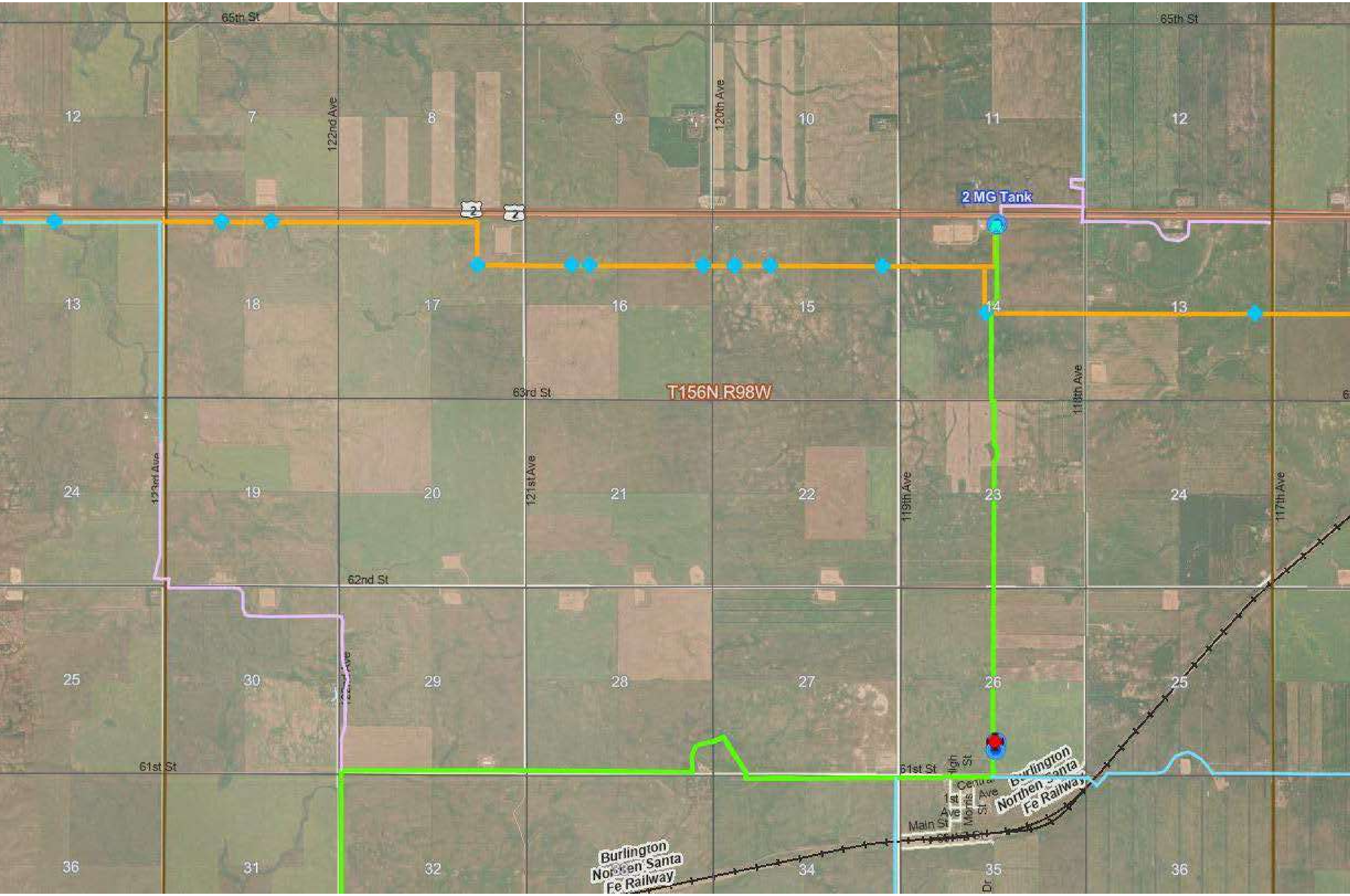
5. **<u>Late Fees and Reconnect Fees</u>**

   a. The Due Date for the monthly minimum and the water payments is the 20th of the month.

   b. If payment is not made by the Due Date, the District may assess a late fee of at least 3.0%.

   c. If payment is not made within thirty (30) days after the Due Date, the District may shut off the water to the member's property without any notice thereof and may assess an additional late fee.
      i. If the District shuts off the member's water at least three (3) times, the District may cancel the membership of the member.

   d. If the District shuts off the water to the member's property, the member shall pay a reconnect fee of $200.00 for the first instance.



65th St
65th St
2 MG Tank
T156N R98W
63rd St
62nd St
61st St
61st St
122nd Ave
120th Ave
121st Ave
123rd Ave
119th Ave
118th Ave
117th Ave
Main St
Burlington Northen Santa Fe Railway
Burlington Northen Santa Fe Railway
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APPENDIX G – NOISE STUDY

BASIN ELECTRIC POWER COOPERATIVE

SOUND STUDY

BISON GENERATION STATION – WHEELOCK TOWNSHIP, WILLIAMS COUNTY, NORTH DAKOTA

PROJECT NO. 175462

REVISION 2

JANUARY 16, 2025

CONTENTS

FIGURES

TABLES

List of Abbreviations

Abbreviation	Term/Phrase/Name
ANSI	American National Standards Institute
ACC	air-cooled-condenser
ACHE	air-cooled heat exchanger
BEPC	Basin Electric Power Cooperative
BMcD	Burns & McDonnell
BOP	balance-of-plant
CadnaA	Computer Aided Noise Abatement
CTG	combustion turbine generator
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
ISO	International Organization for Standardization
Hz	Hertz
L_{dn}	day-night average sound level
L_{eq}	equivalent-continuous sound level
L_{10}	10-percentile exceedance sound level
L_{50}	50-percentile exceedance sound level
L_{90}	90-percentile exceedance sound level
mph	miles per hour
NIST	U.S. National Institute of Standards and Technology
Project	Bison Generation Station
PWL	sound power level
SPL	sound pressure level
STC	sound transmission class
STG	steam turbine generator
USEPA	United States Environmental Protection Agency

Executive Summary

Burns & McDonnell (BMcD) conducted a sound study for Basin Electric Power Cooperative (BEPC) proposed Bison Generation Station (Project) located in Wheelock Township, Williams County, North Dakota. The Project includes two (2) 1x1 combined-cycle H-class power blocks and associated balance of plant (BOP) equipment. Suppliers for the power block equipment have not been selected at this time. Therefore, this study is based on a Mitsubishi Hitachi Power Systems 501JAC combustion turbine generator (CTG) and associated steam turbine generator (STG) combination. The Project will include two (2) air-cooled-condensers (ACCs) and two (2) air-cooled heat exchangers (ACHEs).

The State of North Dakota does not have applicable noise statutes which limit noise from the Project. There are also no numerical noise limits identified for Wheelock Township or Williams County that would be applicable to Project operation, only general language on limiting noise from industrial sources. In the absence of regulatory numerical noise limits, Project sound levels were compared to industry guidelines to limit noise impacts on the surrounding community. For A-weighted sound levels (dBA), guidance from the United States Environmental Protection Agency (USEPA) recommends limiting sound levels at nearby residential receptors to a constant sound level of less than 48.6 dBA. For assessing low-frequency impacts, the American National Standards Institute (ANSI), standard ANSI S12.9, provides guidance that low-frequency sound levels in the 16-, 31.5-, and 63-Hertz (Hz) octave bands less than 65 decibels (dB) generally result in minimal annoyance. This would be approximately equal to a C-weighted sound level (dBC) of 68 dBC for sources with strong low frequency content.

The Project normal operational sound levels, as currently designed, are expected to be below the recommended noise criteria provided by USEPA and ANSI S12.9. The predicted most impacted receptor is expected to be 42 dBA and 64 dBC, from the Project. These sound levels are expected to be comparable to the average existing nighttime ambient sound levels of 40 dBA and 66 dBC, and below the average existing daytime levels of 50 dBA and 75 dBC.

It should be noted that the USEPA guidelines and the ANSI standard are not intended to be construed as regulatory limits as they do not consider cost or engineering feasibility associated with mitigation. In addition, meeting the sound level guidance does not guarantee that complaints would not ever arise. However, they are generally used for guidance for minimizing the potential for noise impacts on the surrounding community.

1.0 Acoustic Terminology

The term "sound level" is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level (PWL). The PWL is the acoustical energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustical energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure levels (SPL), are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micropascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered "just barely perceptible"; a 5-dB change is generally considered "clearly noticeable"; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different wavelengths, also known as the frequency. Frequency is measured in hertz (Hz) and is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 1-1. The C-weighting scale has more of an emphasis on low frequency content than the A-weighting scale and is generally used to describe the low frequency characteristics of sound levels (e.g., "rattling" or "rumbling" associated with sound levels).

Sound in the environment is constantly fluctuating, as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level is the sound level exceeded during "x" percent of the sampling period and is also referred to as a statistical sound level. Common exceedance sound level values are the 10-, 50-,90-percentile exceedance sound levels, denoted by L_{10}, L_{50}, and L_{90}. The equivalent-continuous sound level (L_{eq}) is the energy average of the varying sound over a given time period and is the most common metric used to describe sound. The USEPA uses a noise metric called the day-night average sound level (L_{dn}) which is a 24-hour average sound level, with a 10-dBA penalty applied to sound measured during nighttime hours (10:00 PM to 7:00 AM).

Table 1-1: Typical Sound Pressure Levels Associated with Common Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private Office
40		Farm field with light breeze, birdcalls
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Sources:
(1) Adapted from *Architectural Acoustics*, *M. David Egan, 1988*
(2) *Architectural Graphic Standards*, Ramsey and Sleeper, 1994

2.0 Applicable Regulations & Criteria

The Project is located within Williams County, North Dakota within Wheelock Township. The State of North Dakota does not have applicable noise statutes which limit noise from the Project. The Williams County Zoning Ordinance and Subdivision Regulations[1] were also updated recently (January 2024) and no longer include specific numerical noise limits applicable to the Project that previous versions of the ordinance did.

While there is not a numerical noise limit, there is indication that nuisance noise from the industrial noise sources should be considered at nearby noise sensitive receptors. In absence of numerical noise limits, Project sound levels can be compared to USEPA guidelines and the ANSI S12.9 standard.

2.1 USEPA Guidelines

In 1974 the USEPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. As part of this document, the recommended noise limit is a day-night level (L_{dn}) of 55 dBA at the nearest noise sensitive receptors (i.e., residents). This would be equal to an equivalent continuous sound level (L_{eq}) of 48.6 dBA for a constant source operating continuously (i.e., 24-hours). The USEPA notes that these recommended sound levels are not to be construed as regulatory limits as they do not account for costs of feasibility associated with meeting these target levels. However, they are generally appropriate levels to protect the health and welfare of the community.

2.2 ANSI S12.9 Part 4

Since there is potential for low-frequency noise to be emitted from the Project, ANSI S12.9 Part 4 provides informative guidance for sounds with strong low-frequency content. Section D.2 states the following:

> *"Generally, annoyance is minimal when octave-band sound pressure levels are less than 65 dB at 16, 31.5, and 63-Hz midband frequencies."*

For sounds with strong low-frequency content, this would be approximately equivalent to a C-weighted sound level of 65 to 70 dBC. A target sound level of 68 dBC for the Project falls within this range and should help minimize the potential for low-frequency impacts based on the guidance from the ANSI standard. This target sound level would be evaluated at the residential structure.

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[1] https://www.williamsnd.com/documents/zoning-ordinance-and-subdivision-regulations/ (last accessed July 15, 2024).

3.0 Sound Level Measurements

Burns & McDonnell personnel took sound level measurements to establish the existing ambient sound levels in the areas surrounding the Project. Continuous sound level measurements were collected at one measurement location on the Project site, representative of the existing ambient sound level surrounding the Project area. The long-term measurement location is shown in Figure 3-1. The microphone was placed approximately five feet above the ground and mounted on a tripod.

Sound level measurements were made using a sound level meter that meets the American National Standards Institute (ANSI) S1.4 requirements for a Type 1 Precision Sound Level Meter. A one-half inch random-incidence microphone was used on the meter for all measurements. The sound level meter was calibrated before and after the measurements using a sound level calibrator. Calibration level changes did not exceed ± 0.5 dB during the measurements. The meter and calibrator were checked within a year prior of the measurements to verify compliance with the U.S. National Institute of Standards and Technology (NIST) specifications.

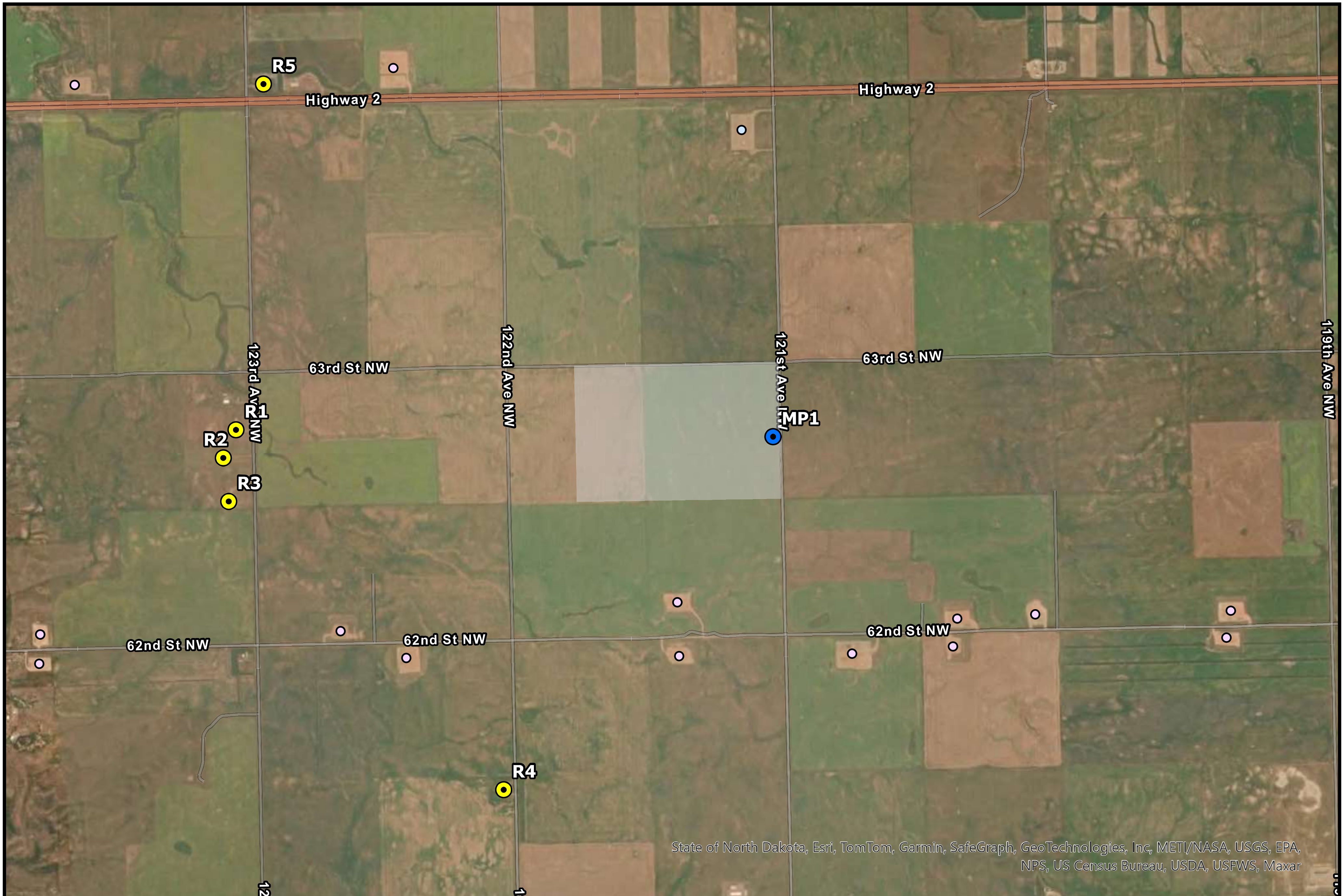
The monitor measured sound levels continuously over a 24-hour period from approximately 1:00 PM on September 30, 2024, to 2:00 PM on October 1, 2024. Ambient sound levels in the area were primarily comprised of intermittent traffic and natural sound sources such as insects and birds. The measured sound level data is shown in graph and tabular form in Appendix B. A summary of the data is shown in Table 3-1 below.

Table 3-1: Ambient Measurement Summary

Time of Day[1]	L_{eq} (dBA)	L_{90} (dBA)	L_{eq} (dBC)	L_{90} (dBC)
Daytime Average	50	41	75	68
Nighttime Average	40	35	66	59

1) Daytime is from 7 AM to 10 PM, and nighttime is from 10 PM to 7 AM

From the previous table, existing average L_{eq} daytime sound levels of 50 dBA/75 dBC and nighttime L_{eq} sound levels of 40 dBA/66 dBC indicate that the recommended constant sound levels for the Project of 48.6 dBA/68 dBC would fall within the existing daytime/nighttime sound level range and Project sound levels would be comparable to the existing environment.



LEGEND

- Project Property Boundary
- Residential Receptors
- Measurement Point
- Existing Well Pads
- Existing Substation

REFERENCE

0 0.35 0.7 MILES

0 0.35 0.7 KILOMETERS

N

Figure 3-1
Ambient Measurement Location

LOCATION:	Williams County, ND
CLIENT:	Basin Electric Power Cooperative
PROJ. NO.:	175462
CREATED:	01/02/2025

BURNS McDONNELL
www.burnsmcd.com

Path: Z:\Clients\ENS\BasinEPC\175462_BasinWLPPermit\Studies\Modeling\Noise\GIS\Basin Williston GIS\Basin Williston GIS.aprx • Coordinate System: • Units:

4.0 Sound Modeling

Operational sound level modeling for the proposed Project was performed using the Computer Aided Noise Abatement (CadnaA) modeling software. Equipment sound levels used for modeling were based on a combination of in-house data and estimated sound levels for the MHPS 501JAC combined-cycle power blocks and auxiliary equipment. This model was used for determining expected sound levels due to the Project and the associated impacts to the existing ambient sound levels at the nearest noise sensitive receptors.

4.1 Sound Modeling Methodology and Input Parameters

Predictive noise modeling was performed using the industry-accepted sound modeling software CadnaA, version 2024. The software is a scaled, three-dimensional program, which considers air absorption, terrain, ground absorption, and reflections and shielding for each piece of noise-emitting equipment, and then predicts sound pressure levels at discrete locations and over a gridded area based on input source sound levels. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:2024, General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center-frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation and directivity. The sound-modeling software calculates omnidirectional, downwind sound propagation, in tandem with user-specified source directivities and propagation properties. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result, modeling results generally are considered a conservative measure of the Project's actual sound level.

The modeled atmospheric conditions were assumed to be calm, and the temperature and relative humidity were left at the program's default values. Reflections and shielding were considered for sound waves encountering physical structures. Sound levels around the site can be influenced by the sound reflections from physical structures onsite. The area surrounding the Project has mild elevation changes, which scatter and absorb the sound waves. Thus, terrain was included to account for surface effects such as ground absorption. Average ground absorption for the Project site and surrounding area was set to 0.5 to account for the mix of hard pavement and soft vegetative ground. The modeling assumptions are outlined in Table 4-1. This model is exclusive of noise sources not associated with the Project (e.g., traffic noise and local fauna). Only Project sound levels have been evaluated.

Table 4-1: Sound Modeling Parameters

Model Input	Parameter Value
Ground Absorption	0.5
Number of Reflections	2
Receptor Height	5 feet above grade
Terrain	USGS topographic land data
Temperature	50 °F
Humidity	70%

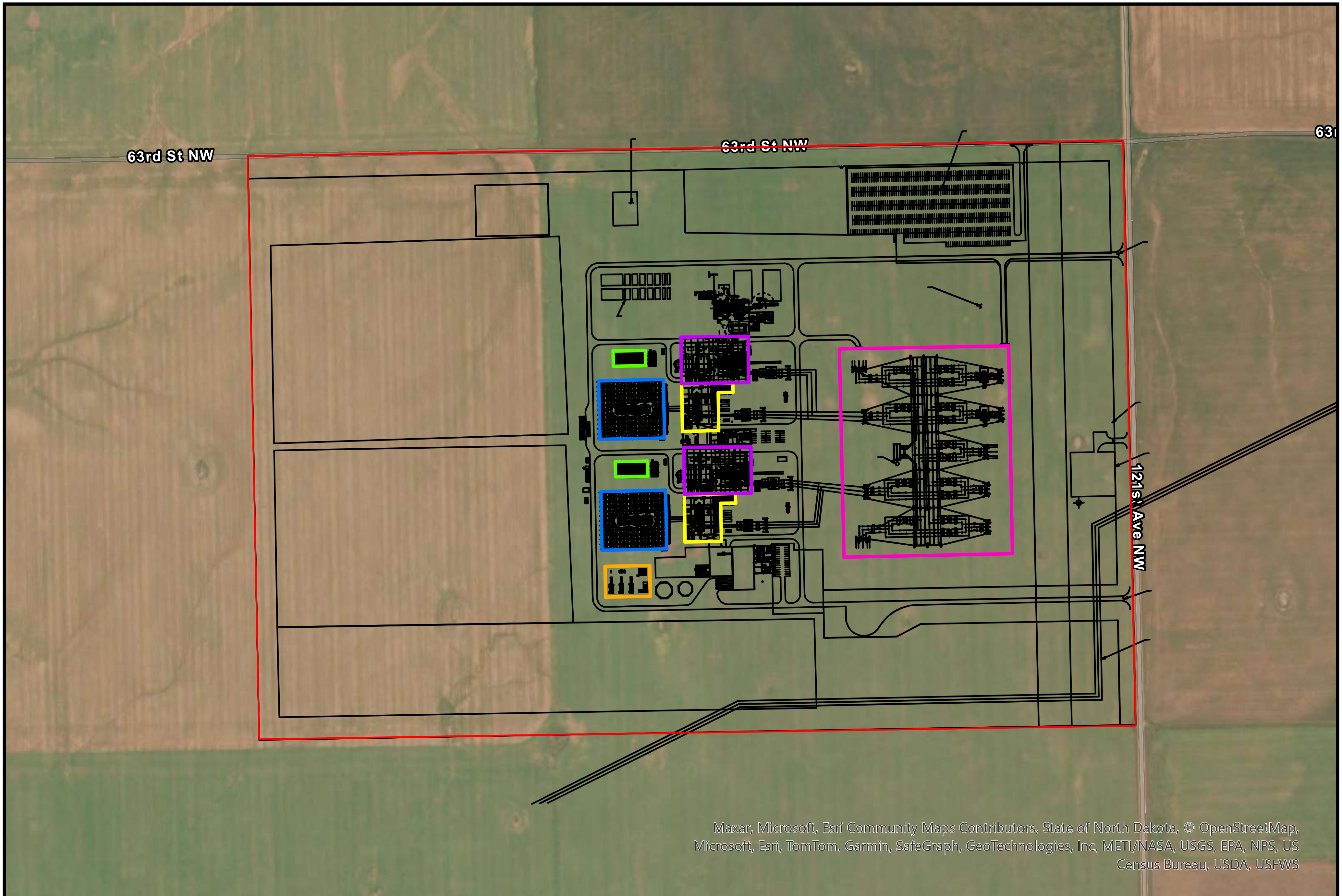
4.2 Equipment Sound Levels

The Project general arrangement is shown in Figure 4-1. The octave-band sound levels for each piece of equipment are included in Appendix A along with a note of the source for the sound level. The preliminary design is assumed to be base package offerings, which includes a standard HRSG stack for the MHPS 501JAC. The CTG and STG packages will be housed inside insulated metal panel buildings, with the CTG filter house intake located on the roof of the CTG building. The insulated metal panel is expected to have a minimum sound transmission class (STC) rating of STC 30. The expected acoustical design for the Project's major noise producing equipment is summarized in Table 4-2 below. The Project will review these sound levels when supplier data is provided to verify sound level assumptions used for this study are representative of the final Project design.

Table 4-2: Project Expected Acoustical Design

Equipment	QTY	Base Sound Pressure Levels	Notes
Power Block Equipment			
MHPS 501JAC Power Block	2	See Appendix A	Standard package equipment including auxiliary skids, housed inside CTG & STG Buildings[1]
BOP Equipment			
GSU Transformer	2 (1 per unit)	85 dBA at 3 feet	
Dew Point Heaters	2	85 dBA at 3 feet	
Air-cooled condenser (ACC)	2 (1 per unit)	65 dBA at 400 feet	Standard package ACC
Air-cooled heat exchanger	2 (1 per unit	63 dBA at 400 feet	Standard package ACHE
HVAC Units	2	80 dBA at 3 feet	
ACC Steam Piping	2 (1 per unit)	84 dBA at 3 feet	Portion Outside Building
Pumps, Valves, Skids, etc.	--	85 dBA at 3 feet	

1) Building construction assumed to be insulated metal panel with minimum STC 30



LEGEND

- Project Property Boundary
- ACC
- ACHX
- CTG Building
- STG Building
- Gas Yard
- Substation

REFERENCE

0 0.08 0.16
MILES

0 0.09 0.17
KILOMETERS

N

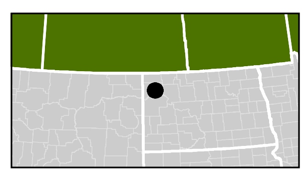


Figure 4-1
General Arrangement

LOCATION:	Williams County, ND
CLIENT:	Basin Electric Power Cooperative
PROJ. NO.:	175462
CREATED:	01/16/2025

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www.burnsmcd.com

Path: Z:\Clients\ENS\BasinEPC\175462_BasinWLPPermit\Studies\Modeling\Noise\GIS\Basin Williston GIS\Basin Williston GIS.aprx • Coordinate System: • Units:

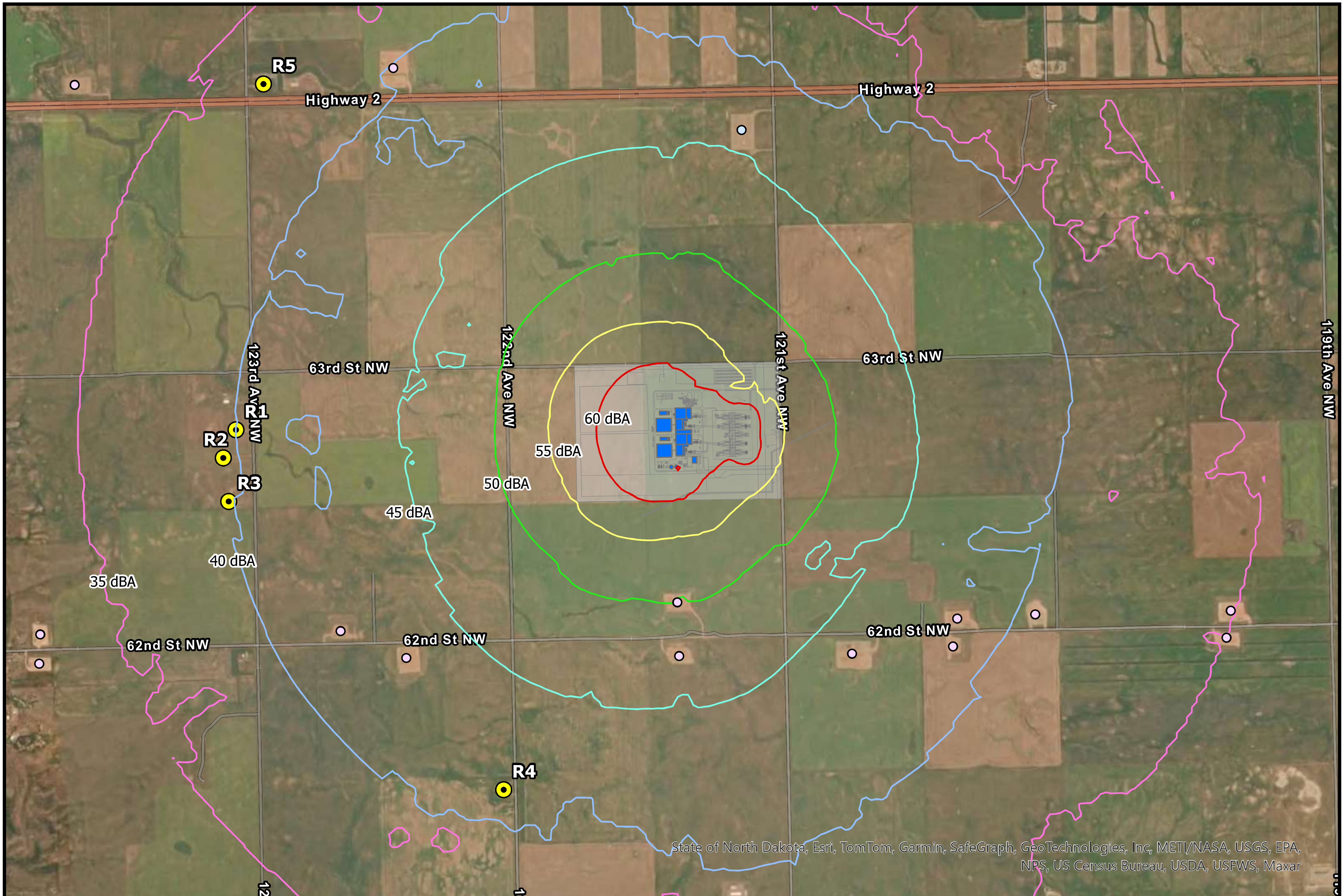
4.3 Model Results

The Project will operate at fairly constant sound levels when operational and could operate day and/or night. Therefore, steady-state sound level predictions were completed for normal operation. The predicted overall steady-state operational A-weighted sound levels, which do not include contributions from ambient sound sources, are shown with 5-dB contours in Figure 4-2. As shown in the figure, the nearest occupied residential receptor is located approximately 6,900 feet southwest of the nearest power block. Table 5 includes the predicted Project A-weighted and C-weighted sound levels at the specific nearest residential receptors.

Table 4-3: Residential Receptor Sound Levels

Receptor Name[1]	USEPA Criteria (dBA)	Project Sound Levels (dBA)	ANSI S12.9 Criteria (dBC)	Project Sound Levels (dBC)
R1	48.6	40	68	64
R2	48.6	40	68	63
R3	48.6	40	68	63
R4	48.6	42	68	64
R5	48.6	36	68	59

As indicated by the table, all receivers are predicted to be below the USEPA and ANSI S12.9 recommended criteria with the assumed base package equipment. Additionally, Project sound levels are expected to be below the existing daytime average ambient sound levels and most receptors are expected to be at or below the existing average nighttime sound levels. Receptor, R4 is the only receptor predicted to be slightly above the existing average nighttime ambient by 2 dBA, but C-weighted sound levels are still expected to be below the average nighttime ambient. Results indicate the Project should generally be comparable to the existing ambient sound levels surrounding the Project.



LEGEND

- Project Property Boundary
- Receptors
- Structures
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- Existing Substation
- Existing Well Pads

REFERENCE

0 0.35 0.7 MILES

0 0.35 0.7 KILOMETERS

N

Figure 4-2
Sound Level Contours

LOCATION:	Williams County, ND
CLIENT:	Basin Electric Power Cooperative
PROJ. NO.:	175462
CREATED:	01/02/2025

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Path: Z:\Clients\ENS\BasinEPC\175462_BasinWLPPermit\Studies\Modeling\Noise\GIS\Basin Williston GIS\Basin Williston GIS.aprx • Coordinate System: • Units:

5.0 Conclusion

Burns & McDonnell conducted a sound study for BEPC proposed Bison Generation Station, which is a combined-cycle gas generation station located in Wheelock Township, Williams County, North Dakota. The Project includes two (2) 1x1 combined-cycle H-class power blocks and associated BOP equipment.

The State of North Dakota does not have applicable noise statutes which limit noise from the Project and there were also no numerical noise limits identified for Wheelock Township or Williams County that would be applicable to Project operation, only general language on limiting noise from industrial sources. In the absence of regulatory numerical noise limits, Project sound levels were compared to industry guidelines to limit noise impacts on the surrounding community. For A-weighted sound levels, guidance from the USEPA was used to limit Project sound levels to a constant sound level of less than 48.6 dBA. For assessing low-frequency impacts, ANSI S12.9 was used to limit Project C-weighted sound levels to 68 dBC for sources with strong low frequency content.

The Project normal operational sound levels, as currently designed, are expected to be below the recommended noise criteria provided by USEPA and ANSI S12.9. The predicted most impacted receptor is expected to be 42 dBA and 64 dBC, from the Project. These sound levels are also expected to be comparable to the average existing nighttime ambient sound levels of 40 dBA and 66 dBC, and below the average existing daytime sound levels of 50 dBA and 75 dBC. This indicates that Project sound levels are expected to be comparable to the average existing acoustic environment surrounding the Project.

It should be noted that the USEPA guidelines and the ANSI standard are not intended to be construed as regulatory limits as they do not consider cost or engineering feasibility associated with mitigation required to meet these guidelines. In addition, meeting the sound level guidance does not guarantee that complaints would not ever arise. However, they are generally used for guidance for minimizing the potential for noise impacts on the surrounding community.

APPENDIX A – MODELED SOUND POWER LEVELS

Appendix A - Base Design Modeled Sound Power Levels

Basin Electric Power Cooperative

Bison Generation Station Wheelock Township

Name	Number of Sources	Sound Power Level (dB)[1] Octave Band Frequency (Hz) 31.5	63.0	125	250	500	1000	2000	4000	8000	Overall (dBA)	Notes
Power Block (Outdoor Equipment)												
GT 4S Cooler	2 (1 per unit)	109	106	103	100	94	93	99	103	89	**106**	MHI Provided
CT Air Filter Face	2 (1 per unit)	137	119	104	87	95	104	94	85	85	**106**	MHI Provided
CT Air Filter House	2 (1 per unit)	126	113	100	86	73	88	90	99	101	**103**	MHI Provided
CT Building Vent Opening	6 (3 per block)	120	116	106	96	91	97	93	93	85	**101**	Calculated from interior levels
ST Building Vent Opening	6 (3 per block)	100	100	99	95	93	89	88	86	80	**96**	Calculated from interior levels
HRSG Stack Casing	2 (1 per unit)	133	127	119	108	97	88	79	75	71	**107**	In-house sound levels
HRSG Stack Exit	2 (1 per unit)	131	129	125	118	110	105	95	90	85	**114**	In-house sound levels
CTG Building Indoor Equipment												
Boiler Feedwater Pumps	2 (per bldg)	104	110	108	102	103	112	110	106	96	**116**	In-house sound levels
Fuel Gas Heaters	2 (per bldg)	106	102	104	94	88	86	86	83	79	**94**	In-house sound levels
Duct Burner Skid	1 (per bldg)	107	113	115	107	97	99	103	104	101	**110**	In-house sound levels
Fuel Gas Filter	3 (per bldg)	106	102	104	94	88	86	86	83	79	**94**	In-house sound levels
GT Casing Cooling Fan	1 (per bldg)	104	106	92	89	95	89	87	85	78	**96**	In-house sound levels
GT Generator	1 (per bldg)	116	109	125	96	95	97	85	84	72	**109**	MHI Provided
GT Enclosure	1 (per bldg)	113	114	117	110	107	112	108	106	96	**115**	MHI Provided
GT Vent Fans	2 (per bldg)	104	107	110	105	101	98	95	94	82	**104**	MHI Provided
GT Vent Duct	2 (per bldg)	111	112	106	104	103	100	98	86	80	**105**	MHI Provided
GT Lube Oil Skid	1 (per bldg)	102	111	116	108	108	106	103	97	88	**111**	MHI Provided
GT TCA Cooler	1 (per bldg)	119	119	118	113	110	107	99	95	91	**112**	In-house sound levels
Enhanced Cooling Air Cooler	1 (per bldg)	109	106	103	100	94	93	99	103	89	**106**	In-house sound levels
Lube Oil Mist Separator	1 (per bldg)	109	102	100	96	101	102	97	91	84	**105**	MHI Provided
GT Cooling Air Compressor	1 (per bldg)	104	105	110	111	106	99	82	76	70	**107**	MHI Provided
HRSG SCR Skid	1 (per bldg)	107	113	115	107	97	99	103	104	101	**110**	Estimated 85 dBA @ 3-ft
HRSGE Blowdown Tank	1 (per bldg)	103	98	100	93	93	91	94	91	88	**99**	In-house sound levels
GT Inlet Filter Silencer Duct	1 (per bldg)	124	119	103	91	82	103	100	100	96	**107**	MHI Provided
GT Inlet Filter IBH Duct	1 (per bldg)	121	116	102	94	86	108	105	104	97	**112**	MHI Provided
GT Inlet Elbow Duct	1 (per bldg)	131	126	112	104	96	118	114	114	107	**121**	MHI Provided
GT Inlet Vertical Duct	1 (per bldg)	129	124	110	102	94	116	112	112	105	**119**	MHI Provided
GT Exhaust Duct Sides	1 (per bldg)	120	119	118	108	103	103	103	99	94	**110**	MHI Provided
GT Exhaust Duct Top	1 (per bldg)	134	134	126	113	101	101	108	114	90	**118**	MHI Provided
HRSG Transition	1 (per bldg)	116	110	100	92	85	98	100	93	85	**104**	In-house sound levels
HRSG Body Upstream	1 (per bldg)	141	135	114	98	89	83	100	96	86	**111**	In-house sound levels
HRSG Body Downstream	1 (per bldg)	137	131	109	93	82	77	93	88	78	**106**	In-house sound levels
HRSG Stack Inlet	1 (per bldg)	127	121	113	102	91	82	73	69	65	**101**	In-house sound levels
Small Pumps	4 (per bldg)	89	88	90	90	90	90	90	87	80	**96**	Estimated 85 dBA @ 3-ft
Large Pumps	4 (per bldg)	94	93	95	95	95	95	95	92	85	**101**	Estimated 85 dBA @ 3-ft

Appendix A - Base Design Modeled Sound Power Levels

Basin Electric Power Cooperative

Bison Generation Station Wheelock Township

Name	Number of Sources	Sound Power Level (dB)[1] Octave Band Frequency (Hz) 31.5	63.0	125	250	500	1000	2000	4000	8000	Overall (dBA)	Notes
STG Building Indoor Equipment												
Steam Turbine	1 (per bldg)	114	115	113	111	108	106	105	101	95	**112**	In-house sound levels
ST Condenser	1 (per bldg)	117	117	116	112	111	106	106	102	95	**113**	In-house sound levels
ST Lube Oil Skid	1 (per bldg)	110	110	102	105	102	101	98	98	94	**106**	In-house sound levels
ST Control Oil Skid	1 (per bldg)	17	69	83	87	96	95	97	89	79	**102**	In-house sound levels
Large Pumps	4 (per bldg)	94	93	95	95	95	95	95	92	85	**101**	Estimated 85 dBA @ 3-ft
ACC Steam Piping	1 (per bldg)	65	73	81	85	82	79	75	71	49	**98**	In-house sound levels (dB/m)
BOP Equipment												
ACC Water Pumps	4 (2 per ACC)	89	88	90	90	90	90	90	87	80	**96**	Estimated 85 dBA @ 3-ft
Amonia Pumps	2	89	88	90	90	90	90	90	87	80	**96**	Estimated 85 dBA @ 3-ft
Dew Point Heater Stack	2	119	101	93	88	89	95	93	92	91	**100**	Estimated 85 dBA @ 3-ft
Excitation Transformer	2 (1 per block)	78	78	82	82	82	66	61	54	49	**81**	Estimated 69 dBA @ 3-ft
Gas Valve	6	106	102	91	83	82	88	90	93	91	**98**	In-house sound levels
SFC Transformer	2 (1 per block)	78	78	82	82	82	66	61	54	49	**81**	Estimated 69 dBA @ 3-ft
ACC Steam Piping	2 (1 per ACC)	65	73	81	85	82	79	75	71	49	**98**	In-house sound levels (dB/m)
ACC	2 (1 per block)	123	124	123	120	115	113	107	101	95	**118**	65 dBA @ 400-ft
ACHE	2 (1 per block)	119	120	119	116	111	109	103	97	91	**114**	62 dBA @ 400-ft
CTG Aux Transformer	2 (1 per block)	90	90	94	94	94	78	73	66	61	**92**	Estimated 75 NEMA
CTG Step Up Transformer	2 (1 per unit)	104	104	108	108	108	92	87	80	75	**106**	Estimated 85 NEMA
Dew Point Heater Body	2	110	102	101	94	90	91	89	86	81	**97**	Estimated 85 dBA @ 3-ft
HVAC Units	6	101	101	102	98	93	90	89	85	78	**97**	Estimated 80 dBA @ 3-ft
ST Aux Transformer	2 (1 per STG)	90	90	94	94	94	78	73	66	61	**92**	Estimated 75 NEMA
ST GSU Trans	2 (1 per STG)	104	104	108	108	108	92	87	80	75	**106**	Estimated 85 NEMA
Substation Transformer	4	105	105	109	109	109	93	88	81	76	**107**	Estimated 85 dBA NEMA

Notes:

1. All sound levels are based on expected base design equipment (i.e., no additional mitigation beyond base design)

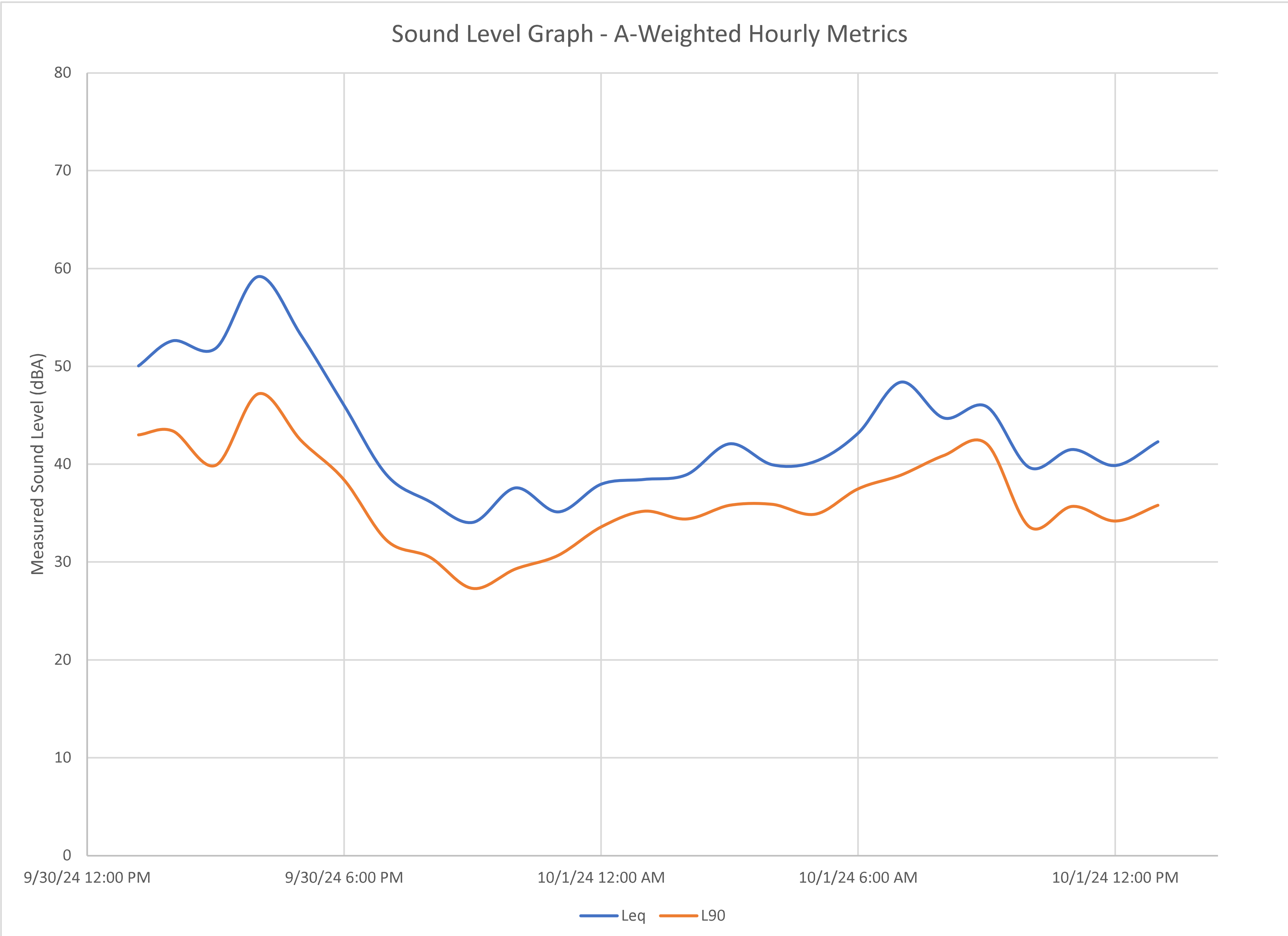
APPENDIX B – AMBIENT SOUND LEVEL MEASUREMENTS

Basin Electric Power Cooperative
Ambient Measurement Data

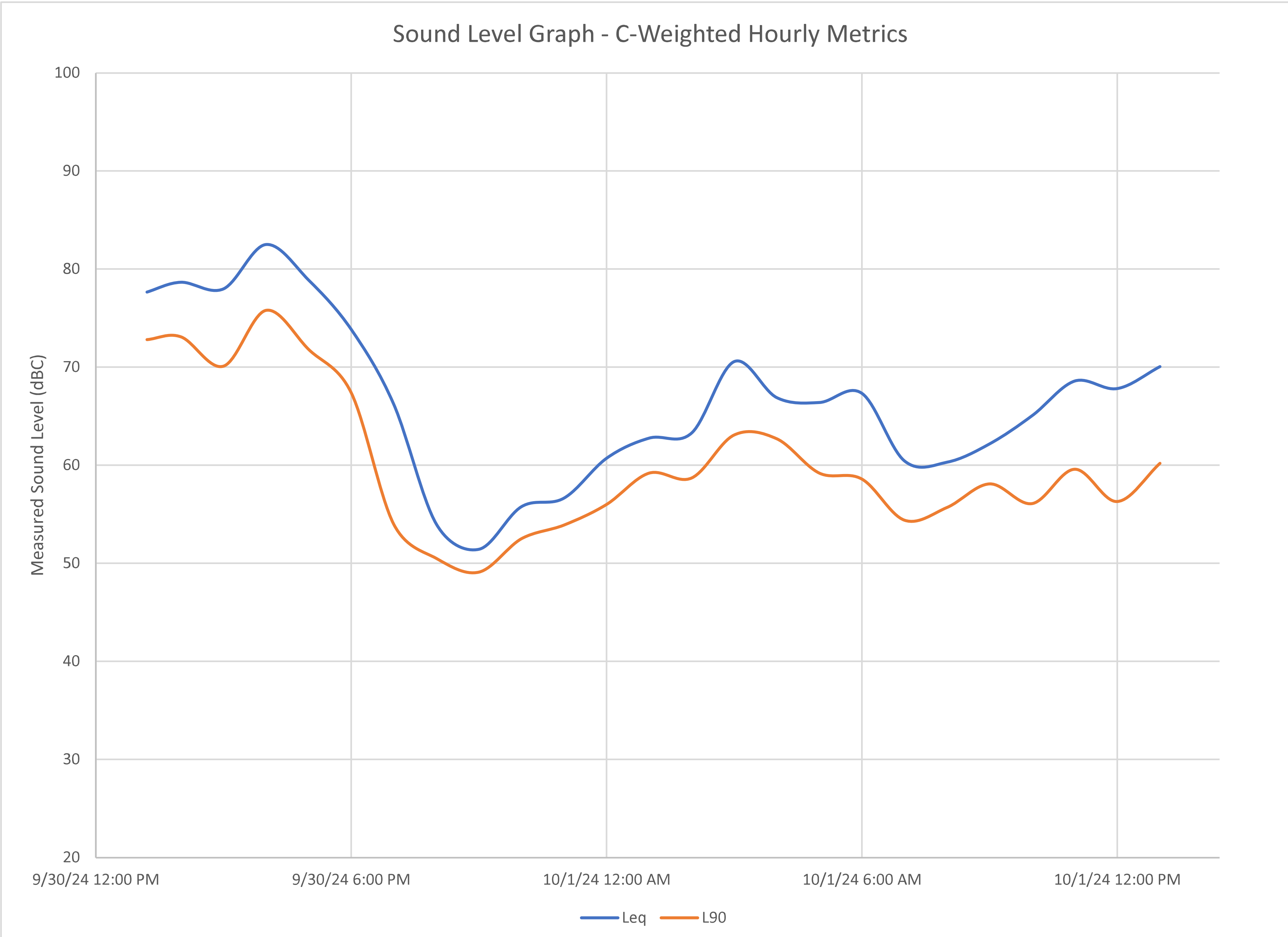
Time	MP1				
	L_{Aeq} (dBA)	L_{A90} (dBA)	L_{ANS} (dBA)	L_{Ceq} (dBC)	L_{C90} (dBC)
9/30/24 1:12 PM	50	43	50	78	73
9/30/24 2:00 PM	53	43	53	79	73
9/30/24 3:00 PM	52	40	52	78	70
9/30/24 4:00 PM	59	47	59	83	76
9/30/24 5:00 PM	53	42	53	79	72
9/30/24 6:00 PM	46	38	46	74	67
9/30/24 7:00 PM	39	32	40	66	54
9/30/24 8:00 PM	36	31	38	54	51
9/30/24 9:00 PM	34	27	37	51	49
9/30/24 10:00 PM	38	29	39	56	53
9/30/24 11:00 PM	35	31	37	57	54
10/1/24 12:00 AM	38	34	39	61	56
10/1/24 1:00 AM	38	35	40	63	59
10/1/24 2:00 AM	39	34	40	63	59
10/1/24 3:00 AM	42	36	43	71	63
10/1/24 4:00 AM	40	36	41	67	63
10/1/24 5:00 AM	40	35	41	66	59
10/1/24 6:00 AM	43	38	44	67	59
10/1/24 7:00 AM	48	39	47	60	54
10/1/24 8:00 AM	45	41	45	60	56
10/1/24 9:00 AM	46	42	46	62	58
10/1/24 10:00 AM	40	34	41	65	56
10/1/24 11:00 AM	42	36	42	69	60
10/1/24 12:00 PM	40	34	41	68	56
10/1/24 1:00 PM	42	36	43	70	60
Daytime Average	**50**	**41**	**50**	**75**	**68**
Nighttime Average	**40**	**35**	**41**	**66**	**59**
Day-night Average (L_{dn})	**50**	**--**	**--**	**--**	**--**

**Daytime is from 7 AM to 10 PM, and nighttime is from 10 PM to 7 AM*

***Day-night average is average Leq with a 10 dB penalty on nighttime sound levels*



Sound Level Graph - A-Weighted Hourly Metrics
Measured Sound Level (dBA)
80
70
60
50
40
30
20
10
0
9/30/24 12:00 PM
9/30/24 6:00 PM
10/1/24 12:00 AM
10/1/24 6:00 AM
10/1/24 12:00 PM
Leq
L90



Sound Level Graph - C-Weighted Hourly Metrics
100
90
80
70
60
50
40
30
20
Measured Sound Level (dBC)
9/30/24 12:00 PM
9/30/24 6:00 PM
10/1/24 12:00 AM
10/1/24 6:00 AM
10/1/24 12:00 PM
Leq
L90

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APPENDIX H – CULTURAL REPORT ABSTRACT

BASIN ELECTRIC POWER COOPERATIVE: A CLASS III CULTURAL RESOURCE INVENTORY OF THE BISON GENERATION STATION PROJECT IN WILLIAMS COUNTY, NORTH DAKOTA, VOLUME 1

By:
Amy C. Bleier

Principal Investigator:
Amy C. Bleier

Metcalf Archaeological Consultants, Inc.
Bismarck, North Dakota

Prepared for:
Basin Electric Power Cooperative

Metcalf Project No. 2024.ND.081

January 2025

Metcalf
ARCHAEOLOGICAL CONSULTANTS

Locational information for archaeological and historic sites is protected under North Dakota Century Code § 55-02-07.
All reports (Class I, II, III, Testing, or Data Recovery) or any loose maps that will be distributed outside the agency or client should not contain site locational information. Site locational information includes the location of a site on a topographic map or aerial photographs, the location of a site in tables, such as Township, Range, and Section, or photographs of sites. It is acceptable to mention the Smithsonian Trinomial designation (e.g., 32EM0123) as this does not contain locational information, other than state and county.

ABSTRACT

Basin Electric Power Cooperative is proposing construction of the Bison Generation Station, a load pocket generation facility, in Williams County, North Dakota. The project includes a 244-acre block west of Ray, North Dakota. Metcalf Archaeological Consultants, Inc. was contracted to conduct a Class III cultural resource inventory of the project area.

The Bison Generation Station is a state level project. Basin Electric Power Cooperative is applying for a permit from the North Dakota Public Service Commission, which is responsible for ensuring the project complies with *North Dakota Century Code* 55-03 - Protection of Prehistoric Sites and Deposits - and *North Dakota Administrative Code* 40-02-02 - Permit for Cultural Resource Investigation.

Archaeologists conducted a pedestrian inventory on September 7, 2024. Amy Bleier served as Principal Investigator. No new cultural resources were identified. Three previously documented cultural resources were revisited: 32WI2444, a multi-component artifact scatter; 32WIx823, a historical farmstead site lead; and 32WIx824, an archaeological isolated find. On October 1, 2024, shovel probes were excavated at each location with negative results. Metcalf Archaeological Consultants, Inc. advises further work and avoidance of 32WIx823 and recommends 32WI2444 and 32WIx824 *not eligible* for inclusion in the State Historic Sites Registry.

Metcalf Archaeological Consultants, Inc. recommends the finding of *No Significant Sites* (*North Dakota Century Code* 49-22-09) if Basin Electric Power Cooperative follows the management recommendations as outlined herein.

For Official Use Only: Disclosure of site locations prohibited (43 CFR 7.18)
Privileged Information—Do Not Release

APPENDIX I – UNANTICIPATED DISCOVER PLAN

Unanticipated Discovery Plan for Cultural Resources and Human Remains

Bison Generation Station
Williams County, North Dakota

February 2025

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

Introduction

Although Basin Electric Power Cooperative (Basin Electric) has conducted thorough surveys for cultural resources within the Bison Generation Station (Project) area, the potential exists for exposure of previously unidentified or buried cultural material during excavation and construction of the transmission line as associate facilities. The purpose of this Unanticipated Discovery Plan (UDP) is to document the procedures to be implemented by Basin Electric's construction coordinator and/or contractor if cultural resources, including archaeological sites and possible human remains, are inadvertently discovered during construction. This plan complies with the North Dakota's "Protection of Human Burial Sites, Human Remains, and Burial Goods" law (North Dakota Century Code [NDCC] 23-06-27) and accompanying administrative rules (North Dakota Administrative Code [NDAC] 40-02-03).

Unanticipated Discovery

In the event that previously unknown cultural (or paleontological) resources are discovered within the Area of Potential Effects (APE) during construction activities for the Project, or should those activities directly or indirectly affect known cultural resources in an unanticipated manner, the following actions, at a minimum, will be initiated by Basin Electric or a representative duly authorized to perform these tasks:

1. All activities will halt in the immediate vicinity of the discovery and all actions will be redirected to areas at least 100 feet from the edge of the discovery.
    a. Basin Electric's construction coordinator and/or contractor will immediately report the discovery to the appropriate parties identified in the Emergency Contact List found later in this document.
    b. Ground disturbing construction activities will not occur within 100 feet in any direction from the cultural resource until the site has been properly assessed as described in paragraph 2 (below) and the State Historical Society of North Dakota (SHSND) concurs that construction may resume.
    c. In the event that a cultural resource specialist or other necessary persons are not immediately available, Basin Electric will require that the discovery be covered or otherwise protected until such time that the cultural resource specialist can be present for inspection and evaluation.

2. Upon arriving at the site of the discovery, the cultural resource specialist will assess the resource. The assessment will include:
    a. The cultural resource specialist, in conjunction with a tribal monitor if appropriate, will ascertain the nature and the extent of the resource, and the potential for intact deposits. Evaluation will involve an examination of the ground surface, backfill piles, and exposed construction surfaces. The cultural resource specialist will discuss the potential for additional impacts to the resource with the construction manager.
    b. Based on this examination, the cultural resource specialist will recommend the unanticipated discovery location is:

        (1) not a site (e.g., isolated find or less than 50 years in age);

        (2) not a historic property, i.e., not eligible for inclusion in the National Register of Historic Places (NRHP);

        (3) a historic property, i.e., eligible for inclusion in NRHP or a culturally sensitive site for which no further impacts are likely to occur;

        (4) an NRHP-eligible or a culturally sensitive site (e.g., exposed hearths, house pits) that is likely to be impacted with further construction; or,

        (5) a site for which additional information is required to ascertain extent and NRHP eligibility.

The cultural resource specialist will provide information and a recommendation regarding the potential resource to SHSND to determine the most appropriate course of action.

Emergency Stabilization of Cultural Resources

Unstable earth conditions during construction or other unforeseen natural or man-made events could endanger cultural resources discovered during construction of the Project. If cultural resources are in imminent danger of destruction, Basin Electric will apply prudent methods to stabilize landforms around the unanticipated discovery. Once stabilized, the resource shall be assessed as described above, subject to safety concerns.

Salvage, Curation or Disposition of Cultural Materials

As stated in item 2.b.5 above, additional information may be required for the cultural resource specialist to assess the nature and extent of an unanticipated discovery and to provide a recommendation to SHSND regarding NRHP eligibility. With appropriate concurrence from SHSND, cultural materials may be salvaged for this purpose. This does not include cultural resources that are covered under North Dakota's "Protection of human remains, and burial goods" law (NDCC 23-06-27) and accompanying administrative rules (NDAC 40-02-03). All other cultural materials recovered from privately owned lands are considered the property of the landowner. After necessary laboratory analysis is completed, Basin Electric will provide the landowner with photographs and descriptions of cultural material from his/her property. The landowner will be encouraged to contribute the materials for curation at the SHSND. If the landowner desires, Basin Electric will return cultural materials recovered from his/her land to him/her.

Unanticipated Discovery of Human Remains

If construction or other Project personnel identify what they believe to be human remains, they will immediately halt construction at that location and Basin Electric and the cultural resource specialist will be notified immediately. The construction coordinator will ensure that further construction does not occur within an area less than 100 feet in any direction from the edge of the discovery until a cultural resource specialist, in conjunction with Basin Electric environmental personnel, arrive to assess the discovery. The inspector will also secure the area of the apparent human remains to ensure no further disturbance or removal of those remains and associated material.

After arrival at the site, the cultural resource specialist will evaluate the discovery to determine if it does in fact consist of human remains. As required by law, Basin Electric will notify the Williams County Sheriff within 24 hours of the discovery. Basin Electric will also notify the SHSND of the finding.

Basin Electric and/or the contractor will secure the location by means of flagging or roping the perimeter of the avoidance area and covering or otherwise protecting the human remains and any associated materials. The remains will not be further disturbed prior to completion of consultations with respective agencies unless such disturbance is necessary to preserve or protect the human remains. Any disturbance necessary to preserve or protect the remains must be done in consultation with law enforcement, SHSND, and the cultural resource specialist. The 100-foot-radius avoidance area may be expanded if the context of the human remains suggests additional human remains may be present within the construction area or if construction activities outside the 100-foot-radius area might destabilize or otherwise degrade the context of the human remains.

Law enforcement will determine whether the finding is associated with a crime scene within 15 days. If deemed not a crime scene, law enforcement will notify the SHSND of their findings. No cultural resource investigations of human remains can occur without a permit from SHSND. The cultural resource specialist will work with SHSND to obtain a permit to conduct investigations of the location. If the remains are determined to be Native American, or if the ethnic identity of the remains is unknown, SHSND will notify the Intertribal Re-interment Committee. A meeting of interested parties will be set up as soon as possible, preferably within 36 hours of the decision that there is no evidence of a crime, to ensure that the disturbed remains receive the maximum protection. SHSND, in consultation with the tribes (as appropriate) and Basin Electric, will agree upon a suitable action.

Work cannot proceed until the stipulations of Protection of Human Burial Sites, Human Remains and Burial Goods in NDCC Section 23-06-27 and Protection of Prehistoric Sites and Deposits in NDAC Section 40-02-03 have been met.

Emergency Contact List

Entity	Name	Role	Telephone Number
Basin Electric Power Cooperative	Lucas Tiegen	Field Coordinator	701.223.0441
Basin Electric Power Cooperative	Ryan King	Environmental Administrator	701.426.9469
Basin Electric Power Cooperative	Chris Bauer	Project Manager	701.223.0441
Metcalf Archaeological Consultants, Inc.	Damita Engle	Cultural Resource Specialist	701.214.1335
Williams County Sheriff	Verlan Kvande	County Sheriff	701.577.7700
Williams County Coroner	Seth Coughlin	County Coroner	701.577.3738
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APPENDIX J – WEST BIOLOGICAL AND WETLAND REPORT

Bison Generation Station
Williams County, North Dakota

Natural Resources Inventory Report

Prepared for:

Basin Electric Power Cooperative

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February 11, 2025

WEST

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REPORT REFERENCE

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ac	acre
BEPC	Basin Electric Power Cooperative
cm	centimeter
DBH	diameter at breast height
ESA	Endangered Species Act
FR	Federal Register
ft	foot
ha	hectare
in.	inch
IPaC	Information for Planning and Consultation
km	kilometer
m	meter
mi	mile
N	north
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
PEMA	Palustrine emergent temporarily flooded
Pf	palustrine farmed wetland
PLSS	Public Land Survey System
R	Range
Sec.	Section
Survey Area	241.07 acres
T	Township
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
W	west
WEST	Western EcoSystems Technology, Inc.
WNS	white nose syndrome

1.0 INTRODUCTION

Basin Electric Power Cooperative (BEPC) proposes to construct and operate the Bison Generation Station (Project). Western Ecosystems Technology, Inc. (WEST), was retained by BEPC to provide natural resources inventory services, which include the wetland delineations, an evaluation of habitat for federally listed species, a noxious weed inventory, a woody vegetation inventory, and a line-of-sight raptor nest survey. The Project's Survey Area encompasses 241.07 acres within the NE¼ and E1/2 of the NW1/4 of Section 20, Township (T) 156 North (N), Range (R) 98 West (W) of Williams County, North Dakota. The Survey Area is currently used for row crop agriculture. The proposed Project is located approximately 18.5 miles (mi) northeast of the city of Williston (Figure 1).

The natural resources discussed in this report are those within the Project's Survey Area, as shown on Figure 1 and Figure 2. A WEST biologist performed field surveys on September 9, 2024. Geospatial field data was collected using an Android tablet paired with an EOS ARROW Lite Global Positioning System unit capable of recording data to sub-meter accuracy.

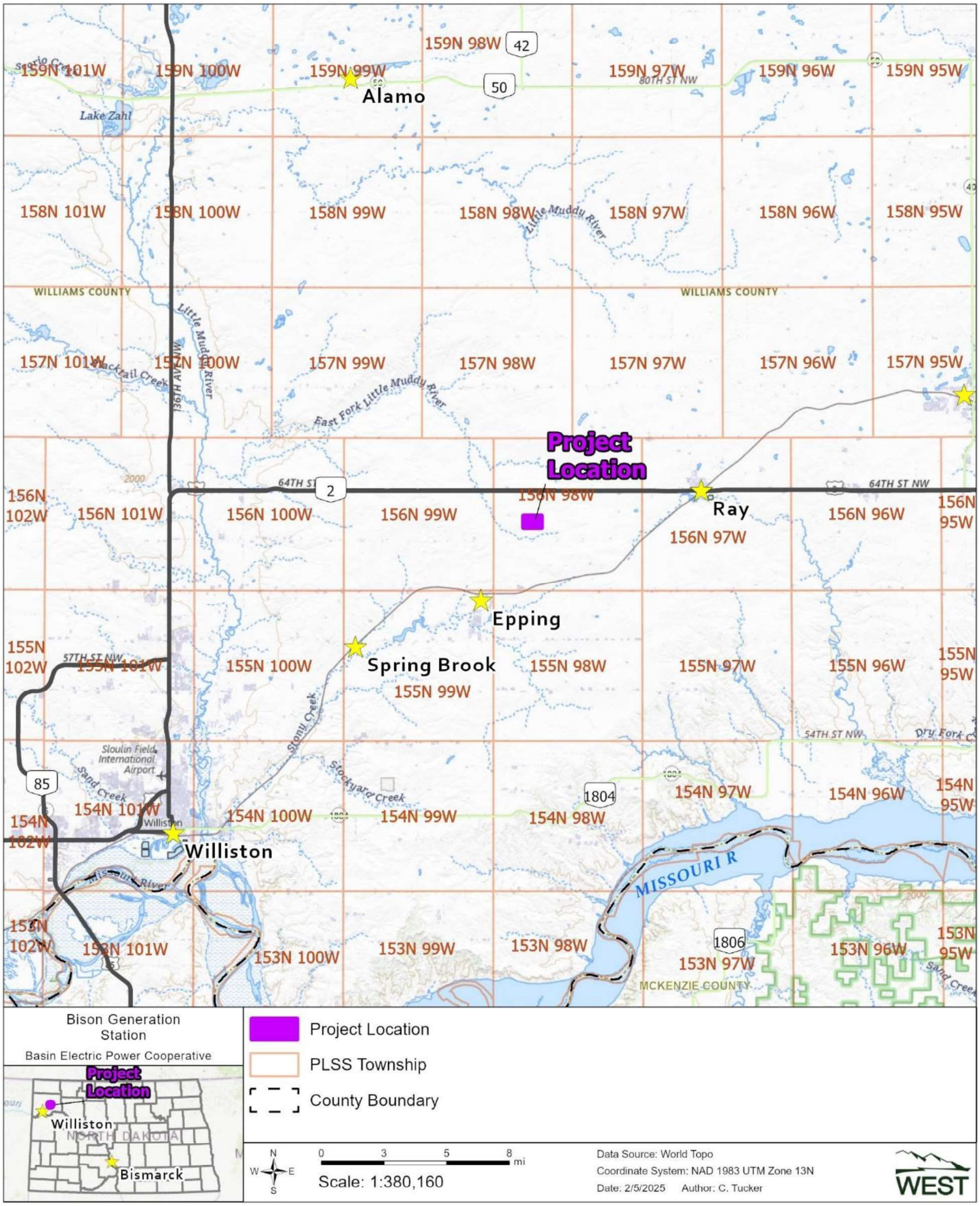

Figure 1. Location of the proposed Bison Generation Station in Williams County, North Dakota.

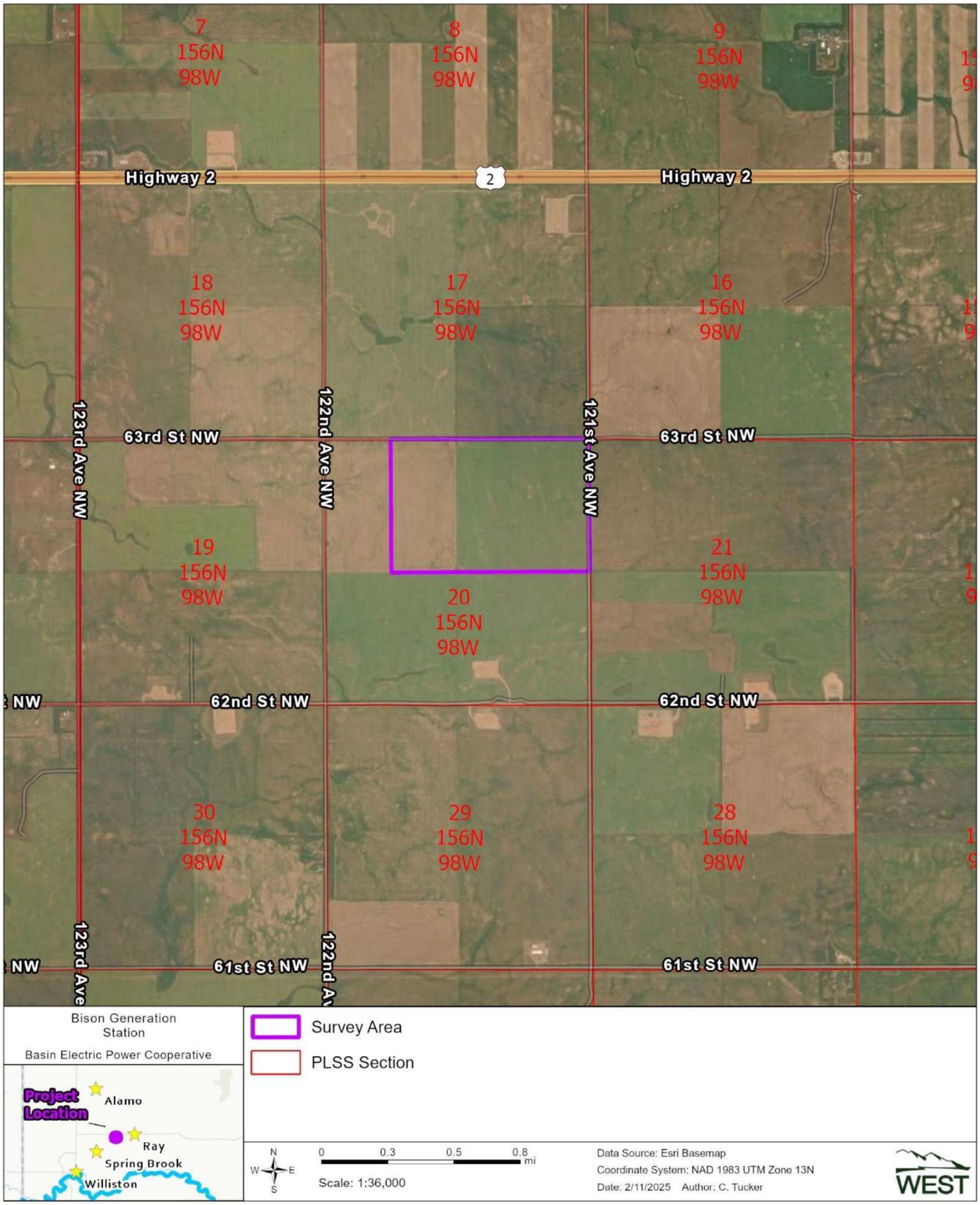

Figure 2. Detailed view of the proposed Bison Generation Station.

2.0 PROCEDURES

2.1 Wetland and Waterbody Field Determination

The aquatic resource delineation was conducted in accordance with the U.S. Army Corps of Engineers (USACE) *1987 Wetland Delineation Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)* (Wetland Manual). Wetlands are defined by Clean Water Act Section 404; 33 CFR Part 328.3 as, "*The term wetland means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*"

Existing vegetation was classified using hydrophytic vegetation criteria outlined in the Wetland Manual and the *National Wetland Plant List* (USACE 2022). Hydrology was determined on-site by observation of hydrologic indicators as defined by the Wetland Manual. Soils, vegetation, hydrology, and landscape indicators were evaluated along the wetland edge to accurately delineate the wetland boundaries.

The Survey Area was also evaluated for Other Waters of the US in accordance with the guidelines set forth by the 2008 "A Field Guide to the Identification of the OHWM in the Arid West Region of the Western United States" and the 2014 "Occurrence and Distribution of Ordinary High-Water Mark (OHWM) Indicators in Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States. A detailed description of Other Waters of the US can be found Under Title 40 Code of Federal Regulations (CFR), Section (§) 122.2 "Water of the United States". These aquatic resources may include traditional navigable waters (rivers, streams, and lakes), non-navigable tributaries of traditional navigable waters that have relatively permanent flow; waters that do not have relatively permanent flow (ditches constructed in uplands and drain only uplands), and roadside and drainage ditches that contain significant nexus to a downstream traditional navigable water.

A separate Aquatic Resource Delineation Report was submitted to the USACE for wetland jurisdictional determination and to determine potential mitigation needs.

2.1.1 Non-Waters of the US

A non-water point was collected for all NHD flowlines and NWI polygons that intersected the Survey Area but clearly did not meet the definition of a wetland or waterbody. Such points were identified with a datapoint number starting at 100 preceded by a "U" (e.g. U-100, U-101…).

2.2 Federally Listed Wildlife Species Evaluation

The U.S. Fish and Wildlife Service (USFWS) Information for Planning Consultation (IPaC) site was used to review federally listed species within the Survey Area and Williams County (USFWS 2025). The review also included the USFWS designated critical habitat for threatened and endangered species geospatial data (2023a), along with known range, reported occurrences, and habitat needs for each species. Table 1 identifies the federally listed species with the potential for occurrence within the Survey Area. Field evaluations were conducted on September 9, 2024 to confirm the presence or absence of potentially suitable habitat for federally listed species within the Survey Area. Background data was collected for preliminary review and to aid in the field inventory of biological resources.

Table 1. IPaC listed species for the Survey Area.

Common Name	Scientific Name	Status
Whooping crane	*Grus americana*	Endangered
Piping plover	*Charadrius melodus*	Threatened, Critical Habitat Designated
Red knot (rufa)	*Calidris canutus rufa*	Threatened
Monarch butterfly	*Danaus plexippus*	Proposed Threatened
Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*	Proposed Endangered

* This species is listed as occurring in Williams County; however, the Project is outside of the current known species range.

Source: US Fish and Wildlife Service 2025, 2023a

2.3 Nesting Raptor Survey

A 0.5-mi line-of-sight survey for nesting raptors was conducted for the Project. The survey used 10x power magnification binoculars to scan tree lines and wooded areas from either the Survey Area or public roads.

2.4 Noxious Weed Inventory

North Dakota has 13 state-listed noxious weed species. The Williams County Weed Control District lists one additional species as invasive (North Dakota Department of Agriculture 2024). Table 2 provides a list of noxious and/or invasive weed species listed for the Project.

Table 2. North Dakota State and Williams County listed noxious and invasive weeds.

North Dakota State Listed Noxious Weeds		Williams County Invasive Weeds	
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Absinth wormwood	*Aremisia absinthium*	Narrowleaf hawksbeard	*Crepis tectorum*
Canada thistle	*Cirsium arvense*		
Dalmatian toadflax	*Linaria genistifolia*		
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*		
saltcedar	*Tamarix chinensis*		
Spotted knapweed	*Centaurea maculosa*		
Yellow toadflax	*Linaria vulgaris*		

2.5 Woody Vegetation (Tree and Shrub) Inventory

The tree and shrub inventory utilized a methodology previously approved by the North Dakota Public Service Commission. Trees and shrubs were recorded within the Survey Area that could potentially be cleared by the Project, including those that are considered non-native species. The location, number, and species of each tree and shrub were documented for this inventory. The trees and shrubs were enumerated by one of two methods: individual count; or by inference utilizing a representative subsample plot to count and then extrapolate the number of individuals or stems based upon the area within the Survey Area.

3.0 RESULTS

3.1 Wetlands

A pre-survey review of the USFWS NWI database identified two palustrine farmed (Pf) wetlands (USFWS NWI 2023). The field survey identified one wetland, covering 0.15 ac. The identified wetland, Wetland 1, is an isolated natural depression with a palustrine emergent temporarily flooded (PEMA) classification. The other Pf classified NWI signature was found to not exhibit wetland hydrology or contain hydric vegetation. An upland point (U-100) was recorded at this site. No other wetlands were documented within the Survey Area. Wetland information is summarized in Table 3 and point locations are identified below in Figure 3. Photographs of the Survey Area are included in Appendix A.

Table 3. Wetlands documented within the Survey Area

Name	Classification	Type	PLSS	Latitude	Longitude	Acres
Wetland 1	PEMA	Depression	Sec. 20, T156N, R98W	48.2323066	-103.311501	0.15
					Total	**0.15**

N = north, PEMA = palustrine emergent temporarily flooded wetland, PLSS = Public Land Survey System, R = Range, Sec. = Section, T = Township, W = west.

3.2 Waterbodies

The pre-survey review of the USFWS NWI and the USGS NHD databases indicated that there is one riverine (R4SBA) signature within the Survey Area. The field survey identified the feature, Waterbody 1, as an ephemeral upland swale. Waterbody 1 is cropped through and contains no hydric vegetation. The feature conveys water to the north for 809.63 feet where the swale broadens into a gentle slope. Waterbody information is summarized in Table 4. Photographs of the Survey Area are included in Appendix A.

Table 4. Waterbodies documented within the Survey Area

Name	Classification	Type	PLSS	Latitude	Longitude	Acres
Waterbody 1	Ephemeral	Upland Swale	Sec. 20, T156N, R98W	48.325552	-103.309163	0.05
					Total	**0.05**

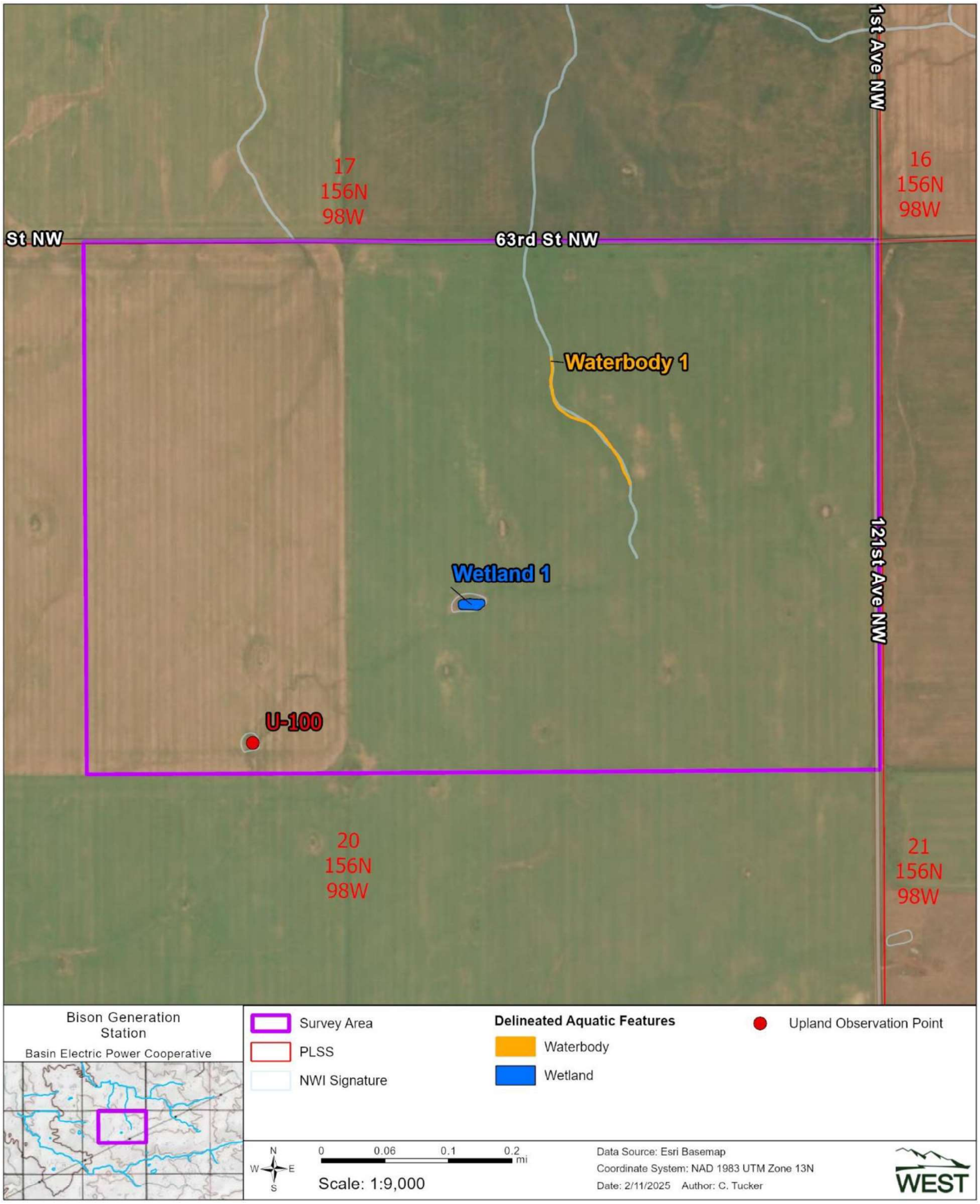

Figure 3. Result of the wetland and waterbody field survey.

3.3 Threatened and Endangered Species Habitat Assessment

Threatened and endangered species that have been documented and/or have the potential to occur within the Survey Area are listed in Table 1 along with designated critical habitat (USFWS 2025, 2023a). A review of USFWS species information datasets, along with habitat data gathered from the field surveys, were used to aid in the determinations. Threatened and endangered species information gathered from the review is documented below in the species discussions.

During the field surveys, no federally listed species were observed and no potential habitat for listed species was documented during the field survey.

3.3.1 Whooping Crane

The primary nesting area for the whooping crane (*Grus americana*) is in Canada's Wood Buffalo National Park. Aransas National Wildlife Refuge in Texas is the primary wintering area for whooping cranes. In the spring and fall, the cranes migrate, primarily along the Central Flyway. During the migration, whooping cranes make numerous stops, roosting in relatively large, shallow marshes and feeding and loafing in harvested grain fields. The primary threats to whooping cranes are power lines, illegal hunting, and habitat loss (USFWS 2023b)

The whooping crane is federally listed and has the potential to occur in all counties of North Dakota. The Project is located within the migration corridor where 50% of whooping cranes travel. Land use within the Project consists entirely of cropland. The USFWS Database (USFWS 2022) shows Williams County has had 29 verified whooping crane sightings. The closest confirmed sighting to the Project was of two adult and one juvenile whooping cranes in 2004, approximately 6.2 mi (10 km) northeast of the Project in Sec. 20, T157N, R97W. The sighting locations are depicted on Figure 4.

Noise and vehicle activity during construction activities may cause migratory cranes to divert from the area but would be unlikely to contribute to any indirect or direct effect that would result in an increase of fatalities and, therefore, would be considered insignificant. If a crane is sighted within 1.0 mi (1.6 km) of the project area, construction activities utilizing heavy equipment would be suspended, and the sighting would be promptly reported to USFWS. In coordination with the USFWS, suspended activities would resume once the bird(s) have left the area. Appendix B contains BEPC's Avian and Bat Protection Plan.

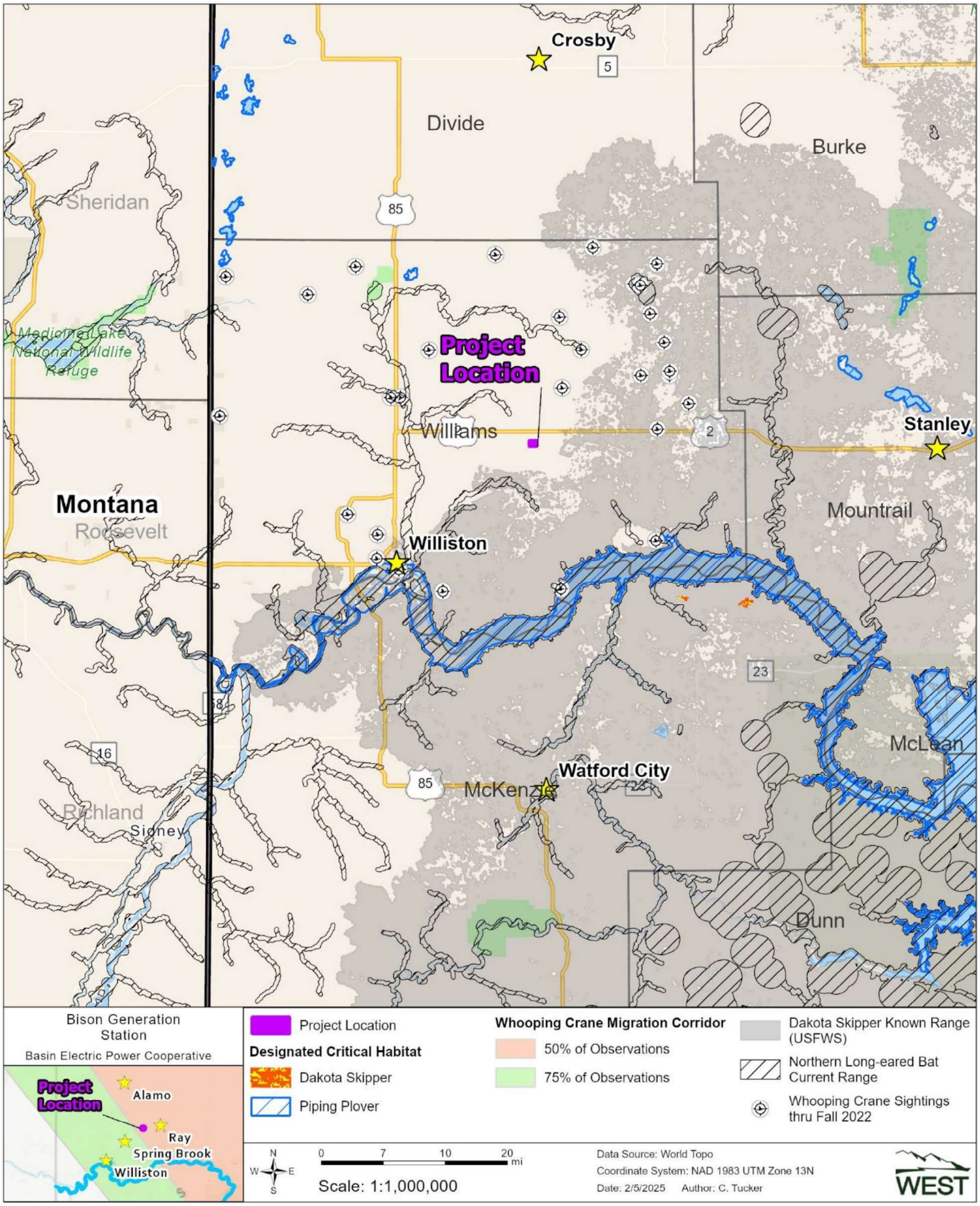

Figure 4. Known sightings, species range, and designated critical habitats in relation to the proposed Bison Generation Station.

3.3.2 Piping Plover

The piping plover (*Charadrius melodus*) is a migratory shorebird that breeds in North Dakota. Suitable nesting habitat for piping plovers includes alkaline wetlands and the shoreline of the Missouri River system; this habitat has been characterized as sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and island margins that interface with the river channel. The piping plover feeds on worms, insects, and mollusks. The decline of piping plover populations is due to the loss of habitat from river impoundment(s), as well as the degradation of habitat related to the channelization river systems, nest predation, and human disturbance (USFWS 1985).

Critical habitat for the Northern Great Plains piping plover has been designated on alkali lakes and wetlands, the Yellowstone River, and Missouri River in North Dakota. The physical and biological features that are essential to the conservation of the species, referred to as the primary constituent elements, require special consideration for protection. These include sparsely vegetated alkaline wetlands, sand and gravel beaches on islands, temporary pools on sandbars and islands, and island margins that interface with the river channel. This Project is approximately 12.9 mi (20.8 km) north of the nearest critical habitat, which is the Missouri River system. (Figure 4; USFWS 2023a). The field survey documented that the Survey Area is predominantly cropland and contains one wetland that does not provide suitable for nesting habitat.

3.3.3 Rufa Red Knot

The red knot (*Calidris canutus*) is a shorebird that breeds in the central Canadian Arctic, with primary breeding grounds in Nunavut Territory, but some potential breeding habitat extending into the Northwest Territories (USFWS 2013b). The rufa red knot (*C, canutus rufa*) winters along the Atlantic coasts of Argentina and Chile (particularly the island of Tierra del Fuego), the north coast of Brazil, and further north into Mexico and the southeast United States (USFWS 2014). During migration, the rufa red knot primarily follows the Atlantic coastline to and from breeding and wintering grounds. However, geolocator results from red knots wintering in Texas showed that a comparatively small population of birds migrate using the Central Flyway across the Midwestern US and may have a northern Great Plains stopover (USFWS 2013b). Rufa red knots spend two to three months annually on the breeding grounds located in northern Canada.

Red knots are specialized molluscivores, feeding primarily on hard-shelled mollusks in relatively soft, wet sand/sediment (USFWS 2014). In addition to mollusks, red knots may feed upon shrimp, crabs, marine worms, horseshoe crab (*Limulus* spp.) eggs, and other similar invertebrates. On the breeding grounds, rufa red knots feed mostly on terrestrial invertebrates and grass shoots/seeds (USFWS 2013b).

The shoreline of the Missouri River provides stopover habitat for red knots utilizing a midcontinental migratory route during annual migrations. However, the species is rare and is not reported in North Dakota every year. Reported historical sightings since 1900 (Igl 2015) are primarily composed of single individuals or relatively small flocks; however, on rare occasions, larger flocks have been reported. Many of these sightings have been made in the prairie pothole region during the spring migration in late April through May. An increase in future sightings may result from an increase in public awareness.

The red knot migrates twice annually from its breeding grounds in the Artic to wintering habitat in southern climates. It does not nest in North Dakota but may use areas along the Missouri River as stopover habitat. The Project is located approximately 12.9 mi (20.8 km) north of the Missouri River system, and the Survey Area does not have suitable shoreline stopover habitat for the rufa red knot.

3.3.4 Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) has been proposed for listing as threatened under the Endangered Species Act (ESA) (89 FR 100662 [December 12, 2024]). The species occurs throughout the Great Plains and much of North America. Monarchs prefer open habitats with flowering plants and lay their eggs exclusively on milkweeds (*Asclepias* spp.), which the larvae feed on until pupation (U.S. Forest Service [USFS] 2021). Monarch butterflies will breed in North Dakota during the summer and migrate south to Mexico for the winter; eventually, the butterflies will make their way back to North Dakota during spring migration. The Survey Area is used for row crop agriculture and does not contain grassland habitat. Therefore, it does not provide usable habitat for the monarch butterfly.

3.3.5 Suckley's Cuckoo Bumble Bee

The Suckley's cuckoo bumble bee (*B. suckleyi*) has been proposed for listing as endangered under the Endangered Species Act (89 FR 102074 [December 17, 2024]). The western portion of the Suckley's cuckoo bumble bee range spans from the Yukon down to Arizona and east to Nebraska and Minnesota (USFWS 2024). Probability of occupancy is estimated to have declined by 85% between 1900 and 2020 (USFWS 2024). Current threats include loss of host species (e.g., western bumble bee [*B. occidentalis*] and Nevada bumble bee [*B. nevadensisl*]), pesticides, habitat loss, climate change, and diseases introduced by non-native bee species (89 FR 102074; Montana Field Guide 2024; Washington Department of Fish and Wildlife [WDFW] 2024). The viability of Suckley's cuckoo bumble bee is dependent on its host species, many of which have declined historically and are expected to continue to do so in the future (USFWS 2024).

Suckley's cuckoo bumble bees are obligate social parasites: they kill or subdue a host species and nest in colonies of other social bumble bees in the genus Bombus (USFWS 2024). Little is known about Suckley's cuckoo bumble bees overwintering sites, but mated queens may use above and below-ground sites with mulch or other decomposing vegetation for overwintering (WDFW 2024; USFWS 2024). Queens emerge from early April to late May shortly after their host species (Montana Field Guide 2024; USFWS 2024). Nests for confirmed host bumble bee species (i.e., western bumble bee and the Nevada bumble bee) occur more often underground (e.g., animal burrow) than aboveground (e.g., logs, stumps; WDFW 2024; USFWS 2024). New queens likely go into hibernation by August or September, while males may be active on the landscape until October (USFWS 2024).

Suckley's cuckoo bumble bees are found in similar habitats to their host species: prairies, grasslands, meadows, woodlands, croplands, and urban areas (NDGFD 2018; Montana Field Guide 2024; USFWS 2024). In general, this species is rare to encounter as a naturally less abundant social parasite without a worker caste (USFWS 2024). Cuckoo bumble bees generally have distributions smaller than their host species and are likely in lower abundance at the edge of their host species range (USFWS 2024). There are no known sightings of the Suckley's cuckoo bumble in North Dakota in recent years, therefore the species is unlikely to occur in the Survey Area (Richardson 2023).

3.4 Nesting Raptor Survey

No active raptor nests were observed within 0.5-mi (0.8-km) of the Survey Area

3.5 Noxious Weed Inventory

A pedestrian survey of the Survey Area was conducted for state and county listed noxious weeds. Noxious weeds were not observed during the field survey.

3.6 Tree and Shrub Inventory

No trees or shrubs were documented during the field survey.

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Appendix A. Project Field Photographs

Photograph 1. View looking north across the Survey Area from the southeast corner.

Photograph 2. View looking west across Wetland 1, a PEMA classified wetland.

Photograph 3. View the location of U-100. The NWI layer indicates the presence of a Pf (farmed) classified wetland, however no wetland characteristics were documented during the field survey.

Photograph 4. View of Waterbody 1 located in the central portion of the Survey Area.

Appendix B. Basin Electric Power Cooperative Avian and Bat Protection Plan

APPENDIX K – AGENCY CORRESPONDENCE

Agency Contacts
Bison Gereration Station
September 2024

Agency	Contact	Title	Address
Aeronautics Commission	Kyle Wanner	Director	PO Box 5020 Bismarck, ND 58502
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Bureau of Land Management	Sonya Germann	State Director	5001 Southgate Drive Billings, MT 59101
Federal Aviation Administration	Dave Anderson	Assistant Manager	2301 University Drive, Bldg 23B Bismarck, ND 58504
Governor's Office	Doug Burgum		600 East Boulevard Avenue Bismarck, ND 58505
Grand Forks Air Force Base	Robert Greene	NEPA Manager	525 Tuskegee Airmen Blvd Grand Forks AFB, ND 58205
Jobs Service North Dakota	Patrick Bertagnolli	Executive Director	1000 E. Divide Avenue, PO Box 5507, Bismarck, ND 58506
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ND Department of Career and Technical Education	Wayde Sick	Director and Executive Officer	600 E. Boulevard Ave, Dept. 270 Bismarck, ND 58505
ND Department of Commerce	Joshua Teigen	Commissioner	1600 E. Century Ave., Suite 6 Bismarck, ND 58503
ND Department of Environmental Quality	David L. Glatt	Director	4201 Normandy Street Bismarck, ND 58503
ND Department of Health	Dr. Nizar Wehbi	State Health Officer	600 E. Boulevard Ave, Dept. 325 Bismarck, ND 58505
ND Department of Human Services	Wayne Salter	Commissioner	600 E. Boulevard Ave, Dept. 325 Bismarck, ND 58505
ND Department of Labor and Human Rights	Nathan Svihovec	Commissioner	600 E. Boulevard Ave, Dept. 406 Bismarck, ND 58505
ND Department of Transportation	Ron Henke	Director	608 East Boulevard Avenue Bismarck, ND 58505
ND Department of Trust Lands (Minerals Management)	Chris Suelzle	Director, Minerals Management	1707 N 9th Street Bismarck, ND 58501
ND Department of Trust Lands (School/Surface Trust)	Joseph Stegmiller	Director, Rights-of-Way Management	1707 N 9th Street Bismarck, ND 58501
ND Energy Infrastructure and Impact Office	Whom it May Concern		1707 N 9th Street Bismarck, ND 58501
ND Forest Service	Thomas Claeys	State Forester	307 1st Street East Bottineau, ND 58318-1100
ND Game and Fish Department	Jeb Williams	Director	100 N. Bismarck Expressway Bismarck, ND 58501
ND Geological Survey		Director	600 East Boulevard Ave. Bismarck, ND 58503
ND Indian Affairs Commission	Brad Hawk	Executive Director	600 E. Boulevard Avenue, 1st Floor Judicial Wing, Rm 117, Bismarck, ND 58505
ND Industrial Commission	Whom it May Concern		State Capitol 14th Floor, 600 E. Boulevard Avenue. Dept. 405, Bismarck, ND 58505
ND Parks and Recreation Department	Kathy Duttenhefner	Natural Resources Chief	604 E Boulevard Avenue, Dept. 750, Bismarck, ND 58505
ND Pipeline Authority	Justin Kringstad	Director	600 East Boulevard Ave. Dept. 405 Bismarck, ND 58503
ND State Water Commission (Department of Water Resources)	Aaron Carranza, P.E.	Division Director	1200 Memorial Highway Bismarck, ND 58504
ND Transmission Authority	Claire Vigesaa	Executive Director	600 East Boulevard Ave. Dept. 405 Bismarck, ND 58503
State historical Society of North Dakota	William D. Peterson, PhD	Director	612 East Boulevard Avenue Bismarck, ND 58505
Twentieth Airforce Ninety-First Missile Wing	Sam Warren	Minot AFB Community Planner	196 Missile Avenue Minot AFB, ND 58705
US Army Corps of Engineers	Jason Renschler	Project Manager	3319 University Drive Bismarck, ND 58504
US Department of Defense	Lloyd J. Austin	Secretary of Defense	1000 Defense Pentagon Washington, DC 20301
US Fish and Wildlife Service	Luke Toso	ND Ecological Services Supervisor	3425 Miriam Avenue Bismarck, ND 58501
Williams County Commission	Steve Kemp	Chairman	206 E Broadway Williston, ND 58801
68th Legislative Assembly	David S. Rust	District 2 Senator	P.O. Box 1198 Tioga, ND 58852-1198
68th Legislative Assembly	Bert Anderson	District 2 Representative	P.O. Box 604 Crosby, ND 58730-0604
68th Legislative Assembly	Donald W. Longmuir	District 2 Representative	P.O. Box 1191 Stanley, ND 58784-1191

BURNS & McDONNELL

September 17, 2024

«Contact»
«Title»
«Agency»
«Address»

Re: Basin Electric Power Cooperative - Combined Cycle Project

Dear «Contact»:

Basin Electric Power Cooperative (Basin Electric), with assistance from Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell), is preparing an Application to the North Dakota Public Service Commission (ND PSC) for a Certificate of Site Compatibility for a proposed new greenfield approximately 1,400 megawatt combined-cycle combustion turbine generation facility in Williams County, North Dakota (Project). The Project is proposed to be located on a 240-acre parcel; located in Section 20, Township 156 North, Range 98 West; approximately 2.7 miles northwest of the town of Wheelock and 2.75 miles northeast of Epping (Figure 1). The Project will include two combustion turbines, two heat recovery steam generators, and two steam turbines. The combined-cycle turbines will be fired solely on natural gas.

In addition to the power generation equipment, an electrical switchyard, gas metering station, stormwater detention ponds, wastewater retention ponds, temporary laydown areas, temporary construction parking, and auxiliary equipment are included as part of the Project. The combined-cycle combustion turbines will include selective catalytic reduction systems and oxidation catalysts to control air emissions. Any additional facilities that may be required later will be permitted, as appropriate, separately, once the Project site has been determined and approved by the ND PSC. Basin Electric anticipates that existing natural gas and electrical transmission facilities adjacent to the Project will be sufficient for the Project's needs.

The Project will apply for a Prevention of Significant Deterioration air construction permit for the Project from the North Dakota Department of Environmental Quality prior to commencing construction, as well as a Title V air operating permit, following commissioning of the facility. Basin Electric will also obtain the appropriate approvals from Williams County and other applicable regulatory agencies.

At this time, Burns & McDonnell is requesting your input to identify any issues or concerns your agency might have with respect to the proposed Project. Input from your agency regarding natural or social resources in the vicinity of the proposed Project will be considered in the Certificate of Site Compatibility Application. Resources to be considered may include:

- Land use
- Public lands (national and state parks, grasslands, refuges, school lands)
- Conservation easements (CRP, WRP)
- Floodplains, water quality, and wetlands
- Soils and geology
- Biological resources (general wildlife, vegetation and fisheries; threatened and endangered species; migratory birds; invasive species)
- Cultural resources (historic and archaeological)
- Aesthetics
- Air quality
- Socioeconomics and environmental justice
- Noise
- Transportation and roads (airport and roadway expansions, construction, operations and maintenance)
- Human health and safety (electromagnetic fields, hazardous materials, environmental risk management)

Please send your comments to almccaslin@burnsmcd.com or Audra McCaslin, Burns & McDonnell, 9450 Ward Parkway, Kansas City, MO 64114.

If you have any questions regarding the Project or need additional information, please call 816-605-7928. We would appreciate your response by October 11, 2024. Thank you for your time and assistance in providing this information.

Sincerely,

Robert G. Everard
Burns & McDonnell Permit Manager

cc: Erin Dukart, Environmental Services Director, Basin Electric Power Cooperative

Outlook

Basin Electric Power Cooperative-Combined Cycle Project

From McKenzie, Chelsie J <cmckenzie@blm.gov>
Date Thu 9/19/2024 2:06 PM
To almccaslin@burnsmcd.com <almccaslin@burnsmcd.com>

Audra,

Upon review of the proposed new greenfield approximately 1,400 megawatt combined-cycle combustion turbine generation facility in Williams County, North Dakota the Bureau of Land Management (BLM) has no resource concerns regarding the proposal, at this time. It does not appear to involve BLM land, but if the project area changes please keep the BLM updated.

Thank you

Chelsie McKenzie
Realty Specialist
Bureau of Land Management
North Dakota Field Office
99 23rd Avenue West, Suite A
Dickinson, ND 58601
Office: 701-227-7702
Cell: 701-502-1271

Outlook

RE: Request for Information – Basin Electric Combined-Cycle Project

From OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Date Wed 1/22/2025 10:25 AM
To McCaslin, Audra L <almccaslin@burnsmcd.com>
Cc Everard, Robert <reverard@burnsmcd.com>; EDukart@bepc.com <EDukart@bepc.com>; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>

Good morning Ms. McCaslin,

No worries. We'll update the project name Bison Generation Station.

We'll get started right away. Thank you.

Respectfully,

Dan Townes
Military Aviation and Installation Assurance Siting Clearinghouse
Office of the Assistant Secretary of Defense (Energy Resilience and Optimization)
Desk: 571-372-8414 (temporarily unavailable)
NIPR: daniel.w.townes.ctr@mail.mil

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Tuesday, January 21, 2025 2:53 PM
To: Townes, Daniel W CTR OSD OUSD A-S (USA) <daniel.w.townes.ctr@mail.mil>
Cc: Everard, Robert <reverard@burnsmcd.com>; EDukart@bepc.com; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

Mr. Townes,

Thank you for your patience, below is the requested information. Also note that the project name is now Bison Generation Station.

Attached is a KMZ showing the following location of the taller structures on-site, along with their approximate heights below:

- The two exhaust stack locations (approximately 250 ft tall)
- The auxiliary boiler stack (approximately 165 ft tall)
- The general location of the two HRSG buildings (approximately 158.5 ft tall)
- The location of the four electrical transmission tie-in structures (approximately 85 ft tall)
- The substation location, including the microwave tower location (approximately 100 ft tall)

The electrical voltage will be 230/345 kV and the interconnection length between the generation substation to the tie-in structures are approximately 300 feet.

Information for the approximate 1-mile long 230 kV transmission line extending north from the tie-in location will be sent in a separate email pertaining specifically to the 230 kV transmission line project.

Thank you,

Audra McCaslin \ Burns & McDonnell
Staff Environmental Scientist
O 816-605-7928 \ M 531-310-7082
almccaslin@burnsmcd.com \ burnsmcd.com
9450 Ward Parkway, Kansas City, MO 64114

From: Townes, Daniel W CTR OSD OUSD A-S (USA)
Sent: Tuesday, September 24, 2024 10:00 AM
To: McCaslin, Audra L
Cc: Everard, Robert; Ruff, Gage T; EDukart@bepc.com; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
Subject: RE: Request for Information – Basin Electric Combined-Cycle Project

Good morning Ms. McCaslin,

Thank you. We'll be standing by.

Respectfully,

Dan Townes

Military Aviation and Installation Assurance Siting Clearinghouse

Office of the Assistant Secretary of Defense (Energy Resilience and Optimization)

Desk: 571-372-8414 (temporarily unavailable)

NIPR: daniel.w.townes.ctr@mail.mil

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Tuesday, September 24, 2024 10:58 AM
To: Townes, Daniel W CTR OSD OUSD A-S (USA) <daniel.w.townes.ctr@mail.mil>
Cc: Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

Good morning Mr. Townes,

I just wanted to give you an update that we did receive your request and that we are working on gathering the information requested. We will provide a response as soon as we have the information available.

Thank you,

Audra McCaslin \ Burns & McDonnell

Staff Environmental Scientist

O 816-605-7928 \ M 531-310-7082

almccaslin@burnsmcd.com \ burnsmcd.com

9450 Ward Parkway, Kansas City, MO 64114

From: Townes, Daniel W CTR OSD OUSD A-S (USA)
Sent: Friday, September 20, 2024 11:12 AM
To: McCaslin, Audra L
Cc: Everard, Robert; Ruff, Gage T; EDukart@bepc.com; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
Subject: RE: Request for Information – Basin Electric Combined-Cycle Project

Good morning Ms. McCaslin,

I am just following up on the request for more information in the email below. Thank you.

Respectfully,

Dan Townes

Military Aviation and Installation Assurance Siting Clearinghouse

Office of the Assistant Secretary of Defense (Energy Resilience and Optimization)

Desk: 571-372-8414 (*temporarily unavailable*)

NIPR: daniel.w.townes.ctr@mail.mil

From: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
Sent: Friday, September 13, 2024 9:24 AM
To: McCaslin, Audra L <almccaslin@burnsmcd.com>
Cc: Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Subject: RE: Request for Information – Basin Electric Combined-Cycle Project

Good morning Ms. McCaslin,

Your Informal Review request for the Basin Electric Combined-Cycle Project has been received. We will begin processing the request shortly.

To aid in our review, can you please provide the following:

- A shapefile and/or KMZ file for mapping the project
- Tallest Structure Height (within the project boundary):
  - Structure Type (roof/exhaust stack/transmission pole/something else):
- Associated Transmission Infrastructure (if applicable)
  - Type of Structures:
  - Structure Heights:
  - Length of Line:
  - Substation Tie-in(s):
  - Rated Voltage of Line:

Thank you for the opportunity to review the project.

Very Respectfully,

The Clearinghouse

Military Aviation and Installation Assurance Siting Clearinghouse

Office of the Assistant Secretary of Defense (Energy Resilience and Optimization)

Email: osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, September 12, 2024 5:50 PM
To: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Cc: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>; Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

Dear To Whom it May Concern:

On behalf of Basin Electric Power Cooperative (Basin Electric), Burns & McDonnell is assisting in the development of a new greenfield combined-cycle project. The proposed project will be located in Section 20, Township 156 North, Range 98 West; in Williams County, North Dakota.

Attached is the official request for information which includes the proposed project description and facility location map.

If you have any questions regarding the project or need additional information, please do not hesitate to contact me at almccaslin@burnsmcd.com or 816-605-7928.

Thank you for your time and assistance,

Audra McCaslin \ Burns & McDonnell

Staff Environmental Scientist

531-310-7082

almccaslin@burnsmcd.com \ burnsmcd.com

9450 Ward Parkway, Kansas City, MO 64114

Natural Resources
Conservation Service

Bismarck State Office
PO Box 1458
Bismarck, ND
58502-1458

Voice 701.530.2000
Fax 855-813-7556

September 26, 2024

Audra McCaslin
Burns & McDonnell
9450 Ward Parkway
Kansas City, MO 64114

Dear Ms. McCaslin:

The Natural Resources Conservation Service (NRCS) has reviewed your letter dated September 12, 2024, concerning the proposed Basin Electric Power Cooperative - Combined Cycle Project in Williams County, North Dakota.

NRCS has a major responsibility with the Farmland Protection Policy Act (FPPA) in documenting conversion of farmland (i.e., Prime, Statewide Importance and/or Local Importance) to non-agricultural use if federal funding is used for the project. It appears by your letter that the proposed project is not supported by federal funding; therefore, FPPA does not apply, and no further action is needed.

However, if federal funding is secured in the future for the proposed project, then FPPA would apply and require filing of a Farmland Conversion Rating Form AD-1006.

If you have additional questions pertaining to FPPA, please contact Wade Bott, State Soil Scientist, NRCS, Bismarck, North Dakota, at (701) 530-2021.

Sincerely,

WADE BOTT Digitally signed by WADE BOTT
Date: 2024.09.26 13:36:29 -05'00'

WADE D. BOTT
State Soil Scientist

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*			Date Of Land Evaluation Request			
Name of Project			Federal Agency Involved			
Proposed Land Use			County and State county and state			
PART II *(To be completed by NRCS)*			Date Request Received By NRCS		Person Completing Form:	
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*			YES ☐ NO ☐	Acres Irrigated		Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %			Amount of Farmland As Defined in FPPA Acres: %		
Name of Land Evaluation System Used	Name of State or Local Site Assessment System			Date Land Evaluation Returned by NRCS		

		Alternative Site Rating			
PART III *(To be completed by Federal Agency)*		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly					
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site					
PART IV *(To be completed by NRCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide Important or Local Important Farmland					
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value					
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)					
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	0	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	0	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Outlook

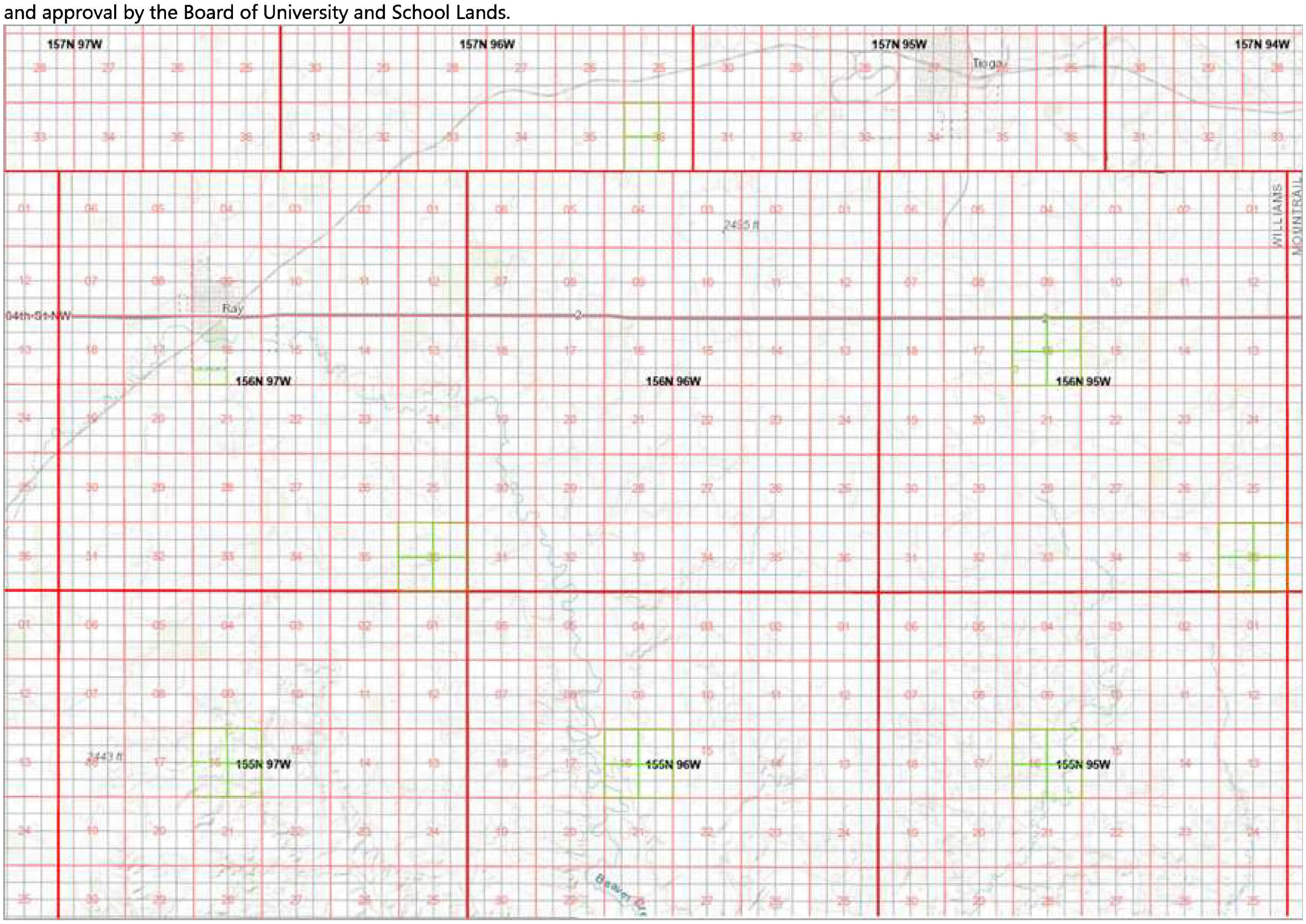
RE: Request for Information – Basin Electric Combined-Cycle Project

From -Info-Land Dept. ROW <landrow@nd.gov>
Date Mon 9/16/2024 4:07 PM
To McCaslin, Audra L <almccaslin@burnsmcd.com>
Cc Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com <EDukart@bepc.com>; Stegmiller, Joseph H. <jstegmiller@nd.gov>; -Info-DTL General Inquiries <dtlrequest@nd.gov>

1 attachment (1 MB)
Basins_Proposed_CombinedCyclePlant_AgencyLetter_09122024_NDDeptofTrustLandsSchools-SurfaceTrust.pdf;

Hello,

NDDTL does not manage any surface estate interests in the listed tract of land stated in the received letter (attached). Any proposed projects (ie, pipelines, electric lines, roads, etc.) crossing NDDTL managed property would need to apply for a Rights of Way and would be subject to review and approval by the Board of University and School Lands.



If you have any questions, please contact the Department via emailing landrow@nd.gov.

Sincerely,

North Dakota Department of Trust Lands
landrow@nd.gov • land.nd.gov/rightsofway • 1707 N 9th St • Bismarck, ND 58501

NORTH Dakota | Trust Lands
Be Legendary.™

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, September 12, 2024 5:07 PM
To: -Info-DTL Surface <dtlsurface@nd.gov>
Cc: Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

You don't often get email from almccaslin@burnsmcd.com. Learn why this is important
***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Dear Joseph Stegmiller:

On behalf of Basin Electric Power Cooperative (Basin Electric), Burns & McDonnell is assisting in the development of a new greenfield combined-cycle project. The proposed project will be located in Section 20, Township 156 North, Range 98 West; in Williams County, North Dakota.

Attached is the official request for information which includes the proposed project description and facility location map.

If you have any questions regarding the project or need additional information, please do not hesitate to contact me at almccaslin@burnsmcd.com or 816-605-7928.

Thank you for your time and assistance,

Audra McCaslin \ Burns & McDonnell
Staff Environmental Scientist
531-310-7082
almccaslin@burnsmcd.com \ burnsmcd.com
9450 Ward Parkway, Kansas City, MO 64114

Outlook

RE: Request for Information – Basin Electric Combined-Cycle Project

From Schumacher, John D. <jdschumacher@nd.gov>
Date Wed 10/2/2024 2:20 PM
To McCaslin, Audra L <almccaslin@burnsmcd.com>

1 attachment (1 MB)
Basins_Proposed_CombinedCyclePlant_AgencyLetter_09122024_NDGameandFishDept.pdf;

Audra McCaslin
Staff Environmental Scientist
Burns & McDonnell

RE: Basin Electric Power Cooperative – Combined Cycle Project

The North Dakota Game and Fish Department has reviewed this project for wildlife concerns.

The National Wetland Inventory indicates a variety of wetlands within or adjacent to the proposed project area. Steps should be taken to protect any wetlands that cannot be avoided, alterations should not be made to existing drainage patterns, and above-ground appurtenances should not be placed in wetland areas. Unavoidable destruction or degradation of wetland acres should be mitigated in kind.

We do not believe this project will have any significant adverse effects on wildlife or wildlife habitat provided these recommendations are implemented where appropriate.

J.D. Schumacher
Resource Biologist

(701) 328-6321 • jdschumacher@nd.gov • gf.nd.gov

NORTH Dakota | Game and Fish
Be Legendary.™

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, September 12, 2024 5:12 PM
To: -Info-Game & Fish Dept. <ndgf@nd.gov>
Cc: Kreft, Bruce L. <bkreft@nd.gov>; Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

Some people who received this message don't often get email from almccaslin@burnsmcd.com. Learn why this is important

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Dear Jeb Williams:

On behalf of Basin Electric Power Cooperative (Basin Electric), Burns & McDonnell is assisting in the development of a new greenfield combined-cycle project. The proposed project will be located in Section 20, Township 156 North, Range 98 West; in Williams County, North Dakota.

Attached is the official request for information which includes the proposed project description and facility location map.

If you have any questions regarding the project or need additional information, please do not hesitate to contact me at almccaslin@burnsmcd.com or 816-605-7928.

Thank you for your time and assistance,

Audra McCaslin \ Burns & McDonnell
Staff Environmental Scientist
531-310-7082
almccaslin@burnsmcd.com \ burnsmcd.com
9450 Ward Parkway, Kansas City, MO 64114

NORTH Dakota | Water Resources
Be Legendary.

October 11, 2024

Mr. Robert Everard
Burns & McDonnell
9450 Ward Parkway
Kansas City, MO 64114
almccaslin@burnsmcd.com
916-333-9400

Dear Mr. Everard

This is in response to your request for a review of the environmental impacts associated with the Basin Electric Power Cooperative – Combined Cycle Project, located in Williams County, North Dakota.

The proposed project has been reviewed by Department of Water Resources (DWR), and the following comments are provided:

-Initial review indicates the project does not require a conditional or temporary permit for water appropriation. However, if surface water or groundwater will be diverted for construction of any future projects identified in the plan, a water permit will be required per North Dakota Century Code § 61-04-02. Please consult with the DWR Water Appropriation Division if you have any questions at (701) 328-2754 or appropinfo@nd.gov.

-There are no FEMA National Flood Insurance Program (NFIP) floodplains identified or mapped where the proposed project is to take place. No permits relative to the NFIP are likely required based on the current Flood Insurance Rate Map and State minimum standards. However, flood risk has been identified through the North Dakota Risk Assessment Mapservice and Base Level Engineering (BLE) (ndram.dwr.nd.gov). In the absence of FEMA NFIP data, BLE is often considered best available data and is recommended to be considered in the design process. The State of North Dakota has no formal NFIP permitting authority as all NFIP permitting decisions are considered by impacted NFIP participating communities, the community with zoning authority for the area in question. Please work directly with the local floodplain administrators of the zoning authorities impacted.

-The DWR Regulatory Division's Engineering and Permitting Section reviewed the project location and determined no drainage permits, or construction permits for dikes, diversions, or restorations are likely required so long as no watercourses are modified (i.e., deepened, widened, rerouted, etc.) and no ponds, sloughs, lakes, or any series thereof, with a drainage area of 80 acres or more are drained.

Thank you for the opportunity to provide review comments. Should you have further questions, please contact me at 701-328-4970 or kyrkoski@nd.gov.

Sincerely,

Kyle Yrkoski

Kyle Yrkoski
Planner III

KY:mg/1570

Outlook

RE: Request for Information – Basin Electric Combined-Cycle Project

From Vigesaa, Claire <cvigesaa@nd.gov>

Date Fri 9/13/2024 7:49 AM

To McCaslin, Audra L <almccaslin@burnsmcd.com>

Cc Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com <EDukart@bepc.com>

Audra,

I am pleased to see this move forward; the project is vital for grid reliability for the region and addressing the electric demand growth in the region. Best to you as the project moves forward. The North Dakota Transmission Authority sees no concerns and is supportive of your endeavor.

Sincerely,

Claire

Claire Vigesaa, Executive Director
North Dakota Transmission Authority
406-489-3881

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, September 12, 2024 5:24 PM
To: Vigesaa, Claire <cvigesaa@nd.gov>
Cc: Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

You don't often get email from almccaslin@burnsmcd.com. Learn why this is important

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Dear Claire Vigesaa:

On behalf of Basin Electric Power Cooperative (Basin Electric), Burns & McDonnell is assisting in the development of a new greenfield combined-cycle project. The proposed project will be located in Section 20, Township 156 North, Range 98 West; in Williams County, North Dakota.

Attached is the official request for information which includes the proposed project description and facility location map.

If you have any questions regarding the project or need additional information, please do not hesitate to contact me at almccaslin@burnsmcd.com or 816-605-7928.

Thank you for your time and assistance,

Audra McCaslin \ Burns & McDonnell
Staff Environmental Scientist
531-310-7082
almccaslin@burnsmcd.com \ burnsmcd.com
9450 Ward Parkway, Kansas City, MO 64114

Outlook

RE: SHSND Ref# 24-9113 Request for Information – Basin Electric Combined-Cycle Project

From Meidinger, Lorna B. <lbmeidinger@nd.gov>
Date Tue 1/28/2025 11:49 AM
To McCaslin, Audra L <almccaslin@burnsmcd.com>
Cc Everard, Robert <reverard@burnsmcd.com>; rking@bepc.com <rking@bepc.com>

1 attachment (238 KB)
24-9113_APEsurvey.pdf;

Audra,

Thank you for the additional information that we requested. Attached is our response.

Respectfully,

Lorna Meidinger
Lead Historic Preservationist
State Historical Society of North Dakota
612 E Boulevard Ave
Bismarck, ND 58505
701.328.2089

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Tuesday, January 21, 2025 1:50 PM
To: Meidinger, Lorna B. <lbmeidinger@nd.gov>
Cc: Everard, Robert <reverard@burnsmcd.com>; rking@bepc.com
Subject: Re: SHSND Ref# 24-9113 Request for Information – Basin Electric Combined-Cycle Project

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Lorna,

Thank you for your patience, below is the requested information. Also note that the project name is now Bison Generation Station.

Attached is a KMZ showing the following location of the taller structures on-site, along with their approximate heights below:

- The two exhaust stack locations (approximately 250 ft tall)
- The auxiliary boiler stack (approximately 165 ft tall)
- The general location of the two HRSG buildings (approximately 158.5 ft tall)
- The location of the four electrical transmission tie-in structures (approximately 85 ft tall)
- The substation location, including the microwave tower location (approximately 100 ft tall)

The Project operational sound levels, as currently designed, are expected to be below the recommended noise criteria provided by USEPA and ANSI S12.9. Refer to the attached figure showing the operational noise level contours for the area surrounding the project.

Thank you,

Audra McCaslin \ Burns & McDonnell
Staff Environmental Scientist
O 816-605-7928 \ M 531-310-7082
almccaslin@burnsmcd.com \ burnsmcd.com
9450 Ward Parkway, Kansas City, MO 64114

From: Meidinger, Lorna B. <lbmeidinger@nd.gov>
Sent: Monday, September 16, 2024 1:29 PM
To: McCaslin, Audra L <almccaslin@burnsmcd.com>
Subject: SHSND Ref# 24-9113 Request for Information – Basin Electric Combined-Cycle Project

Good afternoon Audra,

I am following up from our telephone call la few minutes ago. Please let us know what the total height of the project and the anticipated noise levels will be as that is a factor in determining the area of potential effects. I understand you have not yet received this information from the engineers on the project.

Respectfully,

Lorna Meidinger

Lead Historic Preservationist

State Historical Society of North Dakota

612 E Boulevard Ave

Bismarck, ND 58505

701.328.2089

From: Patton, Margaret M. <mmpatton@nd.gov>
Sent: Friday, September 13, 2024 1:57 PM
To: Meidinger, Lorna B. <lbmeidinger@nd.gov>
Subject: FW: Request for Information – Basin Electric Combined-Cycle Project

---

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, September 12, 2024 5:26 PM
To: Peterson, Bill <billpeterson@nd.gov>
Cc: -Info-Historical Society Cultural Review <shsculturalreview@nd.gov>; Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com
Subject: Re: Request for Information – Basin Electric Combined-Cycle Project

Some people who received this message don't often get email from almccaslin@burnsmcd.com. Learn why this is important

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Dear William D. Peterson, PhD:

On behalf of Basin Electric Power Cooperative (Basin Electric), Burns & McDonnell is assisting in the development of a new greenfield combined-cycle project. The proposed project will be located in Section 20, Township 156 North, Range 98 West; in Williams County, North Dakota.

Attached is the official request for information which includes the proposed project description and facility location map.

If you have any questions regarding the project or need additional information, please do not hesitate to contact me at almccaslin@burnsmcd.com or 816-605-7928.

Thank you for your time and assistance,

Audra McCaslin \ Burns & McDonnell

Staff Environmental Scientist

531-310-7082

almccaslin@burnsmcd.com \ burnsmcd.com

9450 Ward Parkway, Kansas City, MO 64114

October 11, 2024

Audra McCaslin
Burns and McDonnell Engineering Company
9450 Ward Parkway
Kansas City, MO 64114
almccaslin@burnsmcd.com

SHSND Ref.: 24-9113 Basin Electric Combined-Cycle Project in portions of [T156N R98W Section 20] in Williams County, North Dakota

Dear Audra,

We reviewed SHSND Ref.: 24-9113 and inquired about the noise levels and heights of structures for theis project on September 16, 2024. The response was that those factors are not yet known. As a result, we are unable to determine the full extent of the Area of Potential Effects (APE) but recommend a Class III (pedestrian survey) of the full area once we are able to determine the appropriate APE. The survey must follow "North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects," which is available at https://www.history.nd.gov/hp/hpforms.html.

Please include the SHSND Reference number listed above in further correspondence for this specific project. If you have any questions please contact Lorna Meidinger, Lead Historic Preservation Specialist at (701) 328-2089 or lbmeidinger@nd.gov.

Sincerely,

for William D. Peterson, PhD
Director, State Historical Society of North Dakota

24-9113

January 28, 2025

Audra McCaslin
Burns and McDonnell Engineering Company
9450 Ward Parkway
Kansas City, MO 64114
almccaslin@burnsmcd.com

SHSND Ref.: 24-9113 Basin Electric Combined-Cycle Project (Bison Generation Station) in portions of [T156N R98W Section 20] in Williams County, North Dakota

Dear Audra,

Thank you for the additional information regarding the heights of structures and sound levels associated with this project now called Bison Generation Station. It is our determination that the area of potential effects for this project is the area where sounds levels are 30dBA and above. We recommend a Class III (pedestrian survey) of that area. The survey must follow "North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects," which is available at https://www.history.nd.gov/hp/hpforms.html. We also recommend consulting with tribes for any sites that are sensitive to audible disturbance and for what sound level they consider disturbing.

Please include the SHSND Reference number listed above in further correspondence for this specific project. If you have any questions please contact Lorna Meidinger, Lead Historic Preservation Specialist at (701) 328-2089 or lbmeidinger@nd.gov.

Sincerely,

for William D. Peterson, PhD
Director, State Historical Society of North Dakota

24-9113

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

October 8, 2024

NWO-2020-1890-BIS

Burns & McDonnell Engineering Company, Inc.
Attn: Audra McCaslin
9450 Ward Parkway
Kansas City, Missouri 64114

Dear Ms. McCaslin:

This is in response to the information we recently received, by letter dated September 12, 2024, regarding Basin Electric Power Cooperative proposed combined-cycle combustion turbine generation facility project. The proposed project will be located in the N½ of Section 20, Township 156 North, Range 98 West, Williams County, North Dakota.

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

Based on the information included in the letter, the Corps has determined that the proposed project may need a Clean Water Act Section 404 permit. The permit application and instructions for completing the application are enclosed and may also be found at: http://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Obtain-a-Permit. Be sure to accurately describe all proposed work and construction methodology. Once the application is complete, mail it to the letterhead address or to the email address below.

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Please refer to identification number NWO-2020-1890-BIS in any correspondence concerning this project. If you have any questions, please contact Jason Renschler at U.S. Army Corps of Engineers, North Dakota Regulatory Office, 3319 University Drive, Bismarck, North Dakota 58504, by email at Jason.J.Renschler@usace.army.mil, or by telephone at 701-989-6429. For more information regarding our program, please visit our website at *http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx*.

Sincerely,

Jason Renschler
Senior Project Manager
North Dakota

Enclosure
- application.

Outlook

Basin Electric Combined Cycle Project

From Reinisch, Jerry D <jerry_reinisch@fws.gov>
Date Mon 9/16/2024 10:58 AM
To almccaslin@burnsmcd.com <almccaslin@burnsmcd.com>

Audra
After reviewing the materials provided I was wondering how the generated product will be transported and along what route?
What are the anticipated final noise levels during operation?

Thanks

Jerry

Jerry D. Reinisch
U.S. Fish & Wildlife Biologist-Energy
Tribal Liason
3425 Miriam Avenue
Bismarck, North Dakota 58501
(O) 701-333-0267
(FWS) 701-226-7763
(C) 701-425-2133
jerry_reinisch@fws.gov

Outlook

RE: [EXTERNAL] Re: Request for Information – Basin Electric Combined-Cycle Project

From Reinisch, Jerry D <jerry_reinisch@fws.gov>
Date Thu 1/23/2025 11:16 AM
To McCaslin, Audra L <almccaslin@burnsmcd.com>

Thank you Audra, received.
Jerry

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, January 23, 2025 10:44 AM
To: Reinisch, Jerry D <jerry_reinisch@fws.gov>
Cc: Toso, Luke B <luke_toso@fws.gov>; Edens, Hanna K <hanna_edens@fws.gov>; Everard, Robert <reverard@burnsmcd.com>; Ryan King <rking@bepc.com>
Subject: Re: [EXTERNAL] Re: Request for Information – Basin Electric Combined-Cycle Project

Good morning Jerry,

Thank you for your patience, below is the requested information from your initial email regarding the transfer of generated power and operational noise levels (attached) for the proposed project. Also note that the project name is now Bison Generation Station.

The generated electricity will be transported northward by a pair of new approximately one-mile-long 230 kV aboveground transmission lines to the existing Wheelock substation located north of the project site. These transmission lines will be filed under a separate application. The generation facility will also interconnect to the existing 345 kV Springbrook-Tande transmission line by constructing an additional pair of approximately 1.2-mile long 345 kV transmission lines southward from the generation site to the existing transmission line, which will be filed as an amendment to the existing line. We've attached a kmz showing these approximate transmission line routes. Please be advised that these routes are preliminary and subject to change. More information will be provided as part of those separate applications.

The Project operational sound levels, as currently designed, are expected to be below the recommended noise criteria provided by USEPA and ANSI S12.9. Refer to the attached figure showing the operational noise level contours for the area surrounding the project.

Thank you,

Audra McCaslin \ Burns & McDonnell

Staff Environmental Scientist
O 816-605-7928 \ M 531-310-7082
almccaslin@burnsmcd.com \ burnsmcd.com
9450 Ward Parkway, Kansas City, MO 64114

From: Reinisch, Jerry D <jerry_reinisch@fws.gov>
Sent: Tuesday, September 24, 2024 2:40 PM
To: McCaslin, Audra L <almccaslin@burnsmcd.com>
Subject: RE: [EXTERNAL] Re: Request for Information – Basin Electric Combined-Cycle Project

Thank you. I look forward to hearing from you.

Jerry

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Tuesday, September 24, 2024 2:01 PM
To: Reinisch, Jerry D <jerry_reinisch@fws.gov>
Subject: Re: [EXTERNAL] Re: Request for Information – Basin Electric Combined-Cycle Project

Hello Mr. Reinisch,

I wanted to confirm that I had received your initial repsonse on 9/16 with an information request regarding anticipated noise levels and generated product routes. A few other agencies reached out with similar information requests. I have passed along to the project team and we are working on gathering the information requested. We will provide a response as soon as we have the information available.

Thank you,

Audra McCaslin \ Burns & McDonnell

Staff Environmental Scientist

O 816-605-7928 \ M 531-310-7082

almccaslin@burnsmcd.com \ burnsmcd.com

9450 Ward Parkway, Kansas City, MO 64114

From: Reinisch, Jerry D <jerry_reinisch@fws.gov>
Sent: Tuesday, September 24, 2024 1:06 PM
To: McCaslin, Audra L <almccaslin@burnsmcd.com>
Subject: RE: [EXTERNAL] Re: Request for Information – Basin Electric Combined-Cycle Project

Audra

I have been trying to reach out to you wondering where and how the power generated will be transported off-site?

Several whooping crane sightings have been recorded for that area, Particular attention to this species would occur from March 15- May 15 and September 10 – November 15 during their migration periods. Sighting of this species within 1.0 mile of the project area need to be reported to the USFWS immediately and all activities suspended. An awareness for this species should be conveyed prior to and during construction to all on-site personnel. Overhead transmission lines should all be marked with bird deflectors.

Please let me know if I can be of further assistance,

Jerry

From: McCaslin, Audra L <almccaslin@burnsmcd.com>
Sent: Thursday, September 12, 2024 5:32 PM
To: Toso, Luke B <luke_toso@fws.gov>
Cc: Reinisch, Jerry D <jerry_reinisch@fws.gov>; Everard, Robert <reverard@burnsmcd.com>; Ruff, Gage T <gtruff@burnsmcd.com>; EDukart@bepc.com
Subject: [EXTERNAL] Re: Request for Information – Basin Electric Combined-Cycle Project

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Dear Luke Toso:

On behalf of Basin Electric Power Cooperative (Basin Electric), Burns & McDonnell is assisting in the development of a new greenfield combined-cycle project. The proposed project will be located in Section 20, Township 156 North, Range 98 West; in Williams County, North Dakota.

Attached is the official request for information which includes the proposed project description and facility location map.

If you have any questions regarding the project or need additional information, please do not hesitate to contact me at almccaslin@burnsmcd.com or 816-605-7928.

Thank you for your time and assistance,

Audra McCaslin \ Burns & McDonnell

Staff Environmental Scientist

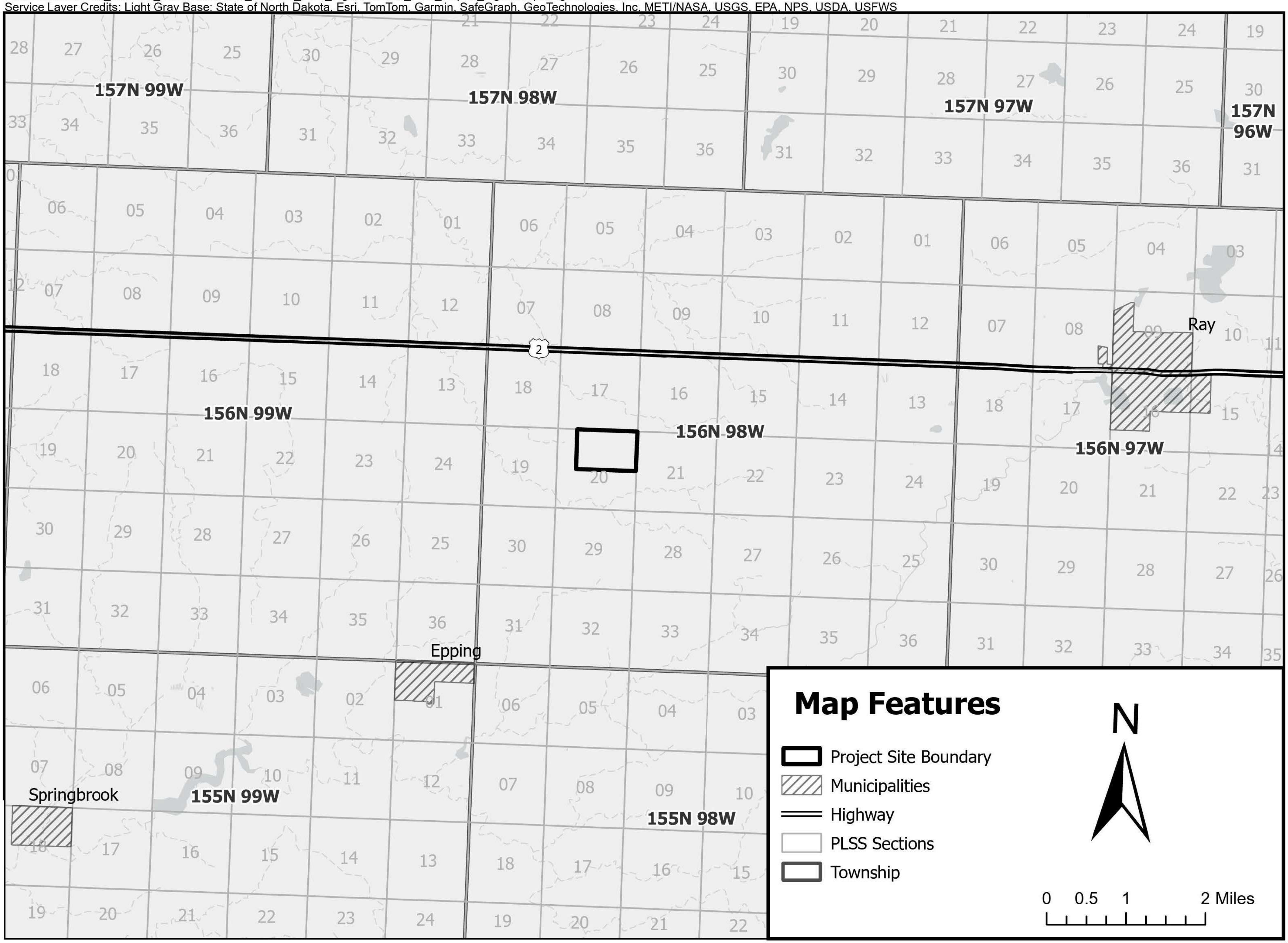
531-310-7082

almccaslin@burnsmcd.com \ burnsmcd.com

9450 Ward Parkway, Kansas City, MO 64114

APPENDIX L – NEWSPAPER PUBLICATION MAP

Path: C:\GIS\Basin_WLPCC_BaseData\Basin_WLPCC_PSC_Figures\Basin_PSC_Report_Figures.aprx gtruff 1/7/2025
Service Layer Credits: Light Gray Base: State of North Dakota, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS



Source: ESRI, PLSS, US Census TIGER, Basin EPC, Burns & McDonnell

Issued: 1/7/2025

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