DOE/EA-2197

Final Environmental Assessment for North Dakota CarbonSAFE: Project Tundra

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National Energy Technology Laboratory **U.S. Department of Energy**

Responsible Agency: U.S. Department of Energy

Title: Project Tundra, Environmental Assessment (DOE/EA-2197)

Location: Milton R. Young Power Plant, 3401 24th Street S.W., Center, ND 58530

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Abstract: The United States (U.S.) Department of Energy (DOE) prepared this Environmental Assessment (EA) to analyze the potential environmental, cultural, and socioeconomic impacts of partially funding a proposed project to design, construct, and operate an amine-based post-combustion carbon dioxide (CO_2) capture technology at a coal-fired power plant. DOE proposes to provide cost-shared funding to Minnkota Power Cooperative, Inc. (Minnkota) for the project at Minnkota's Milton R. Young Station (MRY), an existing lignite-fired coal power plant in Oliver County, North Dakota.

Under the Proposed Action, DOE proposes to provide project cost-shared financial assistance to Minnkota. Based on the best available projections, the project's cost is estimated to be approximately $77 million, and the DOE share would be approximately $38.5 million. The project partners are required to obtain funding for the remaining 50 percent of the project cost. It is important to note that the costs are estimates, based on DOE's knowledge of the cost of construction for Carbon Capture, Utilization, and Storage (CCUS) projects. Exact costs are not available, because Minnkota has not been selected to receive DOE funding for the proposed project at this time.

Availability: This EA was released for public review and comment after publication of the Notice of Availability in the Bismarck Tribune on August 19, 2023. DOE received many comments on the Draft EA. Due to the increased level of public interest and number of comments received, DOE prepared a Comment Response document, included as Appendix K, and reissued the Draft EA for an additional 30-day comment period to allow interested parties to review the comments and responses, as well as any edits to the Draft EA. Five comment letters were received in response to the April 2024 Draft EA. Those letters are included in the Final EA as Appendix L, and appropriate changes were made in the corresponding sections of the document. Other changes include minor edits to correct typos or improve clarity. Changes to the text of the Draft EA are shown with a line down the left side for ease of comparison.

The Draft and Final EAs are available on DOE's National Energy Technology Laboratory website, https://netl.doe.gov/node/6939 and DOE's National Environmental Policy Act (NEPA) website at (https://www.energy.gov/nepa/doe-environmental-assessments).

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AAQS	Ambient Air Quality Standards
ANSI	American National Standards Institute
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BIL	Bipartisan Infrastructure Law
BMP	best management practice
BP	Before Present
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CAA	Clean Air Act
CarbonSAFE	Carbon Storage Assurance Facility Enterprise
CCUS	Carbon Capture, Utilization, and Storage
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CJEST	Climate and Economic Justice Screening Tool
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CWA	Clean Water Act
CX	Categorical Exclusion
DOE	U.S. Department of Energy
DoH	North Dakota Department of Health
DOI	U.S. Department of the Interior
DMR	Department of Mineral Resources
EA	Environmental Assessment
EERC	University of North Dakota Energy and Environmental Research Center
EIV	Environmental Information Volume
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FECM	Office of Fossil Energy and Carbon Management
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FOA	Funding Opportunity Announcement
GHG	greenhouse gas
gpm	gallons per minute
GWP	global warming potential
HAP	hazardous air pollutant
HAZOP	hazard and operability
Hg	mercury

HUC	Hydrologic Unit Code
IPaC	Information for Planning and Consultation
IWG	Interagency Working Group
IWG Report	Interagency Working Group on Social Cost of Greenhouse Gases Report
kg	kilogram
KM CDR	Kansai Mitsubishi Carbon Dioxide Recovery
kV	kilovolt
LCA	Life Cycle Analysis
MBTA	Migratory Bird Treaty Act
mD	millidarcy
mg/L	milligrams per liter
MHI	Mitsubishi Heavy Industries
Minnkota	Minnkota Power Cooperative, Inc.
MLRA	Major Land Resource Areas
MMT/yr	million metric tons per year
MRV Plan	Monitoring, Reporting, and Verification Plan
MRY	Milton R. Young Station
MWe	megawatt electric
MWg	megawatts (gross)
MWh	megawatt-hour
N_2O	nitrous oxide
$NaSO_4$	sodium sulfate
NAAQS	National Ambient Air Quality Standards
NPS	National Park Service
NDDEQ	North Dakota Department of Environmental Quality
NDGF	North Dakota Game and Fish Department
NDIC	North Dakota Industrial Commission
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OCED	Office of Clean Energy Demonstrations
OSHA	Occupational Safety and Health Administration
PCOR	Plains CO_2 Reduction
PHA	Process Hazard Analysis
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
ppm	parts per million
Project	Project Tundra
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psig	pounds per square inch gauge
RCRA	Resource Conservation and Recovery Act

SC-GHG	social cost of greenhouse gas
SC-CH_4	social cost of methane
SC-CO_2	social cost of carbon dioxide
SC-N_2O	social cost of nitrous oxide
SCP	Species of Conservation Priority
SER	significant emission rates
SF_6	sulfur hexafluoride
SHPO	North Dakota State Historical Society, State Historic Preservation Office
SO_2	sulfur dioxide
STPD	short tons per day
SWAP	North Dakota State Wildlife Action Plan
SWPPP	Stormwater Pollution Prevention Plan
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
tpy	tons per year
UDP	Unanticipated Discoveries Plan
U.S.	United States
U.S.C.	United States Code
UIC	Underground Injection Control
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDW	underground source of drinking water
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
wet ESP	wet electrostatic precipitator
ZLD	zero liquid discharge

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CHAPTER 1. INTRODUCTION

The United States (U.S.) Department of Energy (DOE) National Energy Technology Laboratory prepared this Environmental Assessment (EA) under the National Environmental Policy Act (NEPA), as amended, and other relevant federal and state laws and regulations. This EA analyzes the potential environmental and social impacts of partially funding Minnkota Power Cooperative, Inc. (Minnkota) for the proposed North Dakota CarbonSAFE: Project Tundra. The project would include new infrastructure and equipment for the capture and geologic storage of carbon dioxide (CO_2) generated by the existing lignite-fired Milton R. Young Station (MRY) in Center, Oliver County, North Dakota, and would utilize Mitsubishi Heavy Industries' (MHI) Kansai Mitsubishi Carbon Dioxide Recovery (KM CDR) amine-based post-combustion carbon capture technology.

1.1 Document Structure

This EA discloses the direct, indirect, and cumulative environmental effects that would result from the Proposed Action and alternatives. The document is organized into four parts:

- Chapter 1: Introduction—This chapter includes information on the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need.
- Chapter 2: Proposed Action and Alternatives—This chapter provides a more detailed description of the agency's Proposed Action as well as alternative methods for achieving the stated purpose. Alternatives considered but not analyzed in detail are also discussed in this chapter.
- Chapter 3: Affected Environment and Environment Consequences—This chapter contains a description of current resource conditions in the project area and the environmental effects of the No Action Alternative and implementing the Proposed Action.
- Chapter 4: List of Preparers—This chapter provides a list of preparers for the EA.
- Chapter 5: Distribution List—This chapter provides a list of the recipients of the EA.
- Appendices—The appendices provide information on consultation efforts and other information to support the analyses presented in the EA, including literature citations (Appendix A).

1.2 Background

In 2016, Congress directed the DOE's Office of Fossil Energy and Carbon Management (FECM) to test, mature, and prove Carbon Capture, Utilization, and Storage (CCUS) technologies at commercial scale. DOE developed the Carbon Storage Assurance Facility Enterprise (CarbonSAFE) Initiative to fulfill the need for research into safe, efficient, and effective characterization and permitting of commercial-scale CCUS projects. CarbonSAFE projects include storage complexes capable of safely and efficiently storing commercial volumes of CO_2. Storage complexes are geologic reservoirs with permeability and porosity that allow for injection and storage of CO_2, as well as one or more low-permeability seals, which overlay the target storage reservoir(s) and serve as barriers preventing upward migration of CO_2 out of the reservoir(s). Project sites include both the surface footprint and subsurface storage complex over the entire volume of subsurface impacted by the injection. All projects include required monitoring of the target storage reservoir and the surrounding area throughout the project's injection and post-injection phases.

To implement the CarbonSAFE Initiative, DOE established sequential phases of development: Phase I – Integrated CCUS Pre-Feasibility; Phase II – Storage Complex Feasibility; Phase III – Site Characterization and Permitting; and Phase IV – Site Construction. DOE recently added a Phase III.5 in order to accommodate projects that have completed some of the requirements of Phase III prior to applying for DOE funding. DOE issued Funding Opportunity Announcement (FOA) DE-FOA-0001450 (Phase II) in 2017. In 2019, DOE issued DE-FOA-0001999 to request proposals for CarbonSAFE Phase III. DOE conducted a competitive merit review of the proposals and selected projects for Phase III in 2020.

During Phase III, each project team will complete the acquisition, analysis, and development of information to fully characterize a storage complex capable of storing commercial volumes of CO_2 (a minimum of 50 million metric tons of CO_2 within a 30-year period). In addition, Phase III requires the identification of the target storage reservoir(s) within the storage complex, as well as the preparation and submission of the U.S. Environmental Protection Agency's (EPA) Underground Injection Control (UIC) Class VI Permit to Construct for each proposed injection well at the site(s). Once the UIC Class VI Permit(s) to Construct is submitted, any additional activities will include working with the regulators to satisfy their requirements until construction authorization is granted. Finally, Phase III will address pore/surface rights, right(s)-of-way, and all other permitting processes and requirements, liability relief, and finance agreements in support of the business model for eventual commercial operations, as needed. Phase III project participants awarded under DE-FOA-0001999 are required to complete NEPA reviews for a potential Phase IV project, which would include construction of the injection well(s) and obtaining authorization to proceed with commercial scale injection via an Operating Permit from the EPA's UIC Class VI Permitting Process. DOE prepared this EA in response to the requirement to complete the NEPA process as part of the Phase III project. This project has not been selected for a CarbonSAFE Phase IV (construction) project at this time.

"North Dakota CarbonSAFE: Project Tundra" was selected under Phase III and must complete the NEPA process for a potential Phase IV project. DOE assessed this project, as required by NEPA implementing procedures and regulations, as amended, and issued Categorical Exclusions (CXs) prior to the separate, but related, projects in Phase II and Phase III for work conducted in those phases. Copies of all CXs for the previous phases of the proposed project are included in Appendix B. CX documents are also available online at https://netl.doe.gov/nepa.

1.3 Federal Proposed Action

DOE's proposed action is to provide cost-shared financial assistance to Minnkota for the project. Funding for this project is available under two DOE programs, both with funds appropriated by the Infrastructure Investment and Jobs Act, more commonly known as the Bipartisan Infrastructure Law (BIL). Minnkota may apply under either or both FOAs for DOE project funding but may not receive funds from both DOE programs for the same scope of work.

FECM issued DE-FOA-0002711, *Bipartisan Infrastructure Law (BIL): Storage Validation and Testing (Section 40305): Carbon Storage Assurance Facility Enterprise (CarbonSAFE): Phases III, III.5, and IV*, in September 2022. CarbonSAFE Phase IV projects would construct the commercial-scale secure geologic storage facility and prepare it for CO_2 injection. This includes drilling and completion of injection and monitoring wells; completion of risk and mitigation plans; completing all the baseline and any additional monitoring data; completing all other project infrastructure (e.g., CO_2 pipelines, injection facility); and obtaining a Class VI Authorization to Inject or equivalent. DOE funding of Phase IV would not include the operation of the CO_2 injection and storage project. Because the operation of the project can reasonably be expected to occur after the construction is completed, the impacts of operation of the facility are considered to be part of the proposed project for the purposes of the EA.

DOE's Office of Clean Energy Demonstrations (OCED) issued DE-FOA-0002962, *Carbon Capture Demonstration Projects Program*, in February 2023. Projects awarded under this FOA would demonstrate transformational domestic, commercial-scale, integrated carbon capture and storage projects designed to further advance the development, deployment, and commercialization of technologies to capture, transport (if required), and store CO_2 emissions from electric generation facilities or other industrial facilities.

Based on the best available projections, the Phase IV cost is estimated to be approximately $77 million, and the DOE share would be approximately $38.5 million. It is important to note that the costs are estimates, based on DOE's knowledge of the cost of construction for CCUS projects. Exact costs are not available, because Minnkota has not been selected to receive DOE funding for the proposed project at this time. DOE funding of Phase IV would include only the construction of the CO_2 storage facility and its infrastructure; however, because the project cannot proceed without the capture facility, and operation of the storage facility can reasonably be expected to occur after construction is completed, the impacts of these connected actions are included in the analysis of the proposed project's impacts for the purposes of the EA.

1.4 Purpose and Need

The purpose and need for DOE action is to advance the commercial readiness of CCUS by constructing a commercial-scale geologic storage complex and associated CO_2 transport infrastructure. BIL appropriated funds under both the CarbonSAFE Initiative and the Carbon Capture Demonstration Projects Program to further the development, deployment, and commercialization of technologies to capture and geologically store CO_2 emissions securely in the subsurface. Successful implementation of this proposed project will encourage the rapid growth of a vibrant, geographically widespread industry for secure geologic carbon storage by reducing risks and costs for future projects and bringing more storage resources into commercial classifications. Further, this commercial-scale secure geologic storage infrastructure would "support efforts to build a clean and equitable energy economy that achieves zero-carbon electricity by 2035 and puts 'the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050' to benefit all Americans" (DOE 2023a). If selected, this project would contribute to a diverse portfolio of projects that collectively research, advance and demonstrate the reduction of CO_2 from electricity generation and other industrial sectors.

This project in Oliver County, North Dakota was proposed because a fully characterized storage complex: (1) is able to receive and safely store CO_2 in sufficient quantities to meet the DOE goals of 50 million metric tons over a 30-year period; (2) is located in proximity to one or more CO_2 sources that can supply those quantities; and (3) can be connected to the sources by a transport system that can be built and operated economically.

1.5 National Environmental Policy Act and Related Procedures

DOE prepared this EA in accordance with NEPA, as amended ([Public Law 91–190] [As Amended Through P.L. 118–5, Enacted June 3, 2023]), the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR 1021). This statute and the implementing regulations require that DOE, as a federal agency:

- Assess the environmental impacts of its proposed action;
- Identify any adverse environmental effects that cannot be avoided, should the proposed action be implemented;
- Evaluate alternatives to the proposed action, including a no-action alternative; and
- Describe the cumulative impacts of the proposed action together with other past, present, and reasonably foreseeable future actions.

These provisions must be addressed before a final decision is made to proceed with any proposed federal action that has the potential to cause impacts to the natural or human environment, including providing federal funding to a project. This EA is intended to meet DOE's regulatory requirements under NEPA and provide DOE with the information needed to make an informed decision about providing financial assistance. In accordance with the above regulations, this EA allows for public input into the federal decision-making process; provides federal decision-makers with an understanding of potential environmental effects of their decisions before making these decisions; and documents the NEPA process.

1.6 Laws, Regulations, and Executive Orders

- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Protection of Wetlands (Executive Order [EO]11990)
- Floodplain Management (EO 11988)
- Endangered Species Act (ESA)
- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act (BGEPA)
- The Noise Control Act of 1972, as amended
- Federal Actions to Address Environmental Justice in Minority Populations and Low- Income Populations (EO 12898)
- Pollution Prevention Act of 1990
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- National Historic Preservation Act

1.7 Public Involvement, Agency Coordination, and Tribal Consultation

DOE coordinated with the following agencies, tribes, and non-governmental agencies through agency consultation letters and/or notification of the availability of the EA. Agency and tribal consultation letters are included in Appendix C.

1.7.1 Federal, State and Local Agencies

The following agencies, tribes, and non-governmental agencies will be provided with consultation letters and/or notification of the availability of the EA.

- Bureau of Indian Affairs
- National Association of State Energy Officials
- National Association of Tribal Historic Preservation Officers
- North Dakota Department of Environmental Quality (NDDEQ)
- North Dakota Game and Fish Department (NDGF)
- North Dakota Industrial Commission (NDIC)
- State and Tribal Government Working Group
- U.S. Army Corps of Engineers
- U.S. Department of the Interior (DOI), Regional Environmental Officer
- U.S. Environmental Protection Agency (EPA), Region 8
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Forest Service (Local Office)

1.7.2 Tribal Governments

- Apache Tribe of Oklahoma
- Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
- Three Affiliated Tribes of the Forth Berthold Reservation, North Dakota

1.7.3 Non-governmental Organizations

- Center for Biological Diversity
- Clean Water Action
- Ducks Unlimited, Inc.
- Earthjustice
- Electric Power Research Institute
- Environmental Defense Fund
- Environmental Defense Institute
- Friends of the Earth
- Greenaction for Health and Environmental Justice
- Institute for Energy and Environmental Research
- National Audubon Society

- The Nature Conservancy
- Sierra Club
- Trout Unlimited
- Utilities Technology Council
- The Wilderness Society
- Western Resource Advocates

CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter describes the Proposed Action and No-Action Alternative analyzed in this EA, as well as those alternatives dismissed from further consideration. As described in Chapter 1, CEQ's regulations direct all federal agencies to use the NEPA process to identify and assess the reasonable alternatives to proposed actions that would avoid or minimize adverse effects of these actions upon the quality of the human environment (40 CFR 1502.14).

2.2 Proposed Action

As described in Section 1.3 above, DOE's Proposed Action is to provide cost-shared financial assistance to the proposed Project Tundra. Based on the best available projections, the Phase IV cost is estimated to be approximately $77 million, and the DOE share would be approximately $38.5 million. The project partners are required to obtain funding for the remaining 50 percent of the project cost. It is important to note that the costs are estimates, based on DOE's knowledge of the cost of construction for CCUS projects. Exact costs are not available, because the proposed project has not been selected to receive DOE funding at this time. DOE funding of Phase IV would include only the construction of the CO_2 storage facility and its infrastructure; however, because the project cannot proceed without the capture facility, and operation of the storage facility can reasonably be expected to occur after the construction is completed, the impacts of these connected actions are included in the analysis of the proposed project's impacts for the purposes of the EA.

2.3 No-Action Alternative

Under the No-Action Alternative, DOE would not provide cost-shared funding to the proposed project. The project would be delayed if other funding sources were pursued. Alternatively, the commercial-scale carbon capture and storage project (Project Tundra) may not be constructed. DOE assumes, for the purposes of a meaningful NEPA evaluation of the impacts of funding the project, that the recipient would not pursue the project. Consequently, the commercial-scale geologic storage complex would not be constructed, and the risks would not be reduced for future storage complexes and widespread commercial CCUS would not be advanced.

2.4 Alternatives Considered but Dismissed

NEPA requires DOE to assess the range of reasonable alternatives to the Proposed Action. Because DOE has been instructed by Congress on how to utilize this funding, DOE does not have the authority to utilize these funds for any purpose other than commercial-scale carbon capture and sequestration projects. DOE can only choose to fund or not fund any of the projects applying under a competitive FOA. DOE's **proposed action/purpose** is to provide cost-shared funding, and the only available alternative is not funding the proposed project. Alternatives to the **proposed project** include any other project that meets the goals and objectives of the same FOA. Applicants to DOE's FOAs are assessed for environmental impacts, and the results of those assessments are provided to the selecting official prior to selection, in accordance with 10 CFR 1021.216. In the case of CarbonSAFE Phase IV applications, the selecting official would consider the results of each CarbonSAFE Phase III project's EA or EIS. There are four other projects currently completing the NEPA process in CarbonSAFE Phase III:

- DOE/EA-2194: Wyoming CarbonSAFE
- DOE/EA-2196: Establishing an Early CO_2 Storage Complex in Kemper County, Mississippi: Project ECO_2S
- TBD: San Juan Basin CarbonSAFE
- TBD: Illinois Storage Corridor CarbonSAFE

There are additional projects being selected for CarbonSAFE Phase III, which will also undergo NEPA review. Please see DOE's website (https://netl.doe.gov/node/7677) for a current list of those projects. All CarbonSAFE Phase III projects will be analyzed for potential impacts separately and will not be discussed further in this EA. The CarbonSAFE Initiative Draft EA and EIS documents will continue to be published for review at https://netl.doe.gov/node/6939 and https://netl.doe.gov/library/eis, respectively. DOE's consideration of reasonable alternatives to Project Tundra under NEPA is therefore limited to the No-Action Alternative.

2.5 Project Tundra Description

Minnkota, as the project sponsor and host-site, has proposed to construct Project Tundra, which would be the world's largest post-combustion CO_2 capture and geologic storage project, and would capture and permanently store CO_2 emissions from Minnkota's existing MRY Station, a lignite-fired power plant in Oliver County, North Dakota.

The project consists of the carbon capture facility, a 0.5-mile-long CO_2 flowline; Class VI injection wells (up to three); Class I disposal wells (up to two); one underground source of drinking water (USDW) monitoring well; and deep subsurface monitoring wells (up to two). The project surface facilities are located on Minnkota-owned property. One of the deep subsurface monitoring wells is proposed to be installed approximately two miles northeast of the injection site. The Class I injection wells are proposed for disposal of non-hazardous process wastewater generated by the carbon capture process.

On January 21, 2022, the NDIC approved two geologic storage facilities (MRY-Broom Creek and MRY-Deadwood). Additionally, the design and operating conditions of associated injection wells (Class VI) were also approved as a part of the initial order. For the purposes of this EA, the project includes the surface facilities as described above.

The project would be sized for capture and saline formation geologic storage of an annualized average of 4.0 million metric tons per year (MMT/yr) of CO_2, with a design specification of at least 95 percent CO_2 capture from the processed MRY Unit 1 (250 megawatts gross [MWg] owned by Minnkota) and Unit 2 (455 MWg owned by Square Butte Electric) flue gas, Unit 2 is the principal unit of design. The CO_2 would be compressed and piped via a new 0.5-mile-long CO_2 flowline to an injection site for permanent deep geologic storage. If approved, construction is anticipated to begin in 2024 and to be complete by the end of 2028 to first quarter of 2029.

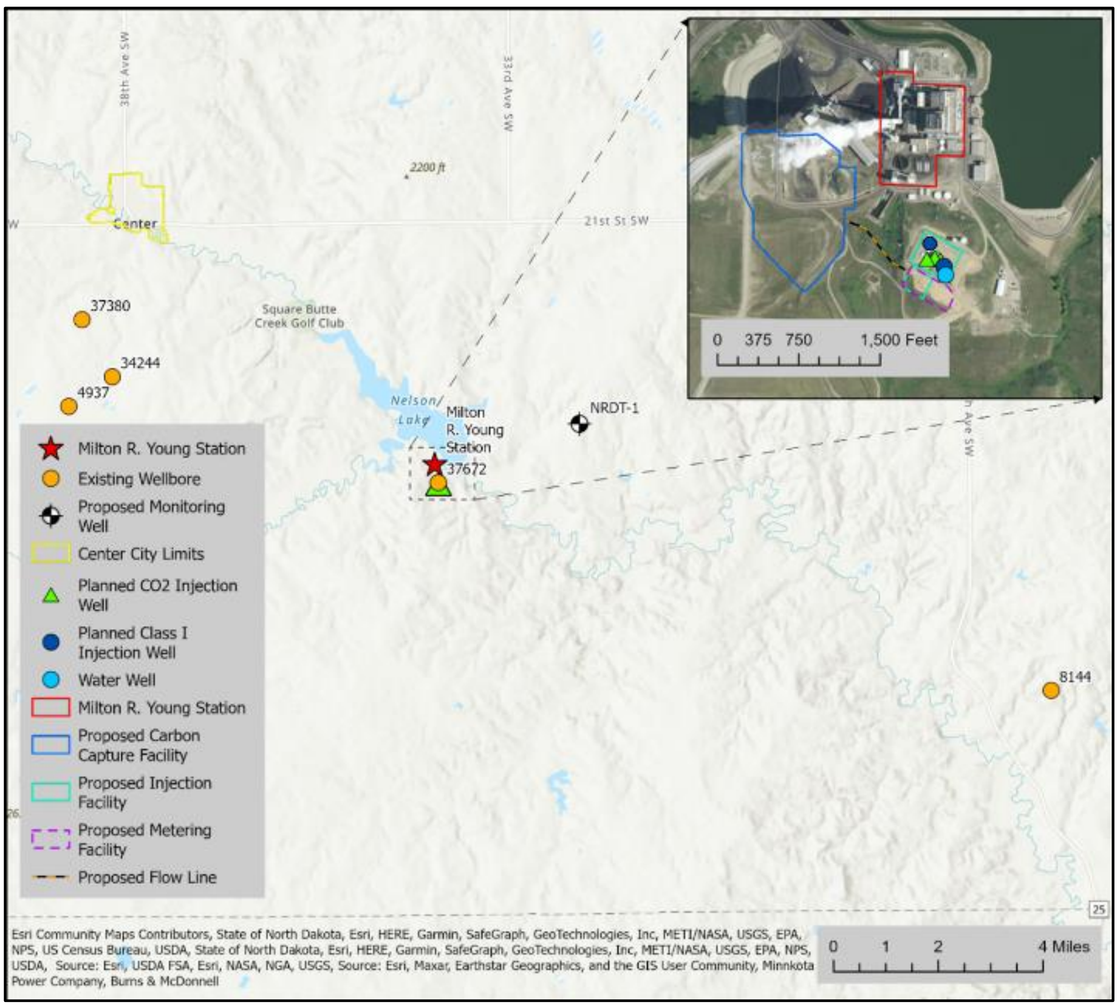
The project would extract steam from the Unit 1 and Unit 2 steam turbines, a necessary component for use in the absorption process. The project would be designed to capture up to 13,000 short tons per day (STPD) of CO_2. During operations, flue gas required to achieve this CO_2 capture rate would require all the flue gas from one unit and a portion of flue gas from the other unit for maximum operation. Various operating scenarios are available and planned to utilize various combinations of flue gas from both units.

The project includes construction of a new water treatment system for operations. Minnkota's existing MRY water system will be upgraded to allow for raw water to be transferred from Nelson Lake to the project water treatment system.

2.5.1 Location and Setting

The proposed project would be located adjacent to MRY near Center, North Dakota (Figure 2-1). The project would be located within the larger MRY associated industrial area that is bound by Nelson Lake to the north and east, coal production and plant waste disposal areas to the south, and agricultural and natural areas to the west.

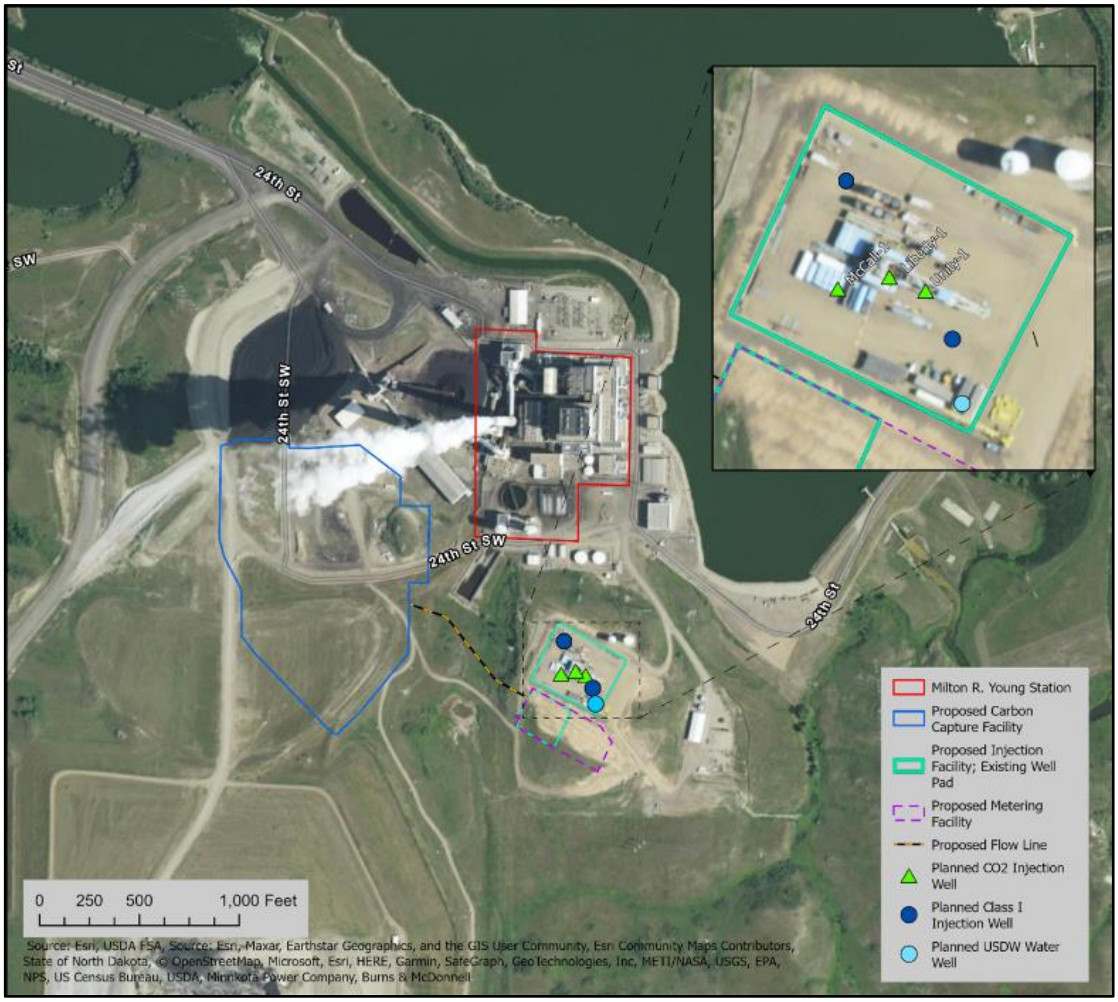
Figure 2-1: Proposed Project Location – MRY Vicinity Map



2.5.2 Facility Configuration and Process Design

The carbon capture facilities would be constructed as a stand-alone facility with a footprint that falls within an irregular area comprised of 25.8 acres west and south of MRY (Figure 2-2). This area is the site of a previously used coal stockpile. Currently, the area comprises equipment and materials storage areas, access roadways, and barren lands. The 0.5-mile-long CO_2 flowline will transport the CO_2 from the carbon capture facility to the injection site.[1] The injection site includes up to three Class VI injection wells referred to as McCall 1, Liberty 1, and Unity 1. The injection site also includes two Class I injection wells and a USDW monitoring well (see Figure 2-2).

Figure 2-2: Proposed Project Plan – Facility Adjacent to MRY Unit No. 1 & Unit No. 2



The project is proposing to use MHI's KM CDR technology, which uses an amine-based solvent to capture CO_2. The steam produced from MRY's coal-fired boilers (Unit 1 and Unit 2) will be used to regenerate the amine. The flue gas would be processed by and vented through the carbon capture facility.

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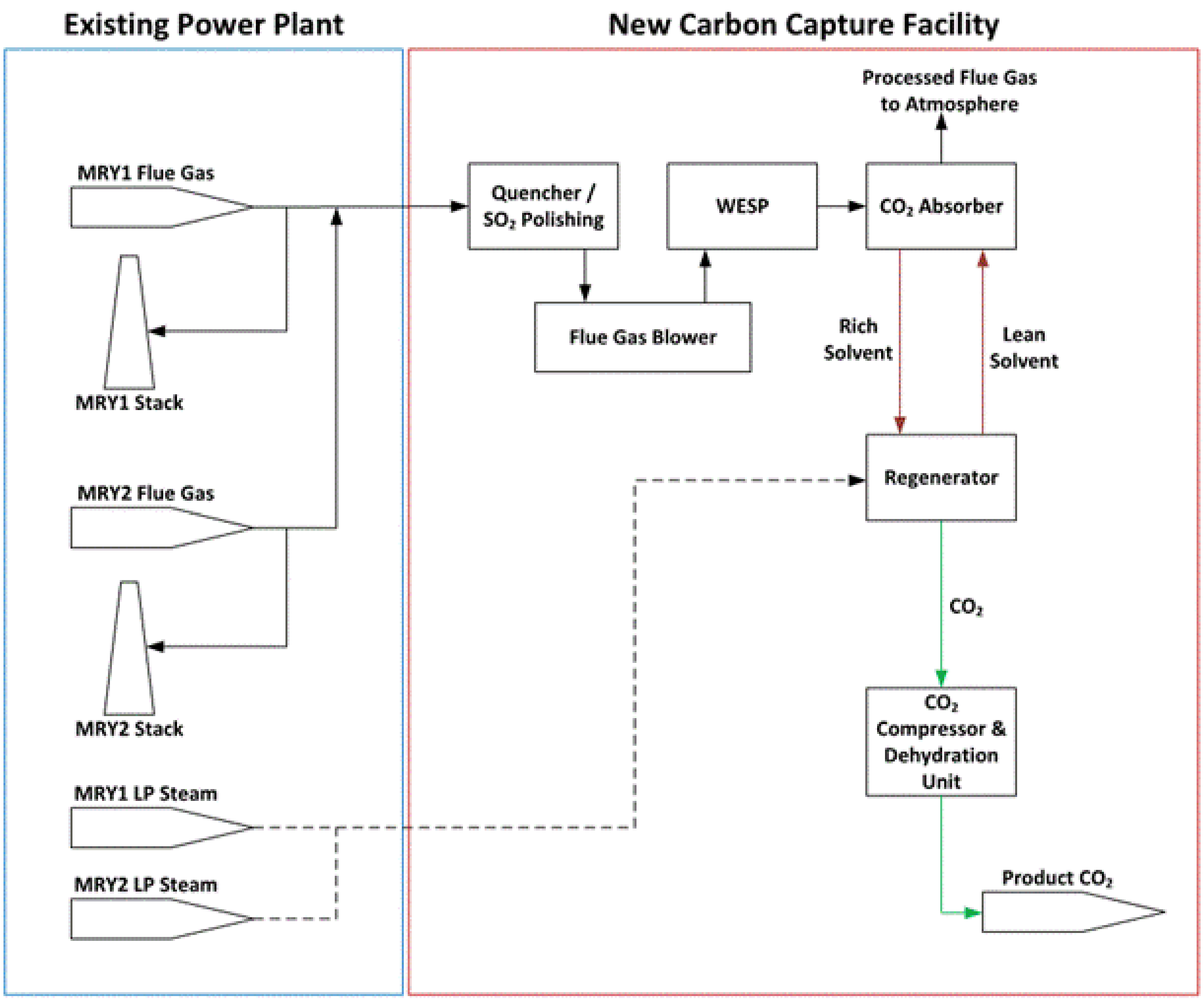
[1] All but 790 feet of the 0.5-mile-long CO_2 flowline would be constructed within the proposed carbon capture and injection facility site boundaries.

The stripped CO_2 vapor would then be compressed, purified (dried), and transported by the CO_2 flowline to the injection site for permanent geologic storage. Figure 2-3 diagrams the carbon capture plant process.

Figure 2-3: Carbon Capture Plant Process



The project would include the following major process components:

- **Quencher and sulfur dioxide (SO_2) polishing scrubber.** This unit cools the flue gas and reduces its SO_2 concentration prior to entry into the CO_2 absorber.
- **Wet Electrostatic Precipitator (wet ESP).** The wet ESP reduces the concentration of particulate matter 10 microns or less in diameter (PM_{10}) and particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) in the flue gas prior to entry into the CO_2 absorber.
- **Flue Gas Blower.** The blower provides sufficient pressure of the flue gas to overcome the pressure drop of the wet ESP and the CO_2 absorber columns.

- **CO_2 Absorber**. This unit separates CO_2 from the flue gas stream via absorption into the amine solvent. The absorber includes a stack where processed flue gas and absorber-generated emissions would be emitted.
- **CO_2 Regenerator.** The CO_2 regenerator separates pure CO_2 from the CO_2-rich amine solvent.
- **CO_2 Compression and Dehydration System.** This system compresses and dries the pure CO_2 stream from the CO_2 regenerator so that it can be transported via the CO_2 flowline for geologic storage.
- **Cooling Tower.** The cooling tower enables heat rejection for the capture plant cooling water system.
- **Class I Injection wells.** The Class I wells are used to manage non-hazardous process water from the carbon capture process.
- **Steam extraction.** Heat is required in the regenerator to separate the CO_2 from the CO_2-rich amine solvent. To provide the necessary heat, a portion of the steam currently produced by the coal fired boilers (Unit 1 and Unit 2) would be extracted and sent to the regenerator system to be utilized in the CO_2 capture process.
- **Water Treatment System.** The project will operate its own water treatment system. The existing MRY lake water pump system will be upgraded as necessary to provide raw water to the project water treatment system. The project's water treatment system will not be able to provide demineralized water, which is needed for several sub-processes. MRY will provide demineralized water from the existing MRY water treatment system. The project's water treatment system is designed for efficiency by producing minimal effluent and using minimal water for make-up water requirements. In addition to the water used for cooling duty, other water will be used throughout the project for cleaning and washing down floors and equipment. Information regarding the source of the water for the project and MRY's existing water supply system is provided in Section 2.5.2.1.
- **Solvent Reclaimer System.** The solvent reclaimer system process would use a proprietary non-hazardous amine solvent to separate CO_2 from the flue gas. Throughout the solvent reclaimer system process, amine solvent will be stored in various storage tanks and vessels. These major process components are shown on Figure 2-3. The captured CO_2 stream would be approximately 98 percent pure, dehydrated, and compressed prior to being sent through the flowline to the injection site. The CO_2 would be in a dense fluid phase which is non-corrosive and non-flammable. Equipment and piping for the project would be rated in accordance with American National Standards Institute (ANSI) Class 900 piping. A Process Hazard Analysis (PHA) was conducted for the project to evaluate potential hazardous or undesirable consequences associated with the proposed equipment and piping (Burns & McDonnell Engineering Company, Inc. [Burns & McDonnell] and Hoglin Engineering 2021; Appendix D). The PHA will be updated as needed prior to project construction. Upon commencing operations, the PHA would be certified and re-evaluated on a 5-year basis in accordance with Process Safety Management requirements.

2.5.2.1 Existing Water Supply System Upgrades

MRY currently operates a water supply system for MRY Unit 1 and Unit 2. The Units use water from Nelson Lake for once-through cooling. The lake level is supplemented as necessary by pumping water from the Missouri River. The existing water intake and point of diversion from the Missouri River is located 20 miles to the south-southeast and 25 river miles downstream in the free-flowing section of the river downstream of Garrison Dam at Lake Sakakawea and upstream of water held by Oahe Dam, which is located approximately 13 miles north of MRY.

From the diversion point, water is pumped via pipeline to an isolated bay on Nelson Lake and is separated from the lake by a small dam. Water is stored in the reservoir upstream of the small dam until it is either used at MRY as boiler pretreatment water, or overflows and supplements the water level of Nelson Lake. The intake structure at the Missouri River is referred to as the "river intake" and the intake structure at Nelson Lake is referred to as the "lake intake." In general, water from the Missouri River is higher quality than Nelson Lake water. Due to its higher quality, Missouri River water is the preferred source for MRY boiler pretreatment water. Nelson Lake water serves as a secondary source of boiler pretreatment water.

In order to meet the project's increased raw water demand from Nelson Lake, the following upgrades will be made to the MRY water supply system:

- **River Intake.** Variable frequency drives will be added to the Missouri River intake pumps. This will allow the pumps to operate a variety of flow rates based on demand and river level. The structure of the river intake will not be modified as part of this project.
- **Lake Intake.** Lake water is used for cooling and for miscellaneous uses at MRY. The lake water system for miscellaneous uses will be upgraded with modified or replaced pumps to increase pumping capacity to meet the demands of both the MRY system and to provide raw lake water to the new CO_2 capture facility water treatment system. The structure of the lake intake will not be modified as part of this work.
- **Configuration Change.** Currently, the lake water system used by MRY only uses filtration. The new CO_2 capture facility water treatment system will utilize ultra-filtration technology (removes bacteria, protozoa, and some viruses) and nano-filtration technology (removes microbes, most natural organic matter, and some natural minerals) to provide the quality necessary for the project.
- **Beneficial Water Reuse.** Utilizing ultra-filtration and nano-filtration will provide the capture plant cooling system and other uses with higher quality water than more traditional water treatment technologies. The cooling water blowdown stream will also be of higher quality than if using more traditional water treatment technologies. Due to these reasons the cooling water blowdown stream can be recycled back through the facility's water treatment system.

A new water appropriation of 15,000 acre-feet from the Missouri River has been approved by the North Dakota State Water Commission to supply the water needs. To accommodate the increased water usage, no modifications are required to the existing Missouri River intake structure or water pipeline, nor to the Nelson Lake intake structure. The capacity of the pumping system from the Nelson Lake intake structure will need to be increased to transfer water to the project's water treatment system.

2.5.3 Facility Construction

The final engineering and procurement activities would occur over an approximate one-year timeframe. Construction of the project is expected to begin in 2024 and be complete in late 2028 to first quarter of 2029. The construction contractor will be responsible for ensuring all work is performed according to the design documents and in accordance with the approved safety plan. A construction management team will be hired by the project owner to verify the contractor executes construction per the design, and that all safety and environmental construction protocols are followed.

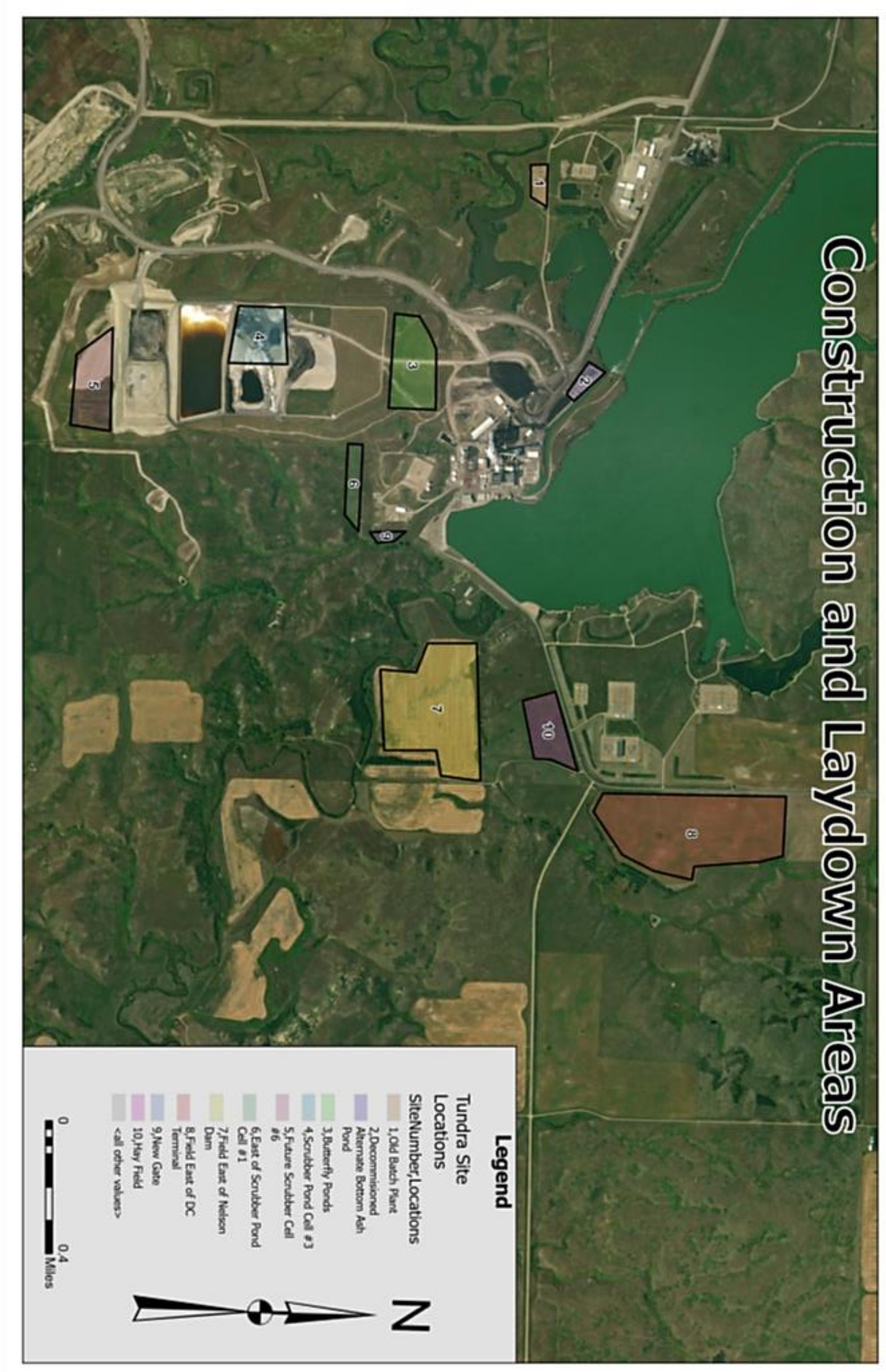
The relocation of the following utilities would be necessary to accommodate the equipment requirements for construction of the project:

- Reroute MRY 230-kilovolt (kV) transmission line around the project;
- Reroute the BNI Coal 69 kV utility service line;
- Reroute and bury a local electric cooperative's 6.9 kV distribution line; and
- Reroute all scrubber blowdown and pond return pipelines.

Equipment required for the project may be fabricated on-site or, alternatively, prefabricated modules may be delivered to the site. All equipment would be installed per the final engineering design specifications. Grading and excavation activities would be performed as needed prior to construction. Best management practices (BMP) would be implemented to verify adherence to appropriate engineering standards and construction requirements.

Project construction would include preparation of laydown and fabrication areas. Figure 2-4 depicts 10 locations on Minnkota-owned property being considered for use as temporary construction and laydown areas. These areas would serve various construction needs including parking, construction trailers, material storage and fabrication, and other activities to support the influx of workers and project construction activities. Minnkota will perform geotechnical studies to determine if the areas are appropriate for the desired use. Additionally, the areas were evaluated for architectural and cultural significance pursuant to Section 106 of the National Historic Preservation Act and for potential effects on threatened or endangered species in accordance with Section 7 of the ESA.

Figure 2-4: Potential Construction and Laydown Areas



Although the areas depicted on Figure 2-4 occupy approximately 221.7 acres, only 97.0 acres of the 221.7 total acres would be needed during construction, including 30.0 acres of land used for agricultural purposes and 67.0 acres of previously disturbed land used for plant operations. Following construction, 90 acres of construction and laydown areas would be restored to original conditions, including the 30.0 acres of agricultural land and 60.0 acres of land previously used for plant operations. The remaining 7.0 acres, within Area 8 on Figure 2-4, would be retained for overflow parking for MRY and project operations. The final construction plan is still being developed and areas may be updated based on site investigations as the construction plan is finalized.

2.5.4 Facility Operations

During the commissioning stages of the project, MRY will use new operators to assist in the troubleshooting and commissioning of the equipment. In addition, maintenance technicians will be utilized to perform maintenance work as needed. This involvement prior to commercial operation will allow for the MRY staff to familiarize themselves with the equipment and be in a better position for reliable operation.

During the initial ramp-up and operation, the project is expected to require additional staffing as necessary to manage the project. After routine operation is established, the expected level of routine staffing will be three operators on shift 24 hours a day, 7 days a week. Instrumentation, electrical, mechanical, maintenance, and laboratory staff will be present for day shift only, unless otherwise necessary. In total, including operations, laboratory, maintenance, engineering, and supervisory personnel, the project is expected to require a staff of 22 full-time equivalents. Two operators would be stationed in the project control room. One of those would be responsible for monitoring the facility operations at all times. One other operator would be conducting routine equipment inspections rounds. A third operator will be responsible for operating the facility’s water treatment system. Operation of the project will be in close cooperation and coordination with operation of MRY.

2.5.5 Post-Operations of the Facility

The project has a design life of 20 years. Upon completion of the project’s useful life, and before the end of the project, the capture system would be dismantled and removed from the site. Decommissioning would include removal of all equipment from the site, for salvage to the degree possible. The site would then be returned to its previous condition. Dismantling, demolition, removal, and site restoration would be included in the project plan and budget.

Minnkota could opt to replace the project with future technologies but would consider all available options at the end of the project’s useful operational life.

2.5.6 Life Cycle Analysis Study

A Life Cycle Analysis (LCA) Study, *Project Tundra Initial Life Cycle Analysis* (Burns & McDonnell 2023), was prepared to quantify the potential life cycle greenhouse gas (GHG) emissions that would result from implementation of the Project Tundra (see Appendix E). The LCA study was conducted in accordance with the requirements outlined in Appendix J of the DOE Office of Clean Energy Demonstration's FOA (Number DE-FOA-0002962; DOE 2023b) regarding carbon capture and storage projects, such as the proposed project. Additional requirements include a contribution analysis showing the impacts from fuel extraction and delivery, plant direct emissions, and CO_2 transport and storage.

The completed analysis looked at the CO_2, methane (CH_4), nitrous oxide (N_2O), and sulfur hexafluoride (SF_6) emissions from upstream, the proposed project, and downstream processes. These emissions are ultimately represented by carbon dioxide equivalents (CO_2e) calculated using the 100-year global warming potential (GWP) values published by Appendix J guidance (DOE 2023b). Further details and the results of the LCA are discussed further in Section 3.3.

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CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This section provides relevant environmental, cultural, and socioeconomic baseline information, and identifies and evaluates the individual or cumulative environmental and socioeconomic changes likely to result from constructing and operating the proposed project at MRY. The region of influence for this EA includes MRY and the immediately surrounding areas.

CEQ regulations encourage NEPA analyses to be as concise and focused as possible, consistent with 40 CFR Part 1500.1(b) and 1500.4(b): "…NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail … prepare analytic rather than encyclopedic analyses." Consistent with the NEPA and CEQ Regulations, this EA focuses on those resources and conditions potentially subject to effects.

The methodology used to identify the existing conditions and to evaluate potential impacts on the physical and human environment involved the following: review of documentation and project information provided by the University of North Dakota Energy and Environmental Research Center (EERC), Minnkota, and their consultants; searches of various environmental and agency databases; and agency consultations. All references are cited, where appropriate, throughout this EA.

Wherever possible, the analyses presented in this chapter quantify the potential impacts associated with the Proposed Action. Where it is not possible to quantify impacts, the analyses present a qualitative assessment of the potential impacts. The subsections presented throughout the remainder of this chapter provide a concise summary of the current affected environment within the region of influence, and an analysis of the potential effects to each resource area considered from implementation of the Proposed Action. Analysis of the no-action alternative is summarized in in Section 3.1.2 and Table 3-1.

3.1.1 Resources Areas Screened from Detailed Analysis

DOE determined that all specific resource areas should be included for discussion in this EA; no resource areas have been dismissed.

3.1.2 No-Action Alternative – Environmental Consequences

Under the No-Action Alternative, the Proposed Action would not occur, the amine based post-combustion carbon capture system would not be implemented, and 13,000 STPD of CO_2 would not be captured for geologic storage. There would be no environmental consequences associated with proposed project construction and no effect on the existing local environment. Minnkota would continue to operate the MRY facility under normal operating conditions.

Table 3-1 summarizes the environmental consequences of the No-Action Alternative.

Table 3-1: No-Action Alternative – Environmental Consequences by Resource Category

Resource Categories	Resource Impacts Under the No Action Alternative
Air Quality	There would be no air emissions associated with proposed project construction and no effect on the existing air emissions from Units 1 or 2 at MRY.
Greenhouse Gases and Climate Change	The beneficial effects of the proposed project (e.g., reduction in CO_2 emissions) would not occur.
Geology and Soils	There would be no changes to the project site, nearby soils, or underlying geologic formations.
Water Resources	No impacts would occur to the project site or nearby surface waters, floodplains, water quality, hydrogeology, or wetlands.
Biological Resources	There would be no changes to the project site or nearby aquatic, wildlife, or vegetative resources.
Health and Safety	There would be no increased potential for adverse impacts to public or employee health and safety from proposed project construction, operation, or decommissioning.
Solid and Hazardous Waste	There would be no increase in the generation of solid waste or hazardous waste from the MRY site.
Infrastructure and Utilities	Construction of utility infrastructure would not occur, and there would be no increase in consumption of water or electricity at the MRY site. Additionally, there would be no increase to wastewater generation and supplemental wastewater treatment would not occur.
Land Use	No land use changes or creation of new impervious surfaces would occur.
Visual Resources	There would be no visual resource changes to the landscape; the area would retain the current visual contrasts.
Cultural and Paleontological Resources	There would be no impacts to cultural and/or paleontological resources or land uses under the No-Action alternative.
Socioeconomic Conditions	There would be no socioeconomic changes, new employment opportunities, or impacts to local businesses.
Noise	There would be no changes to background noise levels or the creation of new sources of noise.
Environmental Justice	There would be no change in effect on environmental justice communities.

3.2 Air Quality

3.2.1 Affected Environment

3.2.1.1 Air Quality

Minnkota currently operates Units 1 and 2 of the lignite coal-fired energy generation facility using coal from the adjacent Center Mine, operated by BNI Energy Inc (BNI 2023). In 2020, Unit 1 was available to produce power 93.9 percent of the time, while Unit 2 was available for power production 93.0 percent of the time. Both units at MRY are equipped with emission control technologies that meet or exceed all current state and federal air quality standards. Notably, between 2006 and 2015, roughly $425 million was invested at MRY to significantly reduce emissions of SO_2, nitrogen oxides (NO_x), mercury (Hg), and other emissions. The power generation units at MRY are classified as an existing major Prevention of Significant Deterioration (PSD) and Title V facility. MRY currently has a Title V Permit to Operate (T5-

F76009), and the permit will expire May 12, 2025. The air emission units include two lignite coal-fired boilers, auxiliary equipment, and associated coal and ash handling equipment.

As described in Section 8.3 of the EPA's *Draft Guidance on Developing Background Concentrations for Use in Modeling Demonstrations*, background air quality concentrations consist of: 1) nearby sources (i.e., sources in the vicinity of the project not adequately represented by ambient monitoring data) and 2) other sources, such as unidentifiable sources, natural resources or other regional transport contributions caused by distant sources. Table 3-2 provides the default background concentration values for criteria pollutants representative of the entire State of North Dakota, including the project area, based on NDDEQ modeling guidance.[2]

Table 3-2: Background Concentrations for the State of North Dakota (ug/m^3)

	Averaging Period				
Pollutant	1-hour	3-hour	8-hour	24-hour	Annual
SO_2	13	11	---	9	3
NO_2	35	---	---	---	5
PM_{10}	---	---	---	30	15
$PM_{2.5}$	---	---	---	13.7	4.75
CO	1,149	---	1,149	---	---

Table 3-2 reflects the background concentrations identified for the project area after consideration of background values and nearby sources, cumulatively.

3.2.1.2 Air Quality Monitoring Network

Oliver County is located in an air quality attainment area for all six criteria air pollutants: ground-level ozone (1 hour and 8 hour), particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), lead, sulfur oxides, and nitrogen dioxide. According to the EPA's assessment of air quality attainment status, the air quality in the region has been designated as in attainment for all criteria pollutants (40 CFR Part 81).

The Division of Air Quality at the NDDEQ works to safeguard the health and environment of North Dakota and utilizes a permit program to evaluate new construction projects for their impact on air quality. A project may be built once a Permit to Construct is issued. A Permit to Operate program confirms that the project will function in compliance with the CAA and North Dakota Air Pollution Control Rules.

3.2.1.3 Formally Classified Lands

Class I federal lands (i.e., formally classified lands) include areas such as national parks, national wilderness areas, and national monuments, which are granted special air quality protections under Section 162(a) of the federal CAA. There are no Class I areas in the vicinity of the proposed project site. The nearest Class I area to the proposed project site is the Theodore Roosevelt National Park, located about 99 miles west of the project (EPA 2022).

2 https://deq.nd.gov/publications/AQ/policy/Modeling/ND_Air_Dispersion_Modeling_Guide.pdf

3.2.2 Environmental Consequences

MRY is an existing major PSD and Title V facility. MRY currently has a Title V permit to operate (T5-F76009), and the permit will expire May 12, 2025. Minnkota will submit a renewal request prior to the expiration of its current Title V operating permit. The air emission units include two lignite coal-fired boilers, auxiliary equipment, and associated coal and ash handling equipment. The emissions from the MRY coal-fired boilers will not change as a result of this project. The project would have the consequential benefit of reducing further the emissions of CO_2, SO_2, and particulate matter from the existing MRY Unit 1 and Unit 2 flue gas streams. According to the EPA's assessment of air quality attainment status, the air quality in the region has been designated as in attainment for all criteria pollutants (40 CFR Part 81).

The NDDEQ required an air dispersion modeling analysis be performed for the project to demonstrate compliance with the North Dakota Ambient Air Quality Standards (AAQS) and National Ambient Air Quality Standards (NAAQS). The modeling analysis confirmed that exhausting combinations of MRY Unit 2 and Unit 1 emissions through the carbon capture absorber stack would not cause or contribute to a violation of the NAAQS or North Dakota AAQS. Table 3-3 summarizes the criteria pollutant modeling results and compares them to the appropriate state and federal ambient air quality standards. The ambient background concentrations were added to the modeled design concentrations for each pollutant and averaging period to estimate the total air quality concentration.

Table 3-3 shows the maximum modeled results from the criteria pollutant modeling and confirms that the total concentrations for each pollutant and averaging period modeled would be below the North Dakota AAQS and NAAQS.

Table 3-3: Comparison of Air Quality Concentrations with Ambient Air Quality Standards

Pollutant	Averaging Period	Rank of Model Impacts	AERMOD Modeled Concentration by Case (μg/m³)					Maximum AERMOD Predicted Concentration (μg/m³)	Ambient Background Concentration (μg/m³)	Total Concentration (μg/m³)	USEPA NAAQS/North Dakota AAQS (μg/m³)	% of Criteria
			Case 1 - All Unit 2, Partial Unit 1 (25%)	Case 2 - All Unit 1, Partial Unit 2 (57%)	Case 3 - Unit 1 Min Load Alone	Case 4 - Unit 2 Min Load Alone	Case 5 - Unit 2 Max Load Alone					
NO_2	1-hr[1]	98th	31.18	30.61	28.95	31.76	30.04	31.76	35.00	66.76	188.0	36%
	Annual[2]	H1H	0.84	0.83	0.87	0.93	0.83	0.93	5.00	5.93	100.0	6%
PM_{10}	24-hr[3]	H6H	7.04	6.74	5.60	8.05	6.70	8.05	30.00	38.05	150.0	25%
$PM_{2.5}$	24-hr[4]	98th	4.68	4.48	3.91	5.40	4.43	5.40	13.70	19.10	35.0	55%
	Annual[5]	H1H	0.61	0.58	0.54	0.72	0.58	0.72	4.75	5.47	12.0	46%
SO_2	1-hr[6]	99th	49.68	47.12	39.68	57.31	47.32	57.31	13.00	70.31	196.5	36%
	3-hr[7]	H2H	53.15	50.41	38.40	58.80	48.32	58.80	11.00	69.80	1,300.0	5%
	24-hr[7]	H2H	16.24	15.40	12.31	18.01	15.29	18.01	9.00	27.01	365.0	7%
	Annual[2]	H1H	1.26	1.20	1.06	1.47	1.20	1.47	3.00	4.47	80.0	6%
CO	1-hr[7]	H2H	27.71	26.50	18.88	27.63	25.44	27.71	1149.00	1176.71	40,000.0	3%
	8-hr[7]	H2H	9.20	8.80	7.32	10.36	8.69	10.36	1149.00	1159.36	10,000.0	12%

1 Eighth-highest maximum daily 1-hour concentration (98th percentile) averaged over the 5 years.
2 Maximum annual concentration over the 5 years.
3 Sixth-highest maximum 24-hour concentration averaged over the 5 years.
4 Eight-highest maximum 24-hour concentration averaged over the 5 years.
5 Maximum annual concentration averaged over the 5 years.
6 Fourth-highest maximum daily 1-hour concentration (99th percentile) averaged over the 5 years.
7 Second-highest maximum concentration over the 5 years.

The project's potential emissions of hazardous air pollutants (HAPs) would be greater than 10 tons per year (tpy) for any single HAP and greater than 25 tpy for all HAPs. A case-by-case maximum achievable control technology determination was completed as part of the NDDEQ's permitting process. The air toxics analysis follows the procedure set forth in the North Dakota Air Toxics Policy. The results indicate that the expected Maximum Individual Cancer Risk and Health Index thresholds are in compliance with the Air Toxics Policy.

Construction of the proposed project would result in direct criteria air pollutant emissions from fuel combustion for operation of construction equipment, and indirect criteria air pollutant emissions from consumption of electricity during the construction period (see DOE Appendix J guidance (DOE, 2023b)). Construction of the proposed project would also result in fugitive particulate emissions (PM_{10}, $PM_{2.5}$) from site clearing and excavation, installation of pilings and concrete, and other construction activities. Proposed project construction activities would not exceed air quality monitoring thresholds or ambient air quality standards in offsite areas. Impacts to air quality during proposed project construction would be minor and temporary in nature. The impacts would be minimized by using best practices during construction activities, including, but not limited to, the use of water sprays for fugitive dust suppression and the use of construction equipment with appropriate emission controls.

In December 2023, the NDDEQ approved the project's application for an Air Permit to Construct. The project's Air Permit to Construct, Air Quality Emissions Analysis, and Air Quality Impact Analysis are provided in Appendix J of this EA. NDDEQ staff concluded that the project would comply with all applicable air pollution control rules and is protective of human health and the environment. Project operation would comply with all federal and state air quality regulations. Project maximum potential emissions would be below PSD significant emission rates (SER) for all regulated pollutants. The project owners would apply for and obtain a Title V operating permit for the project. The project would be considered a single source adjacent to MRY. The project would have its own air emission limits in a separate permit. The air emissions limits previously established for other emissions units at MRY are present in the existing Title V permit for the electricity generating facility.

3.3 Greenhouse Gases and Climate Change

3.3.1 Affected Environment

The proposed project would be located at the existing MRY site near Center, Oliver County, North Dakota. The climate in the Center area is typical of the Midwest, with hot summers and cold, moderately snowy winters. In this area, the lowest temperatures of the year typically occur in January whereas the highest temperatures occur in July. The average low temperature for January is 5 degrees Fahrenheit (°F) with an average of 0.44 inch of precipitation (U.S. Climate Data, 2023). The average high temperature for July is 84 °F with an average of 2.83 inches of precipitation (U.S. Climate Data, 2023). Between 2007 and 2019, the average annual precipitation total was 18.51 inches (U.S. Climate Data, 2023). The average annual snowfall in the greater Bismarck Region was 50.5 inches from 1991 to 2020 (NOAA 2020).

Climate change is an inherently cumulative effect caused by releases of GHGs from human activities and natural processes around the world. GHGs are compounds in the atmosphere that absorb and emit radiation, effectively trapping heat (longwave radiation) and causing what is known as the greenhouse effect. The greenhouse effect causes the Earth's atmosphere to warm and thereby creates changes in the planet's climate systems. The primary GHGs in the Earth's atmosphere are water vapor, CO_2, CH_4, and N_2O.

3.3.2 Environmental Consequences

During the construction phase, direct GHG emissions, including CO_2, CH_4, and N_2O, would result from vehicular emissions from traffic from the construction workforce, traffic from construction deliveries, and internal combustion engine emissions from construction equipment. Indirect GHG emissions would result from electricity consumption (e.g., lighting) for project construction.

Direct GHG emissions are expected during the operation of the CO_2 compressor due to releases of CO_2 during startups and discharges as well as fugitive releases from the transportation of CO_2. The CO_2 compressor would be electric, and the project does not include the installation of emergency generators. Therefore, the project would not have any GHG emissions due to fuel consumption. The project would result in indirect GHG emissions including CO_2, CH_4, and N_2O from electricity consumption (e.g., lighting, electric-powered process equipment) and steam consumption (e.g., process heat).

The proposed capture plant is expected to source flue gas from the Milton R. Young Plant. Flue gas is created as a biproduct of electricity generation. Between 2021 and 2022, the MRY plant emitted flue gas with an average of 5,187,363 tons of CO_2. Electricity generation at MRY and the associated emissions processes are already in operation and would occur with or without construction and operation of the project. The proposed project would not capture and treat 100 percent of the CO_2 produced by the MRY coal plant, however, over the lifetime of the carbon capture facility it is projected to capture an annual average of 4.0 million tons of CO_2. Therefore, the project would result in a net reduction in CO_2 emissions (emissions that would otherwise be released to the atmosphere in the status quo scenario) every year over the anticipated operating life of the project. The project is designed to capture a minimum of 95 percent of unit-wide CO_2 emissions and store the captured CO_2 in secure subsurface geologic formations. Note that a 95 percent unit-wide capture indicates that a 95 percent capture efficiency is occurring at U1 or U2 at MRY.

A screening-level GHG assessment was conducted in accordance with the requirements outlined in Appendix J of DE-FOA-0002962 (DOE 2023b). The goal of the LCA was to begin quantifying environmental impacts from the implementation of the proposed project. The results of the Initial LCA are presented in the next section. Minnkota has performed additional analyses outside of DOE's EA, including a traditional analysis of grid CO_2 intensity (kg/MWh) of the MRY units for comparison with industry data reported to the EPA and the U.S. Energy Information Administration.

3.3.2.1 Life Cycle Analysis Results

The Initial LCA examined the CO_2, CH_4, N_2O, and sulfur hexafluoride (SF_6) emissions from upstream, the proposed project, and downstream processes. These emissions are ultimately represented by CO_2e calculated using 100-year GWP values established in the Appendix J guidance (DOE 2023b). Table 3-4 lists these GWP values.

Table 3-4: Global Warming Potentials Utilized in LCA

GWP Factors	
CO_2	1
CH_4	36
N_2O	298
SF_6	23,500

Source: Appendix J, Table J.1. GWP Characterization Factors (DOE 2023b).

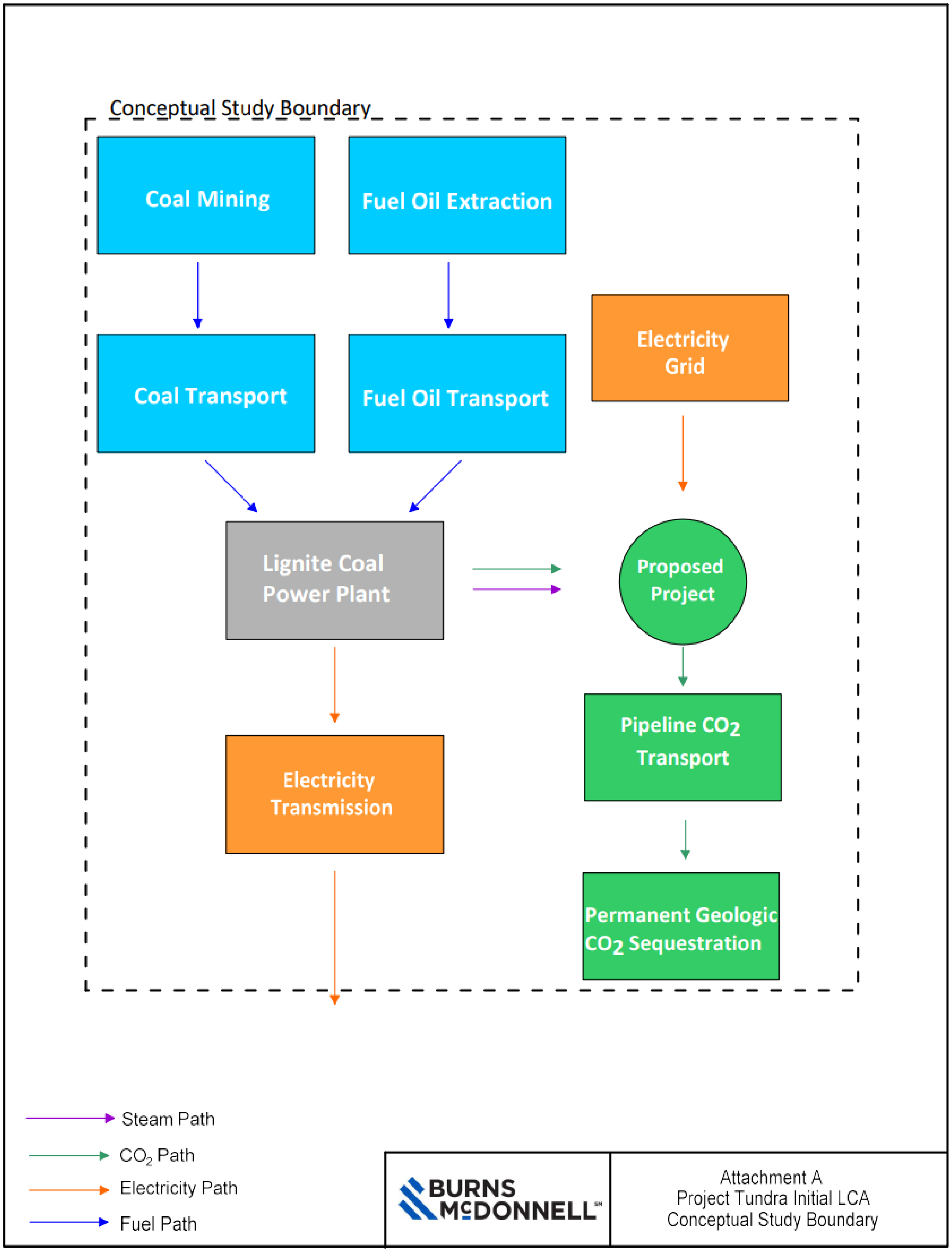
The Initial LCA established a system boundary that determines which unit processes, inputs, outputs, and impacts are considered in the analysis. An Initial LCA analysis as outlined in the DOE Appendix J guidance requires a screening level assessment of GHGs from cradle-to-delivered electricity only. Figure 3-1 provides a diagram of the Initial LCA system boundary. LCA results are presented in terms of a functional unit. This is defined as a reference unit for scaling the product system based on the function provided. The Initial LCA has been defined as kilograms (kg) of CO_2 stored and as megawatt-hours (MWh) delivered to the grid.

The Initial LCA utilized a combination of site-specific data when available and reasonable estimations when not available. The sections below provide an overview of the upstream, carbon capture plant, and downstream emission sources.

Upstream Emissions

The upstream analysis aimed to identify and quantify emissions that are a result of fuel (coal and fuel oil) extraction, production, processing, and transportation operations, as well as combustion occurring at MRY that would produce the CO_2 input stream (i.e., feedstock) for the proposed project. Upstream emissions were split into three categories: fuel extraction, fuel transportation, and MRY direct emissions. Fuel extraction and transportation were further divided to reflect the use of both lignite coal and No. 2 fuel oil at MRY. Fuel delivery was similarly split to reflect the transportation of both fuel types. Although the manufacturing of materials and construction of the proposed project would be considered upstream emissions, this level of analysis was determined to be outside the scope of a “screening-level” Initial LCA.

Figure 3-1: Conceptual Study Boundary



The maximum projected annual coal and fuel oil consumption for both boilers was used to calculate the upstream emissions from fuel extraction and transportation as well as the emissions from the operation of MRY. Calculations were completed based on projected fuel consumption data (for years 2025 to 2043) provided by Minnkota.

Table 3-5: Maximum Upstream Annual Data Inputs

Projected Year of Maximum Consumption	Projected MW Hours Net Produced	Maximum Coal Consumption (tpy)	Projected Maximum Fuel Oil Consumption (gallons per year)
2032	5,024,897	4,371,560	750,000

The GHG emissions calculations utilized the total annual amount of fuel consumed by MRY boilers 1 and 2. Based on this, the MRY plant is estimated to emit a maximum estimated 5.7 million tons of CO_2 annually. It should be noted that these upstream emissions processes are already in operation and they are not a result of the addition of the proposed project. Although the proposed project will not capture and treat 100 percent of the emitted CO_2 produced by the MRY coal plant, it is projected to capture an annualized average of 4.0 million tons of CO_2.

Proposed Capture Plant Direct Emissions

Plant Direct Emissions include the emissions from the operation of the proposed CO_2 separation and purification plant. CO_2 emissions from operation of the CO_2 compressor, including startups and discharges of this equipment, are included in this analysis. This is the only equipment that would have relevant GHG emissions. An estimated maximum of 34,800 metric tons (38,400 short tons) per year of CO_2 emissions are expected to occur annually as a result of plant operations. While CO_2 is expected to be released from the plant, these emissions are fugitive and, without the capture plant, would otherwise be released at the MRY stacks. The carbon capture plant would not be creating “new” sources of CO_2 in order to operate.

Energy Consumption at the proposed capture plant has been incorporated as a plant direct emission. The capture plant will require both electricity and steam to operate. Engineering estimates for the capture plant estimate an approximate requirement of 1,848 megawatts per day of electricity and 2,640 megawatts electric (MWe) per day of thermal (steam) energy. The project would be expected to source electricity and thermal energy from the Minnkota generating system. Emissions from energy consumption were calculated following methodology adapted from EPA's Greenhouse Gas Inventory Guidance: Indirect Emissions from Purchased Electricity (EPA 2023b).

Downstream Emissions

The downstream analysis included emissions from the transportation of CO_2 via flowline from the proposed carbon capture facility to the injection site of the permanent geologic storage site. For the CO_2

transport analysis, an approximate 370 metric tons of CO_2 are lost per year from maintenance activities and fugitive losses, utilizing engineering estimates for the 0.5-mile-long CO_2 flowline.

In accordance with the system boundary established by the DOE Appendix J guidance (DOE, 2023b), CO_2e emissions from the transmission of electricity from MRY were also included as a downstream emission. For this analysis, CO_2e emissions from the SF_6 in the transmission lines were determined utilizing the DOE Appendix J emission factor 7.87 x 10^5 kg of CO_2e per MWh. It is assumed that there are no measurable losses at the wellhead to the sequestration reservoir nor fugitive losses from the reservoir itself.

Results

Each GHG is represented in kilograms of emissions normalized to one kilogram of CO_2 sequestered. There is an expected 0.4 kg of CO_2e emitted per kg of CO_2 stored. This value is largely due to the upstream and downstream processes of the proposed project. This is further explained in the contribution analysis. Table 3-6 provides a breakdown of expected emissions by source.

Table 3-6: Initial Life Cycle Analysis Results (kg of emissions / kg CO_2 stored)

	CO_2	N_2O	CH_4	SF_6 [a]	CO_2e
Upstream					
Coal Mining	$7.52x10^{-04}$	$5.94x10^{-06}$	$8.09x10^{-04}$	-	$3.16x10^{-02}$
FO Extraction	$8.87x10^{-05}$	$2.68x10^{-09}$	$4.76x10^{-07}$	-	$1.07x10^{-04}$
Coal Transportation	$9.35x10^{-04}$	$3.79x10^{-08}$	$7.59x10^{-09}$	-	$9.47x10^{-04}$
FO Transportation	$5.53x10^{-07}$	$1.42x10^{-11}$	$1.11x10^{-11}$	-	$5.58x10^{-07}$
MRY Coal Plant	0.34	$2.15x10^{-05}$	$1.47x10^{-05}$	-	0.34
Proposed Project					
CO_2 Capture Plant [b]	0.01	-	-	-	0.01
Electricity Consumption	0.04	$1.81x10^{-06}$	$1.24x10^{-06}$	--	0.04
Downstream					
CO_2 transportation	$8.58x10^{-05}$	-	-	-	$8.58x10^{-05}$
CO_2 storage [c]	-		-	-	-
Electricity Transmission [d]	-	-	-	$9.25x10^{-08}$	$2.17x10^{-03}$
Total LCA	0.39	$2.93x10^{-05}$	$8.26x10^{-04}$	$9.25x10^{-08}$	0.43

[a] SF_6 is emitted in processes relating to the transmission and distribution of electricity.
[b] The MRY heat input does not change with the installation and operation of the CO_2 capture plant.
[c] Assuming no measurable losses at the wellhead to the reservoir and a reservoir leakage rate of zero.
[d] Does not account for electricity losses that occur as a result of transmission and distribution.

In addition to the original functional unit analysis, additional LCA outputs were generated in a standardized unit of kilograms of emissions normalized to 1.0 MWh. This analysis does not consider the electricity losses that occur during transmission and distribution once the electricity has left the MRY. Table 3-7 provides a breakdown of expected emissions by source.

Table 3-7: Proposed Action, Initial Life Cycle Analysis Results (kg of emissions / MWh)

	CO_2	N_2O	CH_4	SF_6 [a]	CO_2e
Upstream					
Coal Mining	0.79	0.01	0.85	-	33.27
FO Extraction	0.09	$6.25x10^{-03}$	$5.00x10^{-04}$	-	0.11
Coal Transportation	0.98	$2.81x10^{-06}$	$7.98x10^{-06}$	-	1.00
FO Transportation	$5.81x10^{-04}$	$1.50x10^{-08}$	$1.16x10^{-08}$	-	$5.86x10^{-04}$
MRY Coal Plant [b]	352.34	0.02	0.02	-	360
Proposed Project					
CO_2 Capture Plant	8.56	-	-	-	8.56
Electricity Consumption	49.90	$1.92x10^{-03}$	$1.32x10^{-03}$	--	50.52
downstream					
CO_2 transportation	0.09	-	-	-	0.09
CO_2 storage [c]	-	-	-	-	-
Electricity Transmission [d]	-	-	-	$7.85x10^{-05}$	1.84
Total LCA	412.76	0.03	0.87	$7.85x10^{-05}$	455

[a] SF_6 is emitted in processes relating to the transmission and distribution of electricity.
[b] The MRY heat input does not change with the installation and operation of the CO_2 capture plant.
[c] Assuming no measurable losses at the wellhead to the reservoir and a reservoir leakage rate of zero.
[d] Does not account for electricity losses that occur as a result of transmission and distribution.

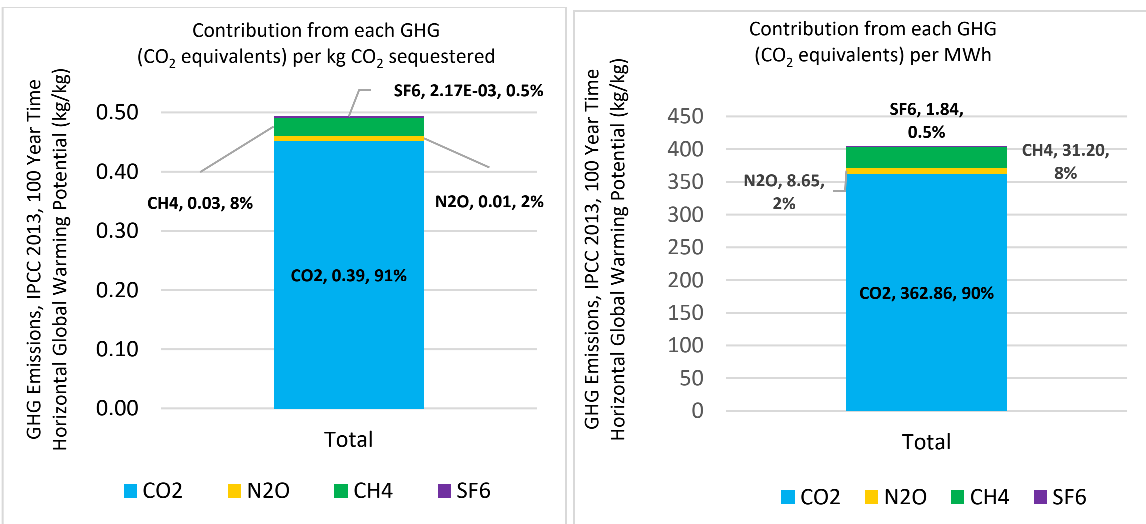
A contribution analysis was completed for fuel extraction and delivery, plant direct emissions, CO_2 transport, and storage categories as outlined in the DOE Appendix J guidance. Contribution of electricity transmission was not required by Appendix J for the initial analysis but was added for this document. Table 3-8 shows the results of the contribution analysis. The Upstream Emissions and the Electricity Transportation categories account for a large majority of emissions contributing to the carbon intensity regardless of functional unit. It should be noted that these two categories account for emission processes that are already in operation and are not dependent on the operation of the proposed project. CO_2 is the most abundant contributor to GHG emissions regardless of category except for electricity transportation. This is due to emissions from electricity transportation being wholly associated to SF_6. Figure 3-2 shows the contribution of each GHG in relation to the total emissions per functional unit. Note that regardless of functional unit, each GHG contributes the same relative percentage.

Table 3-8: Category Contribution Analysis

DOE Appendix J Category	CO_2e Total		Percent Contribution (rounded)
	kg CO_2e per kg CO_2 sequestered	Kg CO_2e per MWh	
Fuel Extraction and Delivery [a] (Upstream Emissions)	0.37	394	87%
Capture Plant Direct Emissions and Energy Use	0.05	59	12%
CO_2 Transport and Storage	8.58×10^{-05}	0.09	0%[b]
Electricity Transportation	2.17×10^{-03}	1.84	0.5%
Total	0.43	455	-

[a] Fuel Extraction and Delivery accounts for all processes identified under upstream emissions.
[b] Percent contribution associated with the proposed project is less than 0.5 percent and rounds to a 0 percent contribution.

Figure 3-2: Contribution Analysis from Each Greenhouse Gas (Carbon Dioxide Equivalents [CO_2e])



Further, a screening-level LCA was completed for a scenario where the proposed CO_2 capture plant does not move forward. The outputs were generated in a standardized unit of kilograms of emissions normalized to 1.0 MWh. In line with the Initial LCA, the analysis does not consider the electricity losses that occur during transmission and distribution once the electricity has left the MRY. Table 3-9 provides a breakdown of expected emissions by source.

Table 3-9: No Action, Initial Life Cycle Analysis Results (kg of emissions / MWh)

	CO_2	N_2O	CH_4	SF_6 [a]	CO_2e
Upstream					
Coal Mining	0.64	5.05×10^{-03}	0.69	-	26.86
FO Extraction	0.08	2.27×10^{-06}	4.04×10^{-04}	-	9.05×10^{-02}
Coal Transportation	0.79	3.22×10^{-05}	6.44×10^{-06}	-	0.80
FO Transportation	4.70×10^{-04}	1.21×10^{-08}	9.39×10^{-09}	-	4.73×10^{-04}
MRY Coal Plant	1,134	1.84×10^{-02}	1.26×10^{-02}	-	1,140
Downstream					
Electricity Transmission [b]	-	-	-	7.85×10^{-05}	1.84
Total LCA	1,136	2.34×10^{-02}	0.70	7.85×10^{-05}	1,170

[a] SF_6 is emitted in processes relating to the transmission and distribution of electricity.
[b] Does not account for electricity losses that occur as a result of transmission and distribution.

This screening-level LCA of MRY's current operations further explains the expected impact of the proposed carbon capture plant. The proposed plant is expected to cause an overall reduction to the carbon intensity associated with 1.0 MWh. Table 3-10 further breaks down the expected impact of the proposed project on each aspect of the Initial LCA analysis. The proposed project has a neutral impact on all processes upstream of MRY and on electricity transportation. A negative net change (a reduction in emissions) is seen at the MRY plant. In contrast, the proposed capture plant and the CO_2 pipeline used for transportation would be new emission sources and, therefore, would have a net positive change (an increase) in emissions when compared to current operations. Refer to Table 3-8 for the full contribution analysis.

Table 3-10: No-Action and Proposed Action Comparison, Initial LCA Results Normalized to 1.0 MWh

Emission Source	kg of CO_2e Emissions per MWh		Percent Change [a]
	No Action	**Proposed Action**	
Upstream			
Coal Mining	26.89	33.27	24%[b]
FO Extraction	0.09	0.11	24%
Coal Transportation	0.80	1.00	24%
FO Transportation	$4.73x10^{-04}$	$5.86x10^{-04}$	24%
Coal Electricity Plant	1,140	360	-68%[c]
Proposed Project			
CO_2 Capture Plant	NA	8.56	NA
Electricity Consumption	NA	50.52	NA
Downstream			
CO_2 transportation	NA	0.09	NA
CO_2 storage	-	-	-
Electricity Transmission	1.84	1.84	0%
TOTAL LCA	**1,170**	**455**	**-61%**

Note: Equivalent to Table K-9 in Appendix K.
[a] Percent change, by definition, cannot be calculated for scenarios where the initial value is zero; such is the case in terms of the CO_2 capture plant, energy consumption, transportation, and storage.
[b] The MRY heat input does not change with the installation and operation of the CO_2 capture plant. The change in these numbers is instead reflective of a shift from producing only grid energy to grid energy and thermal heat for clients.
[c] The capture unit has a s 95 percent capture efficiency of flue gas that is treated by the system.

More details regarding the LCA methodology and calculations are provided in Appendix E.

3.4 Geology and Soils

3.4.1 Affected Environment

3.4.1.1 Soils

Major Land Resource Areas (MLRAs) represent landscape-level areas with distinct physiography, geology, climate, water, soils, biological resources, and land uses. The project area lies within MLRA 54, the Rolling Soft Shale Plain, characterized by Borolls with a frigid soil temperature regime and mixed mineralogy (NRCS 2022). These soils are generally moderately deep to very deep, well drained, and clayey or loamy (NRCS 2022).

Soil map units were assessed using the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2023a). The dominant soil map unit located within the project area consists of Amor-Werner-Farnuf loams (E2609C). These well-drained soils are derived from loamy residuum weathered from mudstone parent material and characterized by fine loamy surface textures. A majority of the soils within the proposed project area were previously disturbed from the construction of the MRY facility.

The carbon capture facilities would occupy 25.8 acres of land in the southwest portion of the MRY property (Figure 2-2). An additional 10 construction and laydown areas would serve various construction needs including parking, construction trailers, material storage and fabrication, and other activities to support the influx of workers and project construction activities (Figure 2-4). Approximately 97.0 acres of land would be required for the temporary construction and laydown areas within the Minnkota-owned property. Following construction, the construction and laydown areas would be restored to original conditions, with the exception of an approximately 7.0-acre area that would be retained for overflow parking for MRY and project operations.

3.4.1.2 Surficial Geology

The project would be located on the eastern flank of the Williston Basin. Figure 2-1 provides the topography of the general area near the MRY facility. Surface conditions and geology in the vicinity of the MRY facility are associated with the Sentinel Butte Formation, a relatively flat-lying sedimentary formation, up to 600 feet in thickness, overlying the Bullion Creek Formation. Both formations are part of the Williston Basin, which is a large intracratonic sedimentary basin extending from western South Dakota and North Dakota to eastern Montana and into southern Saskatchewan. The Sentinel Butte is composed of fluvial and lacustrine deposits, including lignite coal beds, from the Paleocene Epoch. Outcrops of poorly lithified portions of the Sentinel Butte are common and contain assemblages of non-marine plant and animal fossils (North Dakota Geological Survey 2021).

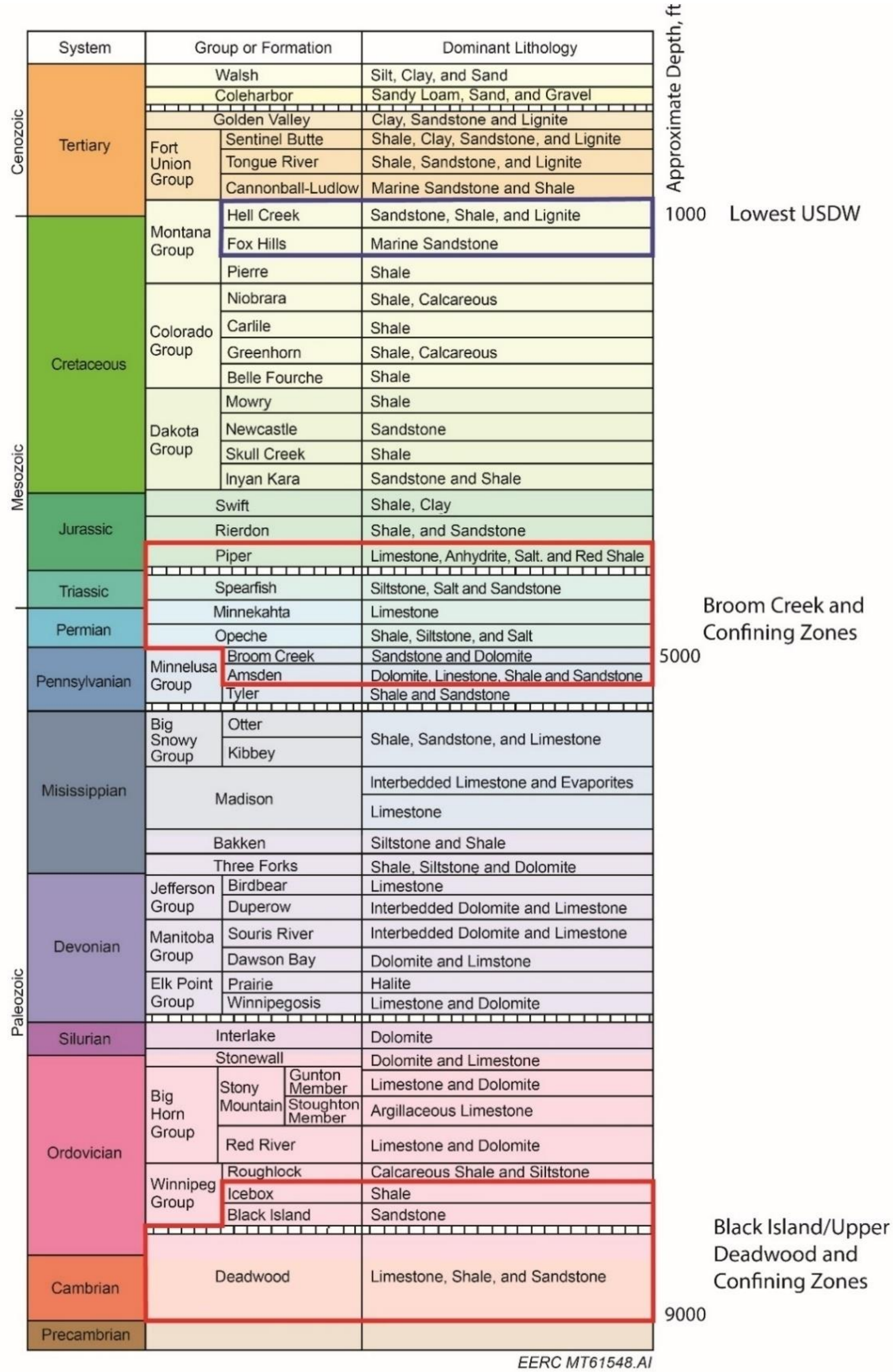
The ground surface at the MRY facility consists of various engineered materials such as granular fill and pavement. The shallow subsurface beneath the engineered materials consists of unconsolidated sediments composed of silts and sands, and to a lesser degree, clays that have been eroded from the Sentinel Butte and redeposited over the millennia by rivers, streams, and other naturally occurring forces. Numerous lakes, shallow ponds, and wetlands, often saline in nature, are present across the landscape in the vicinity of MRY.

3.4.1.3 Bedrock Stratigraphy

Unless otherwise cited, bedrock stratigraphy information in this section was derived from the CO_2 Storage Facility Permits issued by the North Dakota Department of Mineral Resources (DMR), Oil & Gas Division (Case Number 29029, Order Number 31583 for the Broom Creek Storage Facility [DMR 2022a]; Case Number 29032, Order Number 31586 for the Black Island-Deadwood Storage Facility [DMR 2022b]).

The proposed project site is in the eastern portion of the Williston Basin. Depth to bedrock in the vicinity of the MRY ranges from ground surface to approximately 350 feet below ground surface. The bedrock stratigraphy at the proposed project site is summarized on Figure 3-3 and in Section 3.5.1.2 (Figures 3-8 and 3-9). Overall, the stratigraphy of the Williston Basin has been well studied. The Williston Basin has been identified as an excellent candidate for long-term CO_2 storage due, in part, to the thick sequence of clastic and carbonate sedimentary rocks and the basin’s subtle structural character and tectonic stability (Peck 2014; Glazewski 2015).

Figure 3-3: North Dakota Stratigraphic Column of Proposed Project Area



Storage operations are planned in two geologic formations, the Broom Creek and Black Island-Deadwood Formations (Figure 3-3). Two wells are proposed for the injection of CO_2 into the Broom Creek Formation, and one well for injection of CO_2 into the Black Island-Deadwood Formation.

The project was designed using a stacked storage concept, where two storage reservoirs identified by varying vertical depths (i.e., the Broom Creek and Black Island-Deadwood Formations) could be accessed by a common well site. Detailed geologic, stratigraphic, and pore space information is provided in the Geologic Exhibits that were prepared for the project permit applications, which are available online (DMR 2022a, DMR 2022b).

The primary target CO_2 storage reservoir for the proposed project is the Broom Creek Formation (DMR 2022a). This formation is primarily composed of horizontally bedded sandstone which is approximately 4,915 feet below the MRY. Mudstones, siltstones, and interbedded evaporites of the undifferentiated Opeche and Spearfish Formations unconformably overlie the Broom Creek Formation. Mudstones and siltstones of the lower Piper Formation (Picard Member and lower) overlie the Opeche and Spearfish Formations. Together, the lower Piper and Opeche and Spearfish Formations (hereafter "Opeche–Picard interval") serve as the primary confining zone for the CO_2 storage reservoir, with an average thickness of 154 feet. The Amsden Formation (dolostone, limestone, and anhydrite) unconformably underlies the Broom Creek Formation and serves as the lower confining zone, with an average thickness of 270 feet. Together, the Opeche–Picard, Broom Creek, and Amsden Formations would comprise the CO_2 storage facility for the project.

Table 3-11 provides the average thickness and average depths for each formation. Tables 3-12 and 3-13, respectively, provide the geologic properties of the proposed storage facility and the geologic properties for the confining zones.

Table 3-11: Formations Comprising the Broom Creek CO_2 Storage Complex

	Formation	**Purpose**	**Average Thickness, ft**	**Average Depth, ft**	**Lithology**
Storage Facility	Opeche–Picard	Upper confining zone	154	4,712	Siltstone, mudstone evaporites
	Broom Creek	Storage reservoir (i.e., injection zone)	249	4,915	Sandstone, dolostone, dolomitic sandstone, anhydrite
	Amsden	Lower confining zone	270	5,175	Dolostone, limestone, anhydrite

Source: DMR 2022a

Table 3-12 provides the geologic properties of the proposed storage facility.

Table 3-12: Description of Broom Creek CO_2 Storage Reservoir (Primary Injection Zone)

Injection Zone Properties			
Property	**Description**		
Formation Name	Broom Creek		
Lithology	Sandstone, dolostone, dolomitic sandstone, anhydrite		
Formation Top Depth, ft	4,906		
Thickness, ft	Sandstone 168 Dolostone 103 Dolomitic Sandstone 26 Anhydrite 19		
Capillary Entry Pressure (CO_2/brine), psi	0.20		
Geologic Properties			
Formation	**Property**	**Laboratory Analysis**	**Simulation Model Property Distribution**
Broom Creek (sandstone)	Porosity, %*	19.51 (2.46–27.38)	21.4 (1.0–36.0)
	Permeability, mD**	69.29 (0.06–2,690)	168.8 (0.0–8,601.1)
Broom Creek (dolostone)	Porosity, %	8.11 (5.48–8.97)	5.8 (0.0–18.0)
	Permeability, mD	0.03 (0.02–0.05)	0.13 (0.0–2,259.6)

* Porosity values are reported as the arithmetic mean followed by the range of values in parentheses.
** Permeability values are reported as the geometric mean followed by the range of values in parentheses. mD: millidarcy.
Source: DMR 2022a

Table 3-13 provides the geologic properties for the confining zones.

Table 3-13: Properties of Upper and Lower Confining Zones of the Broom Creek Geologic Storage Reservoir

Confining Zone Properties	Upper Confining Zone	Lower Confining Zone
Formation Name	Opeche–Picard	Amsden
Lithology	Siltstone	Dolostone
Formation Top Depth, ft	4,636	5,040
Thickness, ft	154	270
Porosity, % (core data)*	6.55	7.04
Permeability, mD (core data)**	0.112	0.017
Capillary Entry Pressure (CO_2/brine), psi	20.59	69.03
Depth Below Lowest Identified USDW, ft	3,409	3,813

* Porosity values are reported as the arithmetic mean followed by the range of values in parentheses.
** Permeability values are reported as the geometric mean followed by the range of values in parentheses.
Source: DMR 2022a

In addition to the Opeche–Picard interval, there is 820 feet (average thickness across the project area) of impermeable rock formations between the Broom Creek Formation and the next overlying porous zone, the Inyan Kara Formation. An additional 2,545 feet (average over project area) of impermeable intervals separates the Inyan Kara Formation and the lowest USDW, the Fox Hills Formation, located approximately 2,545 feet below the MRY.[3]

The other proposed target CO_2 storage reservoir for the project is the sandstone horizons of the Black Island-Deadwood Formation, lying about 9,280 feet below MRY (Figure 3-3; DMR 2022b). Shales of the Icebox Formation conformably overly the Black Island Formation and serve as the primary upper confining zone with an average thickness of 118 ft (Table 3-14). The continuous shales of the Deadwood Formation B member serve as the lower confining zone with an average thickness of 34 feet.

Table 3-14: Formations Comprising the Black Island/Deadwood CO_2 Storage Complex

	Formation	Purpose	Average Thickness at Tundra Secure Geologic Storage Site, ft*	Average Depth Tundra Project Site, ft TVD	Lithology
Storage Facility	Icebox	Upper confining zone	118 (58 to 176)	9,308	Shale
	Black Island and Deadwood E member	Storage reservoir (i.e., injection zone)	118 (35 to 202)	9,427	Sandstone, shale, dolostone, limestone
	Deadwood C member sand	Storage reservoir (i.e., injection zone)	64 (40 to 88)	9,773	Sandstone
	Deadwood B member shale	Lower confining zone	34 (20 to 49)	9,791	Shale

*Thickness ranges were averaged from regional data in accordance with the Area of Review (model area) as depicted in Figure 2-4 of DMR 2022b. Actual thickness ranges across the Area of Review may differ from those identified in the Tundra Secure Geologic Storage Site (project area) per DMR 2022b.

In addition to the Icebox Formation, there are 570 feet of impermeable rock formations between the Black Island Formation and the next overlying porous zone, the Red River Formation. An additional 7,400 feet, including several thousands of feet of impermeable intervals separate the Black Island and the lowest USDW, the Fox Hills Formation.

[3] The Newcastle Sandstone USDW has a salinity level greater than 3,000 ppm; subsequently, under North Dakota Administrative Code 33-25-01-05 2(2), it is not reasonably expected to supply a public water system; therefore, Hell Creek is the lowest USDW.

The Black Island/Deadwood E Member and the Dead C Member (sand) comprise the proposed storage reservoirs (injection zone) for the project. The J-ROC1 test well[4] was drilled as a part of a separate, but related CarbonSAFE Phase III project in 2020 to a depth of 9,871 feet (results of J-ROC1 investigations detailed in Table 3-14). The upper proposed storage reservoir, the Black Island and Deadwood E Member, has an average thickness of 118 feet across the model area with an average depth of 9,427 feet at the Project Tundra site. The lower storage reservoir, the Deadwood C member (sand), averages 64 feet in thickness across the model area with an average depth of 9,773 feet at the Project Tundra site (DMR 29032). Based on offset well data and geologic model characteristics, the net reservoir thickness within the project area ranges from 63 to 287 feet, with an average of 165 feet.

The lower confining zone of the storage complex is the Deadwood B member shale. The Deadwood B member consists predominantly of shale. The shale within the Deadwood B member is 9,791 feet below the surface with a thickness of approximately 34 feet at the project site (Table 3-14). Table 3-15 provides the geologic properties of this geologic storage facility. Table 3-16 provides the geologic properties for the confining zones, including the average thickness and average depths for each formation.

Table 3-15: Description of Black Island/Deadwood CO_2 Storage Reservoir (Secondary Injection Zone)

Injection Zone Properties			
Property	**Description**		
Formation Name	Black Island, Deadwood E member, and Deadwood C-sand member		
Lithology	Sandstone, dolostone, limestone		
Formation Top Depth, ft	9782.2, 9820.9, and 10,077.4		
Thickness, ft	38.9, 92.3, and 60.9		
Capillary Entry Pressure (CO_2/Brine), psi	0.16		
Geologic Properties			
Formation	**Property**	**Laboratory Analysis**	**Model Property Distribution**
Black Island (sandstone)	Porosity, %*	8.0 (3.4–10.3)	5.6 (1.1–14.8)
	Permeability, mD**	3.7 (0.0019–157)	0.805 (<0.0001–96.0)
Deadwood E Member (sandstone)	Porosity, %	10 (6.85–14.43)	7.0 (0–17.7)
	Permeability, mD	5.63 (0.0325–2,060)	3.88 (<0.0001–4549.2)
Deadwood C Sand Member	Porosity, %	7.6 (1.01–14.69)	7.6 (0.3–17.2)
	Permeability, mD	11 (0.0018–1140)	7.03 (<0.0001–830.3)

* Porosity values are reported as the arithmetic mean followed by the range of values in parentheses.
** Permeability values are reported as the geometric mean followed by the range of values in parentheses.
Source: DMR 2022b

[4] The J-ROC1 test well is at the same location as the planned Liberty 1 injection well.

Table 3-16: Properties of Upper and Lower Confining Zones of the Black Island-Deadwood Geologic Storage Reservoir

Confining Zone Properties	Upper Confining Zone	Lower Confining Zone
Formation Name	Icebox	Deadwood B member shale
Lithology	Shale	Shale
Formation Top Depth, ft	9,308	9,791
Thickness, ft	118	34
Porosity, % (core data)[a]	3.6[c]	2.0
Permeability, mD (core data)[b]	0.00002[c]	0.0103
Capillary Entry Pressure (CO_2/brine), psi	845	176[d]
Depth Below Lowest Identified USDW, ft	8,097	8,580

[a] Porosity values are reported as the arithmetic mean followed by the range of values in parentheses.
[b] Permeability values are reported as the geometric mean followed by the range of values in parentheses.
[c] Porosity and permeability values derived from HPMI (high-pressure mercury injection) testing.
[d] No shale samples in the Deadwood were tested. Value is for a sample from a sandy–shale interval in the Deadwood D member.
Source: DMR 2022b

No known transmissible faults are within the confining systems in the project area. The formations between the Deadwood – Broom Creek – Inyan Kara and between the Inyan Kara and lowest USDW have demonstrated the ability to prevent the vertical migration of fluids throughout geologic time and are recognized as impermeable flow barriers in the Williston Basin (Downey 1986; Downey and Dinwiddie 1988).

3.4.1.4 Legacy Wells

Ten legacy wells are located within the project area, five that penetrate the cap rock of the Broom Creek Formation (Figure 3-4) and five that penetrate the cap rock of the Deadwood Formation (Figure 3-5).

Figure 3-4: Broom Creek Legacy Wells near the Project Area

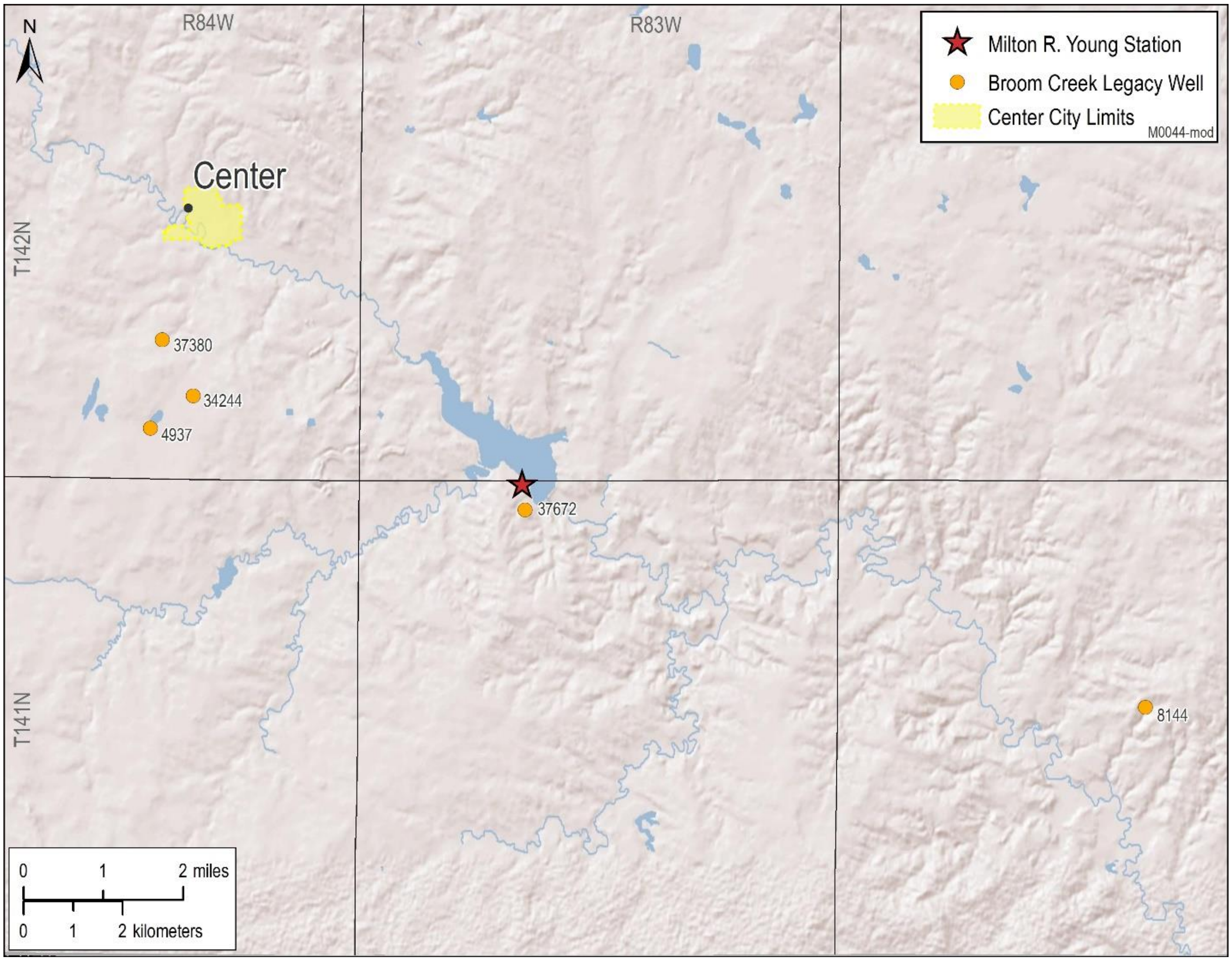
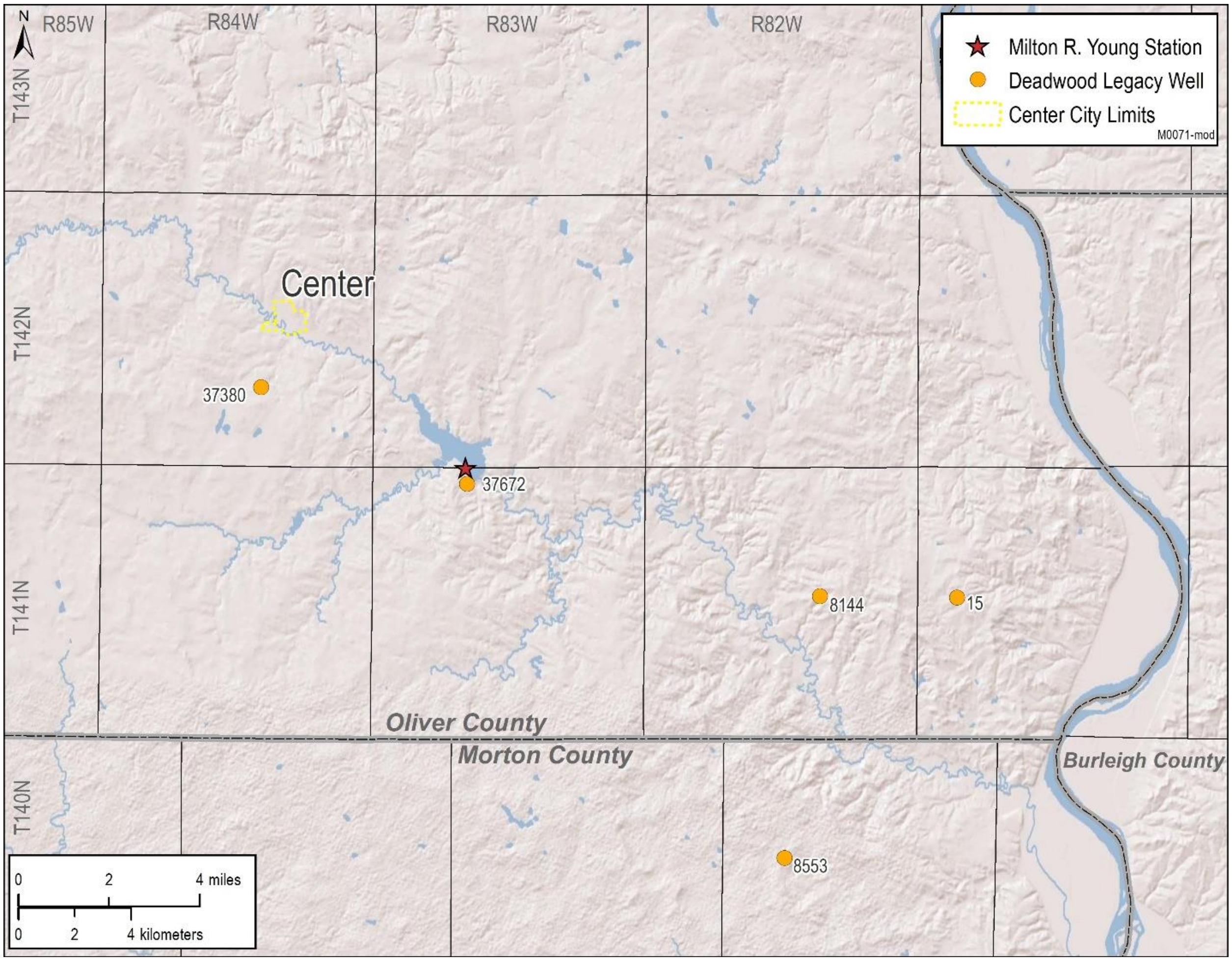


Figure 3-5: Deadwood Legacy Wells near the Project Area



3.4.2 Environmental Consequences

3.4.2.1 Soils

Construction activities would result in temporary and permanent disturbances to soils located in the project work areas. Construction of the project would result in the permanent disturbance of approximately 25.8 acres of soils within the MRY property to accommodate the project facilities. Additionally, approximately 97.0 acres of land would be required for temporary construction and laydown areas. Areas proposed for permanent impacts may require removal of vegetation, grading, and excavation to accommodate project components. Use of the construction and laydown areas would require removal of vegetation and addition of rock or gravel as needed to allow vehicle and equipment access. However, following construction, the construction and laydown areas would be restored to original conditions with the exception of an approximately 7.0-acre area that would be retained for overflow parking for MRY and project operations.

Permanent impacts to soils would occur within the project's permanent facility footprint and the area retained for overflow parking for MRY and project operations. However, these areas are primarily located in previously disturbed lands used for general MRY operations. Therefore, impacts to soils are anticipated to be minimal for the permanent facilities and temporary in nature for the construction and laydown areas that will be restored to original conditions following construction.

3.4.2.2 Surficial Geology

Construction activities would affect surface soils and near surface geology for site grading including vegetation removal, grubbing, topsoil segregation, and excavation as required for foundations. Excavation backfilling, gravel removal, and site restoration would be completed once installation of the project is complete.

The project would have minimal impact on geological resources beyond geologic formation targets for CO_2 injection and wastewater disposal. Following construction, the construction and laydown areas would be restored to original conditions with the exception of an approximately 7.0-acre area that would be retained for overflow parking for MRY and project operations. Further impacts from the project to surface soils and near surface geology within the proposed footprint of the MRY facility would be minimal.

CO_2 injection and its resulting pressure increases would be confined to the intended injection formations and there would be no expected impacts to any surface geology or soil conditions.

3.4.2.3 Bedrock Stratigraphy

The intention of the project is to conduct geologic storage operations of CO_2 by injecting it into the deep subsurface and naturally occurring geologic formations (Broom Creek Formation and Black Island-Deadwood Formation). These formations would be negligibly affected by a geochemical reaction with the injected CO_2 and temporarily impacted by the pressure buildup during CO_2 injection. Impacts to the deep subsurface geologic formations from drilling for injection well installation would be limited to the well boreholes. The size of the boreholes and injection facilities would not physically result in a material change to the underlying geologic formations.

For the project area, the initial mechanism for geologic confinement of CO_2 injected into the Broom Creek Formation would be the cap rock, which would contain the initially buoyant CO_2 under the effects of relative permeability and capillary pressure. Lateral movement of the injected CO_2 would be restricted by residual gas trapping (relative permeability) and solubility trapping (dissolution of the CO_2 into the native formation brine), which would confine the CO_2 within the proposed storage reservoirs. After the injected CO_2 becomes dissolved in the formation brine, the brine density would increase. This higher-density brine would ultimately sink in the storage formation (convective mixing). Over a much longer period of time (greater than 100 years), mineralization of the injected CO_2 would result in long-term, permanent geologic confinement. A geochemical simulation has been performed to calculate the effects of introducing the CO_2 stream into the injection zone. Figures 3-6 and 3-7 show the expected pressure difference and extent of CO_2 plume within the geologic storage facilities after 20 years of injection. The effects have been found to be minor and not threatening to the geologic integrity of the storage system. All injection and monitoring operations would be subject to NDIC Class VI regulations to ensure that there would be no impact on the area and surrounding communities.

Figure 3-6: Pressure Influence Associated with CO_2 Injection into the Deadwood Formation

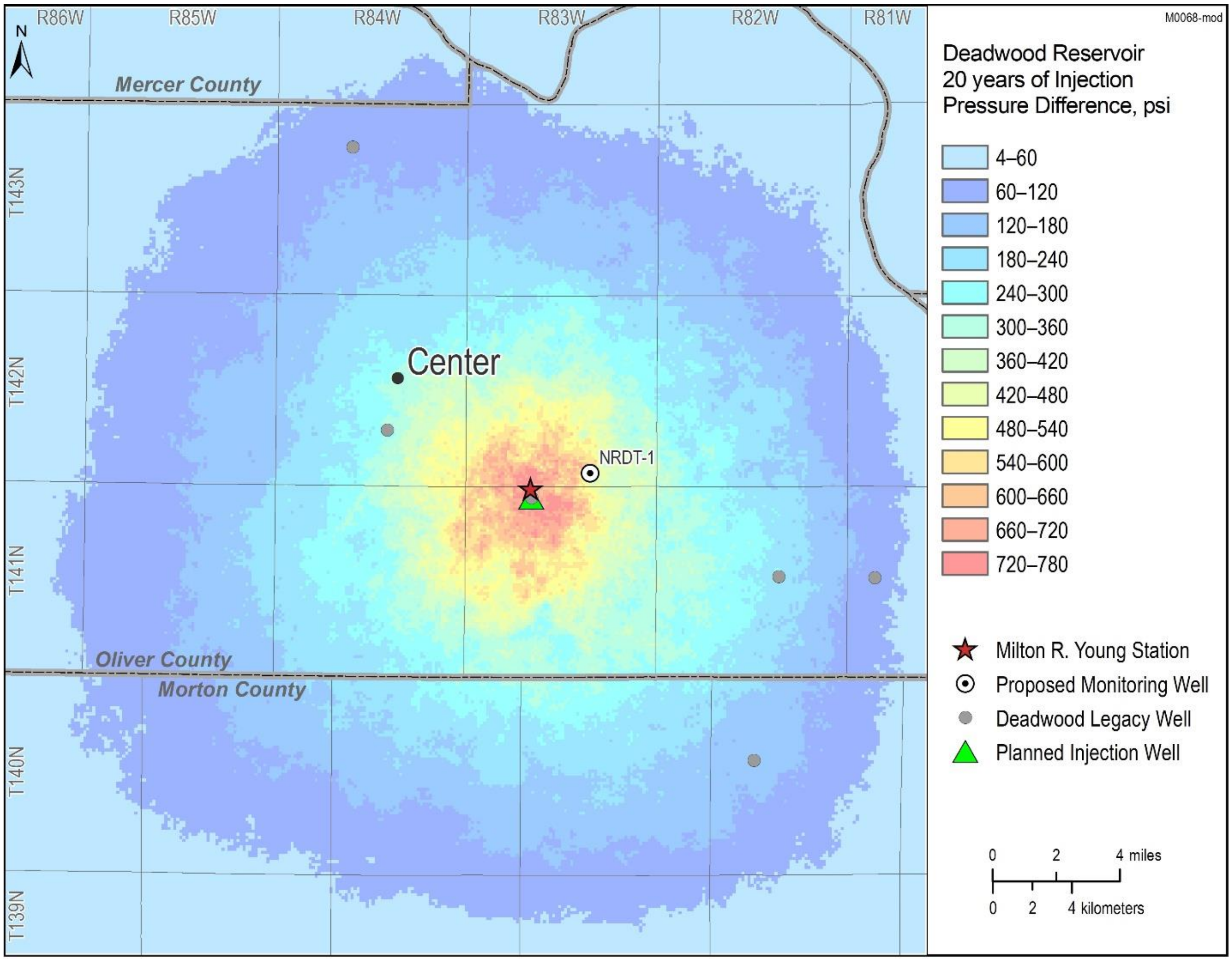
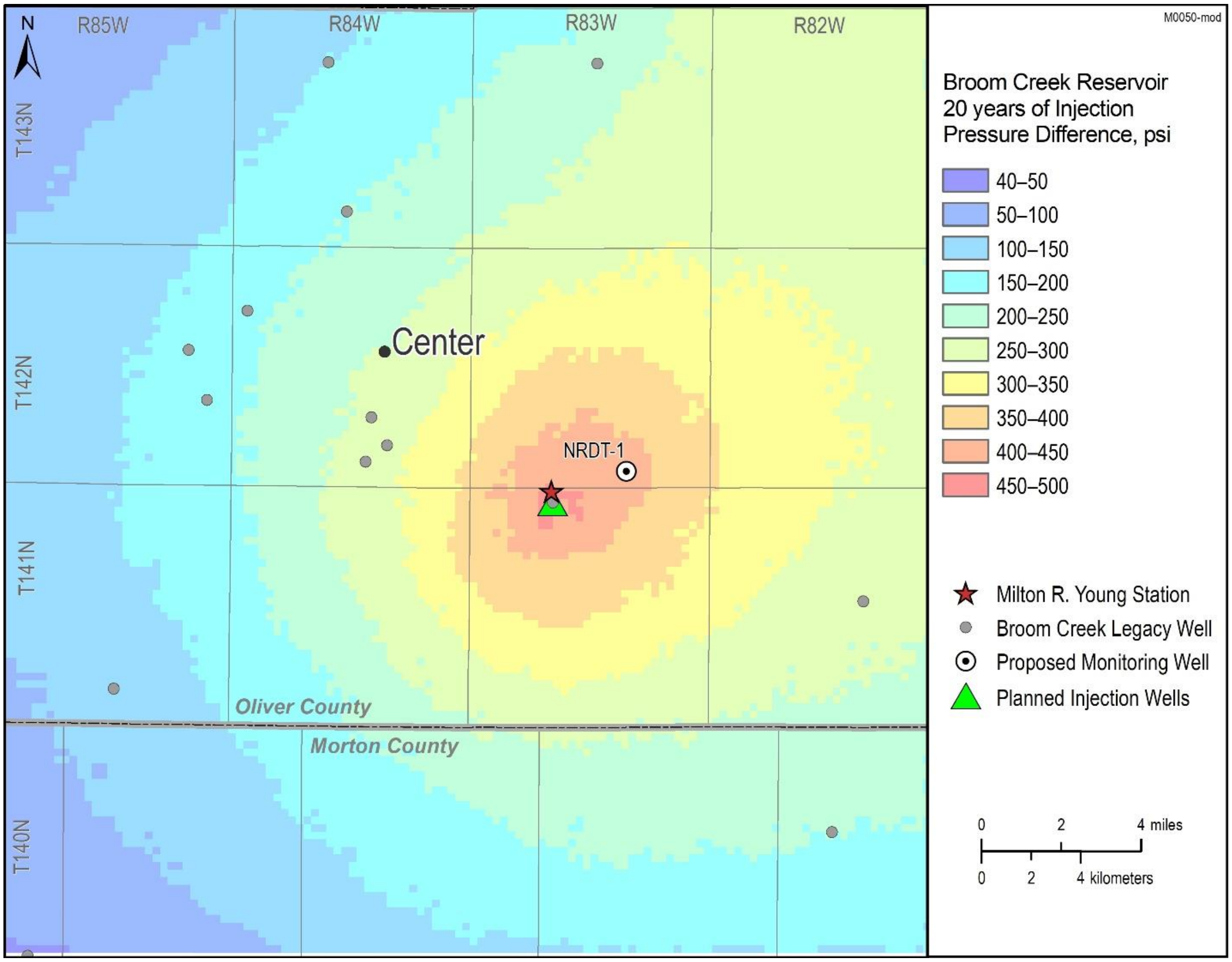


Figure 3-7: Pressure Influence Associated with CO_2 Injection into the Broom Creek Formation



Detailed information regarding Minnkota's strategy for monitoring for CO_2 leakage and establishing expected baselines to monitor against leakage is included in the Monitoring, Reporting, and Verification Plan (MRV Plan) for the project (Appendix F). Appendix F also includes additional information from the EERC regarding the equipment and methods used for seismic monitoring and mitigation measures to reduce potential impacts associated with seismic monitoring.

3.4.2.4 Legacy Wells

The low density of known legacy wellbores in the project area indicates that the CO_2 injection would occur in an area with few available leakage pathways. The legacy wells located in the project area were evaluated and all have the necessary casing and cement bonds needed to prevent leakage pathways and maintain integrity of the geologic storage facilities (Figures 3-4 and 3-5).

3.5 Water Resources

This section describes water resources (e.g., surface waters, water quality, floodplains, groundwater, hydrogeology, wetlands) in the project area and surrounding vicinity. Water resources typically are defined in terms and scale of watersheds, which are areas of land that drain all the streams and rainfall to a common outlet (e.g., river, lake, ocean); watersheds also include the underlying groundwater (U.S. Geological Survey [USGS] no date). Surface waters, wetlands, floodplains, and groundwater are distinct resources, but function as a single, integrated natural system in the watershed. As such, disruption of any part of these resources can have long-term and far-reaching consequences for the entire system (Federal Emergency Management Agency [FEMA] 2007).

The project falls within one sub-watershed, Nelson Lake-Square Butte Creek (Hydrologic Unit Code [HUC] 12: 101301010803), which is a part of the larger Headwater Square Butte Creek Watershed (HUC 10: 1013010108).

Federal regulatory requirements for water resources include, but are not limited to:

- EO 11990, *Protection of Wetlands*, requires federal agencies to "avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is practicable alternative." This EO does not apply to the issuance of federal agency permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.
- EO 11988, Floodplain Management, requires federal agencies to "avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative". This EO was designed to reduce the risk of flood loss, to minimize impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains. This EO applies to management of federal lands and facilities; federally undertaken, financed, or assisted construction and improvements; and federal activities and programs affecting land use.
- The National Flood Insurance Act established the National Flood Insurance Program, which is a voluntary floodplain management program for communities administered by FEMA. Any action within a FEMA-mapped floodplain in participating communities must follow the community's FEMA-approved floodplain management regulations (FEMA 2005).
- The CWA enables the regulation of discharges into waters of the United States and establishment of surface water quality standards (see 40 CFR 230.3 and 33 CFR 328 for definition of waters of the United States). The sections of the CWA most applicable to the effects of ground disturbance activities include Section 303(d), Section 404, Section 401, and Section 402, which establishes the National Pollutant Discharge Elimination System (NPDES) permit program.

3.5.1 Affected Environment

3.5.1.1 Surface Waters, Surface Water Quality, and Floodplains

3.5.1.1.1 Surface Water

Surface waters include rivers, streams, creeks, lakes, ponds, reservoirs, oceans, or any other body of water found on the earth's surface. Surface water is a part of the larger hydrologic cycle (water cycle), maintained by precipitation and water runoff that can be lost through evaporation, seepage into the ground, or use by plants and animals. Typical beneficial surface water uses include drinking water, public supply, irrigation, agriculture, thermoelectric generation, mining, and other industrial uses.

The Headwater Square Butte Creek watershed is comprised of 190,069 acres and contains numerous sub-watersheds under HUC 12. The Nelson Lake-Square Butte sub-watershed encompasses over 31,078 acres. Drainage basins funnel all the streams, snowmelt, and rainfall to a common outlet such as the outflow of a reservoir, or mouth of a bay. Surface runoff from the project site would drain to the Square Butte Creek (Nelson Lake) via overland flow and continue southeast within the creek, eventually draining into the Missouri River south of Harmon, North Dakota.

In 1968, Square Butte Creek was dammed to provide water cooling supplies for the MRY Station. Nelson Lake makes up a large portion of the surface water present in the Nelson Lake-Square Butte sub-watershed, spanning 581 acres with 12.5 miles of shoreline (NDGF 2020). Nelson Lake is not a 303(d)-listed water. Assessment information from 2018, indicates that the waterbody is in good condition for all assessed uses (e.g., agricultural, fish and aquatic biota, fish consumption, industrial, and recreation) (EPA 2018a). Nelson Lake is maintained at a maximum of 1,926 feet above mean sea level, averages 14.4 feet in depth, and has a storage capacity of 8,322.8 acre-feet (NDGF 2020). Recreational and industrial activities associated with MRY power generation are the dominant land uses at and surrounding Nelson Lake.

The lake is owned and maintained by Minnkota, and primarily functions to provide cooling water for the power plant complex as well as provide a source of recreation and scenic beauty for the citizens of the area. Minnkota also maintains and operates Nelson Lake Dam.

Minnkota maintains a site-wide NPDES industrial wastewater permit for MRY operational discharges to Nelson Lake, issued by the NDDEQ (ND-000370). Additional outfalls are covered under the NPDES general stormwater discharge permit (NDR05-0012) associated with industrial activity.

Section 404 of the CWA requires approval from the U.S. Army Corps of Engineers before placing dredged or fill material into waters of the United States, including rivers, streams, ditches, coulees, lakes, ponds, or adjacent wetlands. Engineering evaluations are ongoing to determine all permit requirements for the project; however, it is anticipated that a Section 404 permit would not be required.

3.5.1.1.2 Water Quality

CWA Section 303(d) requires states, territories, and authorized tribes (as delegated by the EPA) to develop lists of impaired surface waters, which are those that do not meet water quality standards established by these jurisdictions. The CWA requires that these jurisdictions establish priority rankings for surface waters on the list and develop total maximum daily loads (TMDLs) of pollutants for these surface waters. A TMDL is a calculation of the maximum amount of pollutant that a surface water can receive and still meet established water quality standards. The NDDEQ has been delegated the authority by the EPA to assess water quality of North Dakota surface waters and develop the state’s Section 303(d) list of impaired surface waters.

Surface waters are assigned priority rankings of 1 through 5, with Category 5 considered impaired under Section 303(d) and requiring a TMDL. The 2018 list of Section 303(d) impaired surface waters is the most current published list (North Dakota Department of Health [DoH] 2019). Square Butte Creek, from Nelson Lake downstream to its confluence with Otter Creek is listed as a Category 5 impaired water for fish and other aquatic biota (DoH 2019). The impairments are caused by water quality standard exceedances for sedimentation/siltation. TMDLs have not yet been developed or approved for this segment and no existing plans for restoration were identified. This segment is listed as a low priority for TMDL development (DoH 2019). The project would not adversely impact downstream sedimentation or siltation impairment in accordance with applicable stormwater and wastewater permits.

3.5.1.1.3 Floodplains

Floodplains are defined as any land area susceptible to being inundated by waters from any source (44 CFR 59.1) and are often associated with surface waters and wetlands. Floodplains are valued for their natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions. For human communities, floodplains can be considered a hazard area because buildings, structures, and properties located in a floodplain can be inundated and damaged during floods. FEMA develops Flood Insurance Rate Maps (FIRMs), the official maps on which FEMA delineates special flood hazard areas for regulatory purposes under the National Flood Insurance Program. Special flood hazard areas are also known as 100-year floodplains, or areas that have a 1 percent annual chance of flooding. FEMA also maps 500-year floodplains, or areas that have a 0.2 percent annual chance of flooding.

According to the FEMA National Flood Hazard Layer Viewer, digital data is unavailable for the unincorporated areas in Oliver County (FEMA 2023). Using the flood maps service center, FIRMs are unavailable for the proposed project area (FEMA 2023). A review of the North Dakota Risk Assessment Map Service through the North Dakota Water Commission was conducted. The project would not be located within any FEMA-mapped 100- or 500-year floodplains (North Dakota Water Commission 2023). Reviews of 1987 FIRMs confirmed the lack of floodplains present in the project area and surrounding region (FEMA 1987).

3.5.1.2 Groundwater and Hydrogeology

The hydrogeology of western North Dakota comprises several shallow freshwater-bearing formations of Quaternary, Tertiary, and upper Cretaceous-aged sediments underlain by multiple saline aquifer systems of the Williston Basin. These saline and freshwater systems are separated by the Cretaceous Pierre Shale of the Williston Basin. The Pierre Shale is a regionally extensive, dark gray to black marine shale between 1,000 and 1,500 feet thick which forms the lower boundary of the Fox Hills–Hell Creek formations (Thamke and others 2014).

Freshwater aquifers are present within the Cretaceous Fox Hills and Hell Creek Formations, overlying Cannonball, Tongue River, and Sentinel Butte Formations of the Tertiary Fort Union Group. The Tertiary Golden Valley Formation overlies the Tertiary Fort Union Group. Above these are undifferentiated alluvial and glacial drift Quaternary aquifer layers, which are not necessarily present in all parts of the proposed project area (Figure 3-8; Croft, 1973).

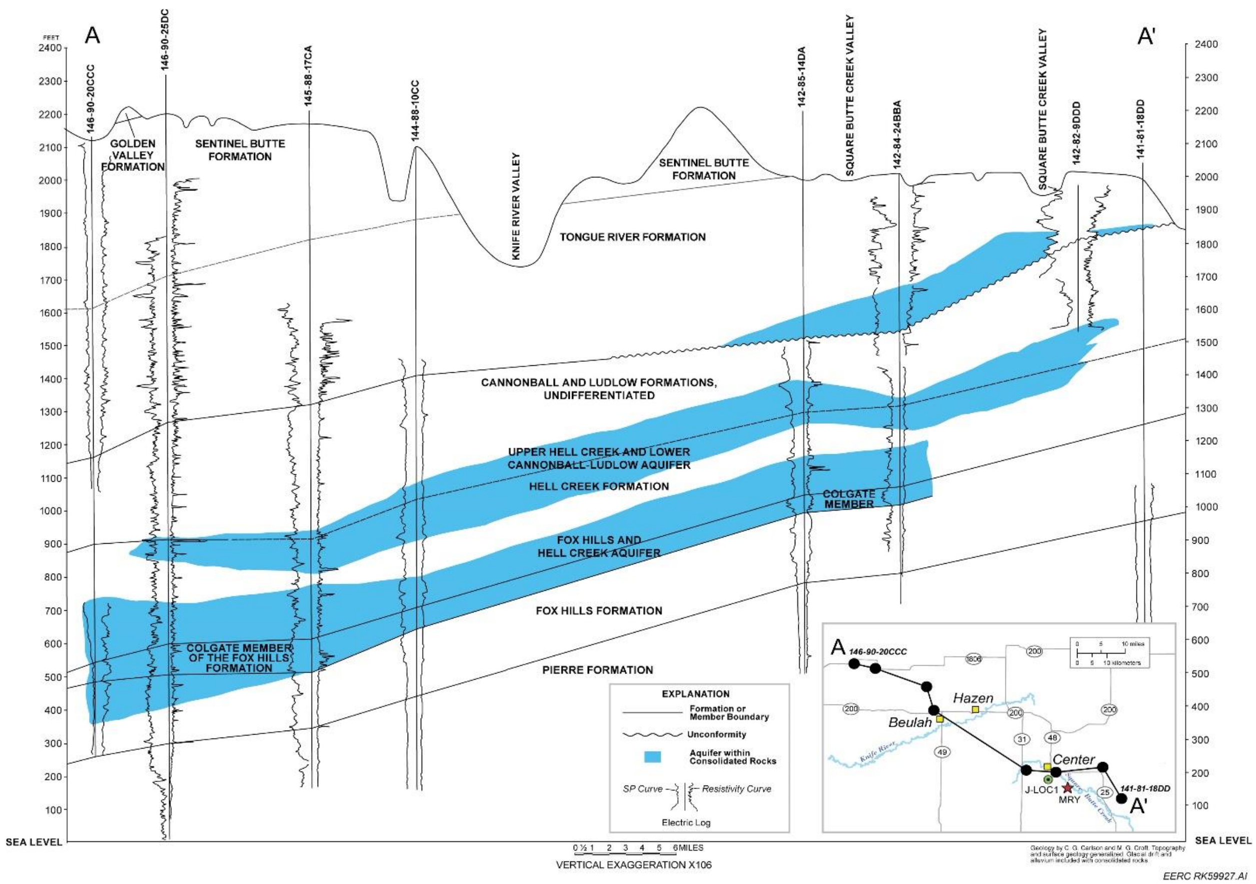
Figure 3-8: Upper Stratigraphy of Oliver County

Era	Period	Group	Formation	Freshwater Aquifer(s) Present
Cenozoic	Quaternary		Glacial Drift	Yes
	Tertiary		Golden Valley	Yes
		Fort Union	Sentinel Butte	Yes
			Tongue River	Yes
			Cannonball	Yes
Mesozoic	Cretaceous		Hell Creek	Yes
			Fox Hills	Yes
			Pierre	No
		Colorado	Niobrara	No
			Carlile	No
			Greenhorn	No
			Belle Fourche	No

Source: modified from Croft 1973

Multiple other freshwater-bearing units, primarily of Tertiary age, overlie the Fox Hills–Hell Creek aquifer system within the proposed project area (Figures 3-3, 3-8, and 3-9). These formations are often used for domestic and agricultural purposes. The Cannonball and Tongue River Formations comprise the major aquifer units of the Fort Union Group, which overlies the Hell Creek Formation. The Cannonball Formation consists of interbedded sandstone, siltstone, claystone, and thin lignite beds of marine origin. The Tongue River Formation is predominantly sandstone interbedded with siltstone, claystone, lignite, and occasional carbonaceous shales. The basal sandstone member of the Tongue River Formation is persistent and a reliable source of groundwater in the region. The thickness of this basal sand ranges from approximately 200 to 500 feet and directly underlies surficial glacial deposits in the project area. Tongue River groundwaters are generally a sodium bicarbonate type with a total dissolved solids (TDS) of approximately 1,000 parts per million (ppm) (Croft 1973).

Figure 3-9: Stratigraphy near the Project Area



Source: modified from Croft 1973
West-east cross section of the major regional aquifer layers in Mercer and Oliver Counties and their associated geologic relationships. The black dots on the inset map represent the locations of the water wells illustrated on the cross section.

The Sentinel Butte Formation, a silty fine- to medium-grained sandstone with claystone and lignite interbeds, overlies the Tongue River Formation in the extreme western portion of the project area. While the Sentinel Butte Formation is another important source of groundwater in the region, primarily to the west of the project area, the Sentinel Butte is not a source of groundwater within the project area. TDS in the Sentinel Butte Formation ranges from approximately 400 to 1,000 ppm (Croft 1973).

A sole source aquifer is one that supplies at least 50 percent of the drinking water for its service area, or aquifers where there are no reasonably available alternative drinking water sources should the aquifer become contaminated (EPA 2018b). No sole source aquifers are located in North Dakota (EPA 2018b).

3.5.1.3 Fox Hills and Hell Creek Formation

The deepest USDW in the project area is the Fox Hills Formation (Figure 3-9), which together with the overlying Hell Creek Formation, is a confined aquifer system. The Hell Creek Formation is a poorly consolidated unit composed of interbedded sandstone, siltstone, and claystone with occasional carbonaceous beds, all fluvial in origin. The underlying Fox Hills Formation is interpreted as interbedded nearshore marine deposits of sand, silt, and shale deposited as part of the final Western Interior Seaway retreat (Fischer 2013). The Fox Hills Formation in the project area is approximately 700 to 900 feet deep and 200 to 350 feet thick. The structure of the Fox Hills and Hell Creek Formations follows that of the Williston Basin, dipping gently toward the center of the basin, to the northwest of the project area.

The aquifers of the Fox Hills and Hell Creek Formations are hydraulically connected and function as a single confined aquifer system (Fischer 2013). The Bacon Creek Member of the Hell Creek Formation forms a regional aquitard for the Fox Hills–Hell Creek aquifer system, which isolates it from the overlying aquifer layers. Recharge for the Fox Hills–Hell Creek aquifer system occurs in southwestern North Dakota along the Cedar Creek Anticline and the aquifer system discharges into overlying strata under central and eastern North Dakota (Fischer 2013).

The Fox Hills–Hell Creek aquifer system is not typically used as a primary source of drinking water due to high concentrations of TDS and fluoride among other constituents. However, the aquifer is occasionally used as a source for irrigation and livestock watering. The project conducted a baseline groundwater monitoring study (Appendix G; Burns & McDonnell 2022). Results from the analysis of water samples collected from wells in the Fox Hills-Hell Creek Formation in 2021 as part of the study indicate groundwater in this formation is a sodium bicarbonate type with a TDS content of approximately 1,520 to 1,760 milligrams per liter (mg/L). Fluoride concentrations ranged from 0.82 ppm to 3.54 mg/L. Previous analysis of Fox Hills Formation water has also noted high levels of fluoride, more than 5 mg/L (Trapp and Croft 1975).

3.5.1.4 Wetlands

Wetlands are important landscape features that provide many beneficial services for people, fish, and wildlife. Some of these services, or functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, producing aesthetic value, ensuring biological productivity, filtering pollutant loads, and maintaining surface water flow during dry periods. Functions are the result of the inherent and unique natural characteristics of wetlands.

No wetlands would be directly affected by the proposed project. An excavated, human-made wetland is located approximately 350 feet south of the proposed CO_2 flowline (USFWS 2019)[5]. The nearest waterbody (Nelson Lake) is approximately 1,500 feet north and east of the project on the north side of MRY and is classified as a dike/impounded lacustrine wetland (USFWS 2019). The National Wetland Inventory also shows several adjacent reservoirs to Nelson Lake as dike/impounded lacustrine wetlands (USFWS 2019). Square Butte Creek is classified as a riverine, lower perennial wetland system (USFWS 2019).

[5] Note that this distance to the nearest delineated wetland and is not inclusive of human-made ponds.

3.5.2 Environmental Consequences

3.5.2.1 Surface Water, Surface Water Quality, and Floodplains

No surface waters or floodplains occur in the proposed project's construction footprint or temporary construction areas; therefore, no filling, excavating, or clearing would occur in these resources. The erosion and transport of sediment due to construction (e.g., clearing, excavating, filling) could result in localized water quality degradation of Nelson Lake due to its proximity to the project (about 1,500 feet away from carbon capture facility, and about 600 feet away from injection facility). Sediment deposition into surface waters can increase turbidity and adversely affect aquatic species and habitats by increasing water temperatures and decreasing dissolved oxygen levels (EPA 2023a). Sediment deposition into surface waters also can increase pollutant and nutrient levels which can adversely affect water quality conditions (EPA 2023a). For example, excess phosphorous may enhance algal growth in surface water, which can affect the availability of oxygen in water. The use of construction equipment also could result in accidental spills or leaks of petrochemicals (e.g., gasoline, hydraulic fluids) that could potentially reach surface waters if not contained and cleaned up. Any accidental spill that would reach Nelson Lake or associated tributaries and reservoirs could degrade surface water quality, which could adversely affect aquatic habitat or limit the beneficial use of the lake (e.g., recreation, fish consumption). Project construction would require the development of a Stormwater Pollution Prevention Plan (SWPPP), which would contain site-specific measures to avoid and minimize erosion and sediment transport to surface waters, as well as measures to contain and clean up accidental petrochemical spills. The potential impacts to Nelson Lake and Square Butte Creek would be mitigated using site-specific measures and best practices identified in the SWPPP and associated NPDES permit (CWA Section 402), designed for water quality protection and to ensure water quality standards of nearby surface waters are not exceeded.

The proposed project would operate under Minnkota's existing NPDES permit (ND-000370) to ensure any industrial discharge to Nelson Lake would not violate water quality standards. No significant modifications to the existing industrial NPDES permit would be required with the addition of the carbon capture facility, and any surface water runoff (e.g., rainfall) would be captured and discharged per MRY's existing site-wide NPDES permit. In addition, the facility design elements would help control runoff, including storm covers (over pumps, piping, etc.) to divert rainwater away from the project.

Spill prevention and containment measures would be considered during the engineering design to prevent pollutant discharges to the surface. Project designs require use of the following tanks (chemical storage and tank volumes are discussed in parenthesis, respectively): Solvent Tank (amine solvent; 399,688 gallons), Solvent Sump Tank (solvent, wash water, drain; 5,118 gallons), Caustic Soda Tank (caustic soda; 129,548 gallons), Reclaimed Waste Tank (reclaimed waste; 88,833 gallons), Wash Water Tank (amine contained water; 90,995 gallons), Dilute Wash Water Tank (diluted amine contained water; 87,121 gallons), Fresh Solvent Stank (fresh amine solvent; 61,499 gallons), Acid Wash Water Tank (diluted amine with sulfuric acid; 99,336 gallons), Sulfuric Acid Tank (sulfuric acid; 2,647 gallons), Acid Wash Waste Tank (acid wash waste; 20,629 gallons), Acid Wash Condensate Tank (acid wash water condensate; 326 gallons), Precoat Filter Wash Water Drum (precoat filter wash water; 8,269 gallons), and

TEG Tank (triethylene glycol; 381 gallons). Possible pollutant discharges will be mitigated through implementation of spill prevention and containment measures.

Minnkota would be required to maintain and implement a SWPPP which would outline BMPs, stormwater sampling guidelines, and control of potential pollutants. The purpose of the SWPPP would be to protect and maintain the quality of the receiving surface water in accordance with federal and state CWA regulations. All construction stormwater runoff which directly or indirectly impacts surface water would be controlled to minimize impacts by establishing a plan to manage the quality of stormwater runoff from the site. All attempts would be made to prevent contamination of water from construction activities, such as fuel spillage, lubricants, and chemicals, by following safe handling and storage procedures. Stormwater runoff would be managed to minimize sediment and silt movement, and other potential pollutants.

As described in Section 2.5.2.1, a new water appropriation of 15,000 acre-feet from the Missouri River has been approved by the North Dakota State Water Commission to supply the water needs for the project. DOE received comments on the Draft EA regarding potential effects of the project water appropriation from the Missouri River on downstream water users. Further analysis determined that the 15,000 acre-feet of water requested for the project is 0.10 percent of the mean annual discharge recorded at Garrison Dam and the requested withdrawal rate of 13,480 gallons per minute (gpm), or 30.0 cubic feet per second, is 0.14 percent of the mean daily discharge rate (see Section K.4.5 Appendix K for more information). This water appropriation does not represent a significant change to daily flow or annual discharge from the Missouri River. Therefore, the project would not preclude other water users from exercising their right to appropriate water, subject to North Dakota Water Commission permitting requirements and regulatory requirements at NDAC Title 89-03 and North Dakota Century Code 61-04.

3.5.2.2 Groundwater and Hydrogeology

The impermeable nature of the surface geology in the watershed and the disturbed and compacted nature of the project site would limit groundwater contamination during construction and operations. Subsurface activities may include the construction of pilings and injection wells for the project. Permitting requirements under the CWA protect surface and groundwater to prevent pollutant-laden discharges. The MRY facility maintains CWA permits and adheres to the requirements. New CWA or other applicable permits for the project would require implementation of BMPs as well as studies to ensure that the resource is protected. Therefore, impacts on groundwater or hydrogeologic resources would not be likely.

3.5.2.3 Wetlands

No filling, excavating, or clearing would occur in wetlands. The nearest wetland[6] is over 600 feet from the facility boundaries and approximately 30 feet from the closest temporary laydown and construction area. Due to the distance between the project facility and the nearest wetland, it is unlikely that facility operations would affect wetlands. BMPs (e.g., installation of silt fence and other erosion and sediment control devices) would be installed at the temporary construction and laydown areas as needed to avoid or minimize impacts to wetlands during construction.

3.6 Biological Resources

3.6.1 Affected Environment

Information regarding wildlife species and habitat within the project area was obtained from a review of existing published sources and site-specific wildlife and habitat information from Minnkota's Environmental Information Volume (EIV), the USFWS, and the NDGF file information.

3.6.1.1 Aquatic Resources

Nelson Lake is located adjacent to the project area (see Section 2.5.1) and supports various fish species, including largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), northern pike (*Esox lucius*), white crappie (*Pomoxis annularis*), black crappie (*Pomoxis nigromaculatus*), perch (Genus *Perca*), common carp (*Cyprinus carpio*), and walleye (*Sander vitreus*) (NDGF 2020). Per the NDGF, Nelson Lake is considered the best largemouth bass lake in North Dakota, with open water year-round allowing warmwater fish to grow better than in other lakes in North Dakota (NDGF 2022).

Aquatic mussels do not appear to have a regular presence in Nelson Lake or Square Butte Creek according to the historical and current ranges noted by NDGF (NDGF 2023b, NDGF 2015). No other publicly available evidence supporting freshwater mussel presence in waters near the project was identified.

3.6.1.2 Wildlife Resources

The proposed project site would be located within the existing MRY facility in an area historically used for coal pile storage that has since been reclaimed. While the area is undeveloped, it provides minimal, low-quality wildlife habitat due to the disturbed and industrial nature of the area. The areas surrounding the project area are generally low-quality wildlife habitat, including the adjacent landfill, coal mines, and industrial facilities. The project would not result in the loss of quality wildlife habitat. While wildlife may potentially use the area, the past and present disturbances for plant operations provide limited, minimally vegetated wildlife habitat. The carbon capture facilities would occupy 25.8 acres of land west and south of MRY that was previously used for stockpiling coal. Approximately 97.0 acres of land would be required for temporary construction and laydown areas within the Minnkota-owned property. However, following construction, the construction and laydown areas would be restored to original conditions with

[6] Note that these distances are to the nearest delineated wetland and are not inclusive of human-made ponds.

the exception of an approximately 7.0-acre area that would be retained for overflow parking for MRY and project operations. Potential habitat in the areas retained for the carbon capture facilities and overflow parking would be permanently removed and would result in displacement of wildlife species. However, impacts would be low due to the limited existing habitat at the project site, abundance of additional and higher quality habitat in the surrounding area, and the limited area of disturbance across the entire site.

Typical wildlife species likely to occur in the project vicinity could include squirrels, rabbits, fox, songbirds, shorebirds, grassland birds, raptors, coyotes (*Canis latrans*), skunks, raccoons (*Procyon lotor*), otters, white-tailed deer (*Odocoileus virginianus*), toads, turtles, snakes, and butterflies (NDGF 2023a). Given the active power generation facility, coal and industrial operations, landfill, and the roadways adjacent to the proposed project site, species likely to occur in the proposed project area would be those acclimated to more developed environments.

3.6.1.2.1 Federally Listed Species

The ESA of 1973, 16 United States Code (U.S.C.) 1531 et seq., establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants, as well as the preservation of the supporting habitats and ecosystems. ESA Section 7 requires any federal agency authorizing, funding, or carrying out any action to confirm that the action is unlikely to jeopardize the long-term survival of any endangered or threatened species, or result in the destruction or adverse alteration of critical habitat of such species. Regulations implementing the ESA interagency consultation process are found in 50 CFR Part 402.

A review of the USFWS Information for Planning and Consultation (IPaC) system indicates five federally threatened or endangered species and one candidate species have the potential to occur within the project area based on known range and distribution. However, based on habitat requirements, the proposed project site does not support suitable habitat for any of these species. Table 3-17 summarizes these species, their habitat requirements, and their potential to occur in the project area (USFWS IPaC 2023a; NDGF 2015; Burns & McDonnell 2022). North Dakota does not have a state endangered or threatened species list; only those species listed under the ESA are considered threatened or endangered in North Dakota (NDGF 2021). Table 3-17 is not inclusive of all federally listed threatened or endangered species in North Dakota; only those with the potential to occur in the vicinity of the proposed project, per the IPaC system, are included.

Table 3-17: Federally Listed Species Potentially Occurring within the Project Area

Common Name	Scientific Name	Status	Potential to Occur within the Project Vicinity	Recommended Determination of Effect
Birds				
Piping plover	*Charadrius melodus*	T	Unlikely to occur; preferred habitat includes Alkali Lakes and Missouri River sandbars. The property site is an existing industrial site. Oliver County also contains critical habitat for the piping plover.	No Effect
Red knot	*Calidris cantus*	T	May occur; migrates through North Dakota in mid-May and mid-September to October in "extremely low numbers." Breeding and nesting habitat is marine, while Red Knots have been observed during migration in the Missouri River system, sewage lagoons, and large permanent freshwater wetlands.	Not Likely to Adversely Affect
Whooping crane	*Grus americana*	E	May occur; migrates through North Dakota in April to mid-May and September to early November, found along wetlands and ponds.	Not Likely to Adversely Affect
Mammals				
Northern Long-eared bat (NLEB)	*Myotis septentrionalis*	E	Unlikely to occur; hibernates in caves and mine shafts during the winter months, and roosts in wooded areas during the summer months.	No Effect
Insects				
Dakota skipper	*Hesperia dacotae*	T	May occur; preferred habitat of mixed-grass prairies dominated by bluestem, purple coneflower, and needlegrasses may exist within project area, and species has been documented in Oliver County.	Not Likely to Adversely Affect
Monarch butterfly	*Danaus plexippus*	C[a]	May occur; preferred habitat of prairies, meadows, grasslands, and right-of-way ditches along roadsides. Eggs laid on milkweed host plant (primarily Asclepias spp.).	Not Likely to Jeopardize

Source: USFWS IPaC 2023a, NDGF 2015

BGEPA = Bald and Golden Eagle Protection Act; E = Endangered; T = Threatened; C = Candidate Species

[a] Federal candidate species are not currently listed and consultation under the ESA is not required.

3.6.1.2.2 Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The USFWS has statutory authority and responsibility for enforcing the MBTA (16 U.S.C. 703-712). Most native bird species (birds naturally occurring in the United States) are protected under the MBTA, and the list of protected species is identified in 50 CFR 10.13, which is reviewed and updated regularly. MBTA species having the potential to occur in the project area are listed in Table 3-18 (USFWS IPaC 2023a).

Table 3-18: Migratory Bird Species Potentially Occurring in the Project Area

Common Name	Scientific Name	Status	Habitat
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, MBTA	Forested areas adjacent to large bodies of water, using select super-canopy roost trees that are open and accessible.
Bobolink	*Dolichonyz oryzivorus*	MBTA, Birds of Conservation Concern (BCC)	Grasslands, hayfields, and marshes with dense vegetation of grass, weeds, with low bushes.
Franklin's Gull	*Leucophaeus pipixcan*	MBTA, BCC	Prairie marshes with low vegetation density; prefers patchy areas with interspersed open water.
Golden Eagle	*Aquila chrysaetos*	BGEPA, MBTA	Open and semi-open prairies, woodlands, and barren areas; preference for hilly or mountainous regions.
Long-eared Owl	*Asio otus*	MBTA, BCC	Roosts in dense vegetation near open prairies and grasslands which are used for foraging.
Marbled Godwit	*Limosa fedoa*	MBTA, BCC	Species breeds in marshes and flooded plains, also found on mudflats and beaches during winter & migration.
Prairie Falcon	*Falco mexicanus*	MBTA, BCC	Prefers wide-open habitats, including prairies and agricultural fields. Also found in deserts and alpine meadows in the western United States.
Western grebe	*Aechmophorus occidentalis*	MBTA, BCC	Freshwater lakes and marshes with large open water areas surrounded by emergent vegetation. Nesting typically on floating vegetation well-hidden along shorelines.
Willet	*Tringa semipalmata*	MBTA, BCC	Nesting in grasslands and prairies near freshwater. Feeding on beaches, rocky coasts, mudflats, and marshes.

Source: USFWS IPaC 2023a, USFWS 2021

The bald eagle was officially removed from the federal threatened and endangered species list in 2007 but is still protected under the federal BGEPA as well as the MBTA. The BGEPA protects bald and golden eagles by prohibiting anyone without a permit issued by the Secretary of the Interior from "taking" a bald or golden eagle, including their parts, nests, or eggs (16 U.S.C. 668-668c).

The Fish and Wildlife Conservation Act, as amended in 1988, requires the USFWS to identify birds of conservation concern (BCC), which include species, subspecies, and populations of all migratory nongame birds that could become candidates for listing under the ESA if additional conservation actions are not taken (USFWS 2021). BCC species having the potential to occur in the project area are listed in Table 3-18.

There is a low occurrence potential for migratory bird species in the project area, given the current conditions and lack of vegetation communities and other habitat components at the site and the occurrences would be isolated to individuals briefly passing through the area.

3.6.1.2.3 Species of Conservation Priority

The state of North Dakota has developed a list of numerous avian, mammal, reptiles/amphibians, and fish Species of Conservation Priority (SCP) based on varying degrees of rarity, geographic range, breeding status, and other factors as part of its State Wildlife Action Plan (SWAP; NDGF 2015). Per the SWAP, the project would be located in the Missouri River System/Breaks Focus Area. While direct impacts to the aforementioned species groups would not be anticipated, indirect impacts associated with the proposed project could include increased construction-related noise, human presence, and the use of artificial lighting. These impacts already occur at the proposed project site in association with operation of the current MRY facility and would increase slightly under the Proposed Action. A discussion for SCP in the region surrounding MRY is provided below.

Birds

Bird species listed as key SCP in the Missouri River System/Breaks Focus Area are as follows: bald eagle, golden eagle, piping plover, red knot, least tern (*Sterna antillarum athalassos*), and red-headed woodpecker (*Melanerpes erythrocephalus*) (NDGF 2015). Many of the species have been previously discussed in Section 3.6.1.

The least tern was delisted in January 2021 (NDGF 2021). The species prefers sparsely vegetated sandbars or shoreline salt flats along the Missouri River System but was not noted to occur near Nelson Lake or Square Butte Creek (NDGF 2015). The Yellowstone River, Missouri River, Lake Sakakawea, and Lake Oahe are the only areas in the state where the species resides (NDGF 2015). Direct impacts to the least tern would not be expected as a result of project development.

The red-headed woodpecker is listed as a SCP species due to population decline and habitat destruction or degradation (NDGF 2015). The species has been found in deciduous woodlands, river bottoms, parks, shelterbelts, roadsides, agricultural areas, or in cities (NDGF 2015). Key areas for this species include the upper portion of the Little Missouri River, the lower Missouri River Valley, and the southern portion of the Red River Valley (NDGF 2015). Given the lack of key area presence in conjunction with the regularly occurring industrial activities, direct impacts to the red-headed woodpecker as a result of project development would not be expected.

Mammals

Mammal species listed as key SCP in the Missouri River System/Breaks Focus Area are as follows: river otter (*Lontra canadensis*), northern long-eared bat (*Myotis septentrionalis*), western small-footed bat (*Myotis ciliolabrum*), long-legged bat (*Macrophyllum macrophyllum*), long-eared bat (*Myotis evotis*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*) (NDGF 2015). The northern long-eared bat is federally listed as endangered and is included in Table 3-17.

The river otter is listed as a SCP species due to historic occurrences throughout North Dakota; however, the species is currently considered uncommon in the state (NDGF 2015). River otters inhabit wetlands and woodland riparian habitat within approximately 300 yards of a river or stream (NDGF 2015). Notably, habitats that retain open water are critical for providing food sources for the species. Key areas for the species include the Red River of the North (and associated tributaries); reports of occurrence in the

Missouri River have been noted, but no population has been identified as of 2015 (NDGF 2015). Direct impacts to the species from the project would not be anticipated.

Direct impacts to the western small-footed bat, long-legged bat, long-eared bat, little brown bat, and big brown bat are not anticipated. The western small-footed bat, long-legged bat, and long-eared bat species are considered rare in North Dakota, while the little brown bat and big brown bat are considered common residents (NDGF 2015). Although little brown bats and big brown bats are considered common residents, no potential bat roosting or foraging habitat exists within the project site or would be disturbed during construction or operation of the proposed project. Additionally, no hibernacula are present within the project site. Bats are a highly mobile species; however, mortality due to collisions with project-related vehicles or construction equipment would not be likely. Given the lack of suitable roosting and foraging habitat within the proposed project site, in conjunction with the industrial operations presently occurring at the site, impacts to SCP bat species would be unlikely.

Reptiles/Amphibians

Reptile and amphibian species listed as key SCP in the Missouri River System/Breaks Focus Area are as follows: smooth softshell turtle (*Apalone mutica*), spiny softshell turtle (*Apalone spinifera*), and false map turtle (*Graptemys pseudogeographica*) (NDGF 2015).

The smooth softshell turtle is listed as a year-round resident with a rare abundance in the state (NDGF 2015). The species has only been verified in the extreme lower portion of the Missouri River system, where a large river with sandy beaches or sandbars is present (NDGF 2015). The habitat alteration of the Missouri River has adversely impacted the species habitat, leading to only a handful of documented occurrences (NDGF 2015).

The spiny softshell turtle is listed as a year-round resident with a rare abundance in the state (NDGF 2015). The species has only been documented in the tributaries of the Missouri River below Garrison Dam and the head waters of Lake Oahe (NDGF 2015). Like the smooth softshell, the species prefers large rivers with sandy beaches or sandbars (NDGF 2015). The habitat alteration of the Missouri River has adversely impacted the species habitat, leading to only a marginal number of documented occurrences (NDGF 2015).

The false map turtle is listed as a year-round resident with a rare abundance in the state (NDGF 2015). Similar to the spiny softshell turtle, this species has only been documented in the tributaries of the Missouri River below Garrison Dam (NDGF 2015). Much of the habitat alternation in and surrounding the Missouri River has led to the habitat and population decline of the false map turtle (NDGF 2015).

Due to a lack of suitable riverine habitat in the proposed project area, it is unlikely that activities associated with the Proposed Action would have any impact on SCP turtle species.

Fish

Fish species listed as key SCP in the Missouri River System/Breaks Focus Area are as follows: sturgeon chub (*Macrhybopsis gelida*), sicklefin chub (*Macrhybopsis meeki*), northern redbelly dace (*Chrosomus* *eos*), flathead chub (*Platygobio gracilis*), blue sucker (*Cycleptus elongatus*), paddlefish (*Polyodon spathula*), pallid sturgeon (*Scaphirhynchus albus*), and burbot (*Lota lota*) (NDGF 2015).

Direct impacts to the sturgeon chub, sicklefin chub, northern redbelly dace, flathead chub, blue sucker, paddlefish, pallid sturgeon, and burbot would not be expected as a result of the proposed project. All of the aforementioned species are considered to be rare, uncommon, or declining in North Dakota (NDGF 2015). While the proposed project is near Nelson Lake and Square Butte Creek, no in-water work is proposed as a part of the site designs; therefore, it is unlikely that the project would impact SCP fish species. See Section 3.5 for additional information regarding water resources.

3.6.1.3 Vegetation

The project would be located across two Level IV ecoregions, the Missouri Plateau (43a) and the River Breaks (43c), within the Level III Ecoregion of the Northwestern Great Plains (Bryce, Omernik et. al 1996). The Northwestern Great Plains is a semiarid rolling plain in which native grasslands persist in areas of steep or broken topography, which has been largely replaced by spring wheat and alfalfa fields. Agriculture is primarily dryland farming and cattle grazing due to precipitation patterns and limited irrigation potential in the region. On the Missouri Plateau, the landscape is open and consists of shortgrass prairie. Much of the original soil and complex stream drainage patterns have been retained. The River Breaks were formed by broken terraces and uplands descending to the Missouri River in soft, easily erodible strata. The dissected topography, wooded draws, and uncultivated areas provide habitat for wildlife, and steep slopes restrict land use to rangeland and grazing.

The proposed project site consists of previously disturbed land used for general storage of coal and materials. Currently, the project site has been reclaimed and is largely unused, except for some material storage and the existing well pad. Vegetation in the areas adjacent to the project site consists of grasses within graveled areas; open grassy areas, and small sparingly wooded riparian areas near the reservoirs surrounding Nelson Lake. The proposed construction and laydown areas would be predominantly located in previously disturbed lands used for general MRY operations but several of the laydown areas would be located in hayed fields. Construction areas and laydown areas that would be temporarily affected would be restored to original conditions, except for the proposed overflow parking area.

3.6.2 Environmental Consequences

3.6.2.1 Aquatic

Erosion and transport of sediment due to construction (e.g., clearing, excavating, filling) could result in localized water quality degradation of Nelson Lake, Square Butte Creek, and adjacent reservoirs and tributaries. Sediment deposition into surface waters can increase turbidity that can adversely affect aquatic species. For example, high turbidity levels can affect fish gill function, blood sugar levels, and behavior (e.g., altered response to predation risk; Bash *et al.* 2001). Sediment deposition into surface waters also can increase pollutant and nutrient levels, which can result in excess phosphorous loading that can enhance algal growth and the availability of oxygen for aquatic organisms. The use of construction equipment also could result in accidental spills or leaks of petrochemicals (e.g., gasoline, hydraulic fluids) that could reach surface waters if not contained and cleaned up. These petrochemicals can be toxic to aquatic organisms and can affect the health and survival of these organisms and their habitats. However, direct and indirect impacts to aquatic species and their habitats would not be expected during project construction or operation. While there would be a potential for accidental spills or sediment to reach Nelson Lake, the use of engineering controls and BMPs would limit the likelihood of such an accident. All surface runoff and wastewater generated during construction and operations would be controlled, contained, and treated prior to any discharge to Nelson Lake per the SWPPP and NPDES permits. These discharges to Nelson Lake would be compliant with water quality standards and would not affect aquatic habitat conditions. Refer to Section 3.5.2.1, Surface Water, Surface Water Quality, and Floodplains, for additional details regarding potential impacts to water resources. No direct or indirect impacts to aquatic species and their habitats are anticipated as a result of the project.

3.6.2.2 Wildlife

The project would be required to undergo Section 7 consultation with the USFWS to ensure that the action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federally listed species are not anticipated to be present in the project area. On July 21, 2023 DOE sent a letter to the USFWS stating it has determined that the project would have *no effect* or *may affect, but is not likely to adversely affect* the federally listed species with potential to occur in the project area. As of the issuance of this EA, the USFWS has not identified any concerns.

As identified in Table 3-18, migratory bird species have the potential to occur in the vicinity of the project. However, due to the lack of suitable nesting and foraging habitat within the project area, no direct impacts to migratory birds would be expected to occur. Mortality due to vehicular collisions with project-related vehicles or construction equipment would not be likely, and all hazardous materials and wastes would be stored and disposed of in accordance with Minnkota's standard operating health and safety procedures.

Indirect impacts could occur to migratory bird species residing in habitats adjacent to the project site due to increased noise, fugitive dust, and human presence associated with construction activities. This could result in habitat loss as a result of an avoidance response to an area greater than the project footprint; however, human presence and noise currently exist in the project area and would increase only slightly under the Proposed Action. Impacts to migratory birds would be short term and would not result in population-level impacts.

Based on a general lack of suitable habitat in the proposed project area, the project is unlikely to have direct or indirect long-term impacts on SCP. Indirect and temporary impacts, if any, would be similar to those described for migratory birds.

3.6.2.3 Vegetation

The proposed project area consists of reclaimed lands and is largely unused, except for minor amounts of material storage and the presence of the existing well pad. Laydown areas are primarily sited in reclaimed lands with the exception of two hayed fields. Vegetation in the areas adjacent to the proposed project and laydown areas do not contain any sensitive plant communities or sensitive habitats; therefore, impacts would not occur to vegetation communities or special status plant species from the Proposed Action.

3.7 Health and Safety

3.7.1 Affected Environment

The affected environment for health and safety includes the proposed project construction and operations personnel, Minnkota employees at MRY, as well as members of the public that could be potentially exposed to health and safety impacts of the proposed project. Construction personnel would be at higher risk than the general public during the construction period of the project; however, these increased human safety hazards are temporary.

Peak labor force is anticipated to be approximately 600 to 700 persons during project construction of various trades and assignments, plus project management and administrative personnel (see Section 3.13.2 for more information). Construction workers on site could be exposed to workplace hazards and health and safety impacts during proposed project construction and during project decommissioning after the end of proposed project operations.

Minnkota has indicated that there would be operations personnel on site 24 hours per day for operation of the project. Operations workers also would be involved in overseeing deliveries, materials management, and waste management activities, and could potentially be exposed to workplace hazards and health and safety impacts during project operations.

3.7.2 Environmental Consequences

Construction and operation of the proposed project would result in the potential for health and safety impacts to the personnel associated with construction, operations, and decommissioning; Minnkota employees; and members of the public. Potential health and safety impacts to project construction and operations personnel would include workplace (occupational) injuries during construction, operation, and decommissioning including those related to operation of mechanical and electrical equipment; fall hazards; vehicle accidents; and potential occupational exposure to hazardous materials from transport, storage, and use of process chemicals (including diesel fuel, gasoline, lubricating oils, hydraulic fluid, paints, solvents, or other corrosive, flammable, or toxic chemicals).

Human health and safety hazards would be mitigated by complying with applicable federal and state occupational safety and health standards, National Electric Safety Code regulations, and utility design and safety standards. Minnkota personnel and contractors would perform activities according to Minnkota's standard operating health and safety procedures. Prior to beginning work each day, an Authorization to Work, Pre-Task Analysis form would be prepared and discussed. Heavy equipment would be up to Occupational Safety and Health Administration (OSHA) safety standards and personal safety equipment would be required for all workers on site. Any accidents or incidents would be reported to the designated safety officer.

The construction site would be managed to reduce risks to the general public, who would not be allowed to enter any construction areas within the project site. The highest risk to the general public would be from increased traffic volume on the roadways near or adjacent to the project as a result of commuting construction workers and transportation of equipment and materials. These impacts would be both temporary during construction and minimal during long-term daily operation of the project. No residences, businesses, or other structures are located in proximity to the project. Based on these measures, it is not anticipated that the project would create additional demands on human health services or the safety of the local community.

Minnkota maintains current safety and environmental programs which would be complied with during project design and construction. The project and all connected systems to MRY would utilize hazard and operability (HAZOP) studies to ensure that the system operational hazards have been mitigated. As part of the HAZOP, a flue gas transient analyses would be performed on the existing MRY Units 1 and 2, as integrated with the carbon capture facility, to account for any potential risk to system operation. All piping, vessels, tanks, and containments would be evaluated to ensure that the materials of construction are compatible.

Minnkota would conduct Process Safety Reviews of proposed project systems at five distinct stages to identify and mitigate potential hazards. The five stages are (1) project initiation and definition; (2) project award/start; (3) design; (4) construction; and (5) plant operations. Each Process Safety Review would review a series of checklists including safety and environment, technology/design, and plant controls and shut down. Minnkota relies on the Oliver County Fire Department to respond to all but minor fires at the facilities. It is anticipated that the proposed project would follow the same fire response plan as is in place for MRY.

Operation of the proposed project would involve use of hazardous and non-hazardous commercial chemical products. Operation of the proposed project would use amine solvent as a process fluid to capture the CO_2 from the power plant flue gas. Fresh (unused) amine solvent would be delivered to the site by truck prior to commencement of operation and stored in aboveground storage tanks. Any solvent wastes generated as a result of solvent reclamation would be safely stored for off-site disposal. Transport, storage, and handling of fresh and spent amine solvent would be conducted in accordance with solvent handling guidance developed by the solvent supplier.

All storage tanks associated with the project would be located within secondary containment systems, and piping systems would be designed to reduce the potential for a pollutant discharge. All chemicals used for the carbon capture process would be stored in storage tanks within the boundaries of the MRY facility. Operation of the project would involve the use of low-pressure steam and capture of CO_2; releases of which to the workplace environment could result in potential occupational health and safety hazards.

The capture process would be designed with appropriate industry standards to provide safe project operation. These design standards would reduce the potential for unplanned releases from process equipment and storage tanks. Safety relief values and/or overflow lines would be designed in accordance with applicable standards for storage vessels and equipment. Safety relief valves would only operate in the event of process vessel mechanical failure and would not open during routine operation of the carbon capture facility. Process instrumentation design would include safety-instrumented systems, flow restriction and safety interlocks, automatic safe-shutdown capability, and emergency power supply to maintain process safety and reduce the potential for unplanned incidents.

All project-related construction personnel and operations personnel would receive training in areas relevant to construction and operational safety and their job requirements including Hazard Communication/Right-to-Know, Hazardous Materials Management/Chemical Hygiene, Job Safety Assessment, and Hazardous and Solid Waste Management. Construction and operations personnel would use personal protective equipment appropriate for their work activities in accordance with Minnkota's project safety requirements. The project would be equipped with eye wash stations and emergency showers for response to chemical exposure from amine solvent and from handling of other hazardous materials.

3.8 Solid and Hazardous Waste

3.8.1 Affected Environment

The affected environment for solid and hazardous waste includes onsite areas within MRY in which solid and hazardous wastes would be generated and stored. Solid and hazardous wastes generated from project construction, operation, and decommissioning would be transported and disposed of appropriately in accordance with applicable regulations depending on the generated waste.

MRY generates non-hazardous solid wastes and is a very small quantity generator of hazardous wastes from its existing power plant operations. Wastes produced include coal combustion solids, spent solvents, waste oil, municipal solid waste, and non-hazardous and hazardous wastes. Minnkota maintains non-hazardous solid waste landfills adjacent to the MRY. Municipal solid waste from MRY is transported off-site to local municipal solid waste landfills for disposal. Other non-hazardous wastes are disposed of in on-site landfills.

3.8.2 Environmental Consequences

Adverse environmental impacts associated with construction and operation of the project would not be likely with the proper management of solid and hazardous wastes.

Construction of the proposed project would generate non-hazardous waste such as construction debris and scrap metal. Waste such as spent solvents and used oils resulting from construction activities may also be generated. All waste, both hazardous and non-hazardous, would be managed pursuant to federal and state environmental regulations. Stormwater generated from the construction site would be managed as specified in the project SWPPP.

New operational waste streams would be generated due to the carbon capture facility processes. All new waste streams would be profiled and either sent offsite to be disposed of by properly licensed disposal providers or disposed of in the MRY landfill in accordance with the landfill's permits. Hazardous waste would not be expected from any of the new waste streams, but if a waste was determined to be hazardous it would be disposed of in accordance with state and federal regulations.

The CO_2 capture process would use a proprietary amine solvent formulation to separate CO_2 from flue gas. The process includes both a solvent reclamation process and a filtering process that would produce waste streams. The waste streams are comprised of heat stable salts, nonvolatile solvent degradation products, unrecovered solvent, acid wash, reclaimed waste, precoat filter, water treatment waste, and cooling tower blowdown. The MHI process generates non-hazardous wastewater which would be injected into the Class I well(s).

3.9 Infrastructure and Utilities

3.9.1 Affected Environment

The affected environment for infrastructure and utilities includes the existing utility infrastructure at MRY and the existing production of electricity, water, and steam at the MRY Station. MRY includes two coal-fired steam turbine electric generators (with a total rating of 705 MWg). Minnkota produces electricity as a public utility and consumes electricity and water in operating its electric power generation equipment. MRY generates wastewater that is treated in a Minnkota wastewater treatment plant and subsequently discharged under a NPDES permit. MRY power plant flue gas desulfurization system effluent is indirectly discharged to a permitted pond immediately south of MRY and the proposed project.

3.9.2 Environmental Consequences

3.9.2.1 Water and Wastewater

The project would also include the construction and use of two Class I injection wells to dispose of excess process wastewater generated by the carbon capture facility. The first Class I well would be located at the injection site (Figure 2-2). The second Class I well would be installed approximately 300 feet northwest of the first well near the northwest corner of the existing injection site well pad (Figure 2-2). The Class I well(s) would enable the project to be a zero liquid discharge (ZLD) project during operation. Injectate water would be primarily a mixture of existing scrubber pond water and proposed combined wastewater from the carbon capture facility. The carbon capture process is not yet operational, so the exact chemistry of the injectate is unknown. The chemistry of the proposed combined wastewater from the carbon capture facility is based on modeling. However, chemical compositions of the proposed injectate waste streams indicate that the two primary wastewaters (scrubber pond water and combined wastewater from the carbon capture facility) and native waters in the proposed injection interval (formation water) are sodium sulfate ($NaSO_4$) dominant. Geochemical mixing model results are summarized in Table 3-19 (WSP, 2024). For modeling scenarios in which the estimated saturation indices are greater than 0.5, there is a potential risk of mineral scaling (precipitation) within the injection zone. This mineral scaling risk may be mitigated through proactive chemical additives to the injectate (e.g., pH adjustment, antiscalants) and/or through periodic well/reservoir maintenance activities. Additional information on injectate composition can be found in Appendix H, Class I (Non-hazardous) Injection Well Permit.[7] The injectate compatibility evaluation may be updated once the carbon capture facility is operational and representative wastewater can be sampled.

Table 3-19: Mixing Model Results for the Geomean of Formation Waters with Added Carbon Dioxide and Scrubber Pond Water

Sample Type		Mixture (Cell 4 Max TDS:Formation Water with added CO_2)										
Sample Name (Ratio of Injectate to Formation Water)		100:0	90:10	80:20	70:30	60:40	50:50	40:60	30:70	20:80	10:90	0:100
Pressure (pounds per square inch)		2,400										
Temperature (degrees Celsius)		50										
MINERAL PHASES - Saturation Indices												
Anhydrite	$CaSO_4$	-0.2	-0.3	-0.3	-0.3	-0.4	-0.5	-0.6	-0.7	-0.8	-1.1	-1.7
Gypsum	$CaSO_4{:}2H_2O$	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.5	-0.6	-0.7	-1.0	-1.6
Barite	$BaSO_4$	**0.8**	**0.8**	**0.9**	**0.9**	**1.0**	**1.1**	**1.1**	**1.2**	**1.3**	**1.4**	**1.4**
Calcite	$CaCO_3$	-0.7	-0.7	-0.7	-0.6	-0.6	-0.6	-0.5	-0.5	-0.4	-0.3	0.0
Magnesite	$MgCO_3$	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	-1.3
Halite	NaCl	-3.4	-3.5	-3.6	-3.7	-3.7	-3.9	-4.0	-4.1	-4.3	-4.5	-4.8

Notes:
Saturation indices below -0.5 indicate undersaturation
Saturation indices between -0.5 and 0.5 indicate equilibrium and are identified by light grey shading
Saturation indices greater than 0.5 indicate oversaturation and are identified by bold type and dark grey shading

Low-pressure steam, cooling water, and other utilities would be provided to the project by MRY through direct connections to MRY electrical, steam, and process water, systems. The project would utilize the local rural water utility for potable water service. Various utilities, per the final project financial arrangements, would be directly metered by MRY.

Approximately 4,000 gpm of cooling water would be required for operating the project. Cooling water would be recycled through the project wastewater treatment system to the degree possible to minimize system makeup, and a portion would ultimately be disposed of in the Class 1 wells.

Potable water would be used for sanitary purposes, cooking, and eyewash stations at the proposed project. Potable water consumption would be less than 5 gpm (1.1 cubic meters per hour). Amine solvent would be supplied to the project already pre-mixed with water and therefore a large volume of fill water would not be needed for the amine solvent storage tank.

Low-pressure steam at a maximum operating pressure of 155 pounds per square inch gauge (psig) (770 °F) would be supplied by MRY for use in the capture process. Steam condensate would be returned from the project to MRY.

Demineralized water as required for the capture island equipment would be provided by MRY from the existing MRY water treatment system.

Wastewater streams resulting from operation of the project include both continuous and discontinuous flow. Continuous flow would result from condensate from the quencher flue gas treatment process which would be collected and re-used in the project cooling water system. Discontinuous flow results would be liquid waste from process water containing trace amine solvent concentrations; liquids from cleaning/flushing process equipment during maintenance activities; and stormwater runoff from the site.

[7] A revised Class I (Non-hazardous) Injection Well Permit will be included with the Final EA.

Once final quencher wastewater concentration values are determined, the proposed project would proceed with final wastewater design, co-disposing of it in permitted facilities with flue gas desulfurization waste streams from the MRY flue gas desulfurization scrubbers.

Liquids that would intermittently be generated from maintenance activities may not be acceptable for treatment in MRY's wastewater treatment plant. Any liquids generated would be monitored and liquids that are not acceptable for treatment in MRY's wastewater treatment plant would be either re-used, treated on site, or disposed of offsite in licensed treatment and disposal facilities. Stormwater from the project that is found to be contaminated also would be either treated on site or disposed of offsite in licensed facilities. Any water that contains amine solvent will be captured and re-used in the process. The project is ZLD, no process wastewater will be allowed to enter the MRY NPDES outfalls.

3.9.2.2 Stormwater

Captured and diverted uncontaminated stormwater from the project would be handled, treated, and discharged by Minnkota under its existing NPDES permit. No modification to the MRY Industrial NPDES permit (ND-000370, NDR05-0012) would be needed for management of uncontaminated stormwater from the project, except for potentially modifying the outfall descriptions to include project process areas.

A new construction stormwater permit (General Permit for Stormwater Discharges Associated with Construction Activities [NDR11-0000]) would be required for the project, as proposed ground-disturbing activities exceed 1.0 acre. Minnkota and or its contractors would comply with the federal NPDES and state stormwater regulations for construction activities, receiving coverage prior to initiating any ground-disturbing activities.

3.9.2.3 Electricity

Electricity needed to operate the project would be supplied by Minnkota through a direct connection to the MRY 230 kV transmission electrical system.

3.9.2.4 Natural Gas

Not applicable; the proposed project would not be supplied with or consume natural gas.

3.10 Land Use

3.10.1 Affected Environment

The project would source lands within the industrial footprint of the MRY under the ownership of Minnkota, including adjacent lands used as temporary construction and laydown areas. The carbon capture facilities would occupy 25.8 acres of land in the southwest portion of the MRY property (Figure 2-2). An additional 10 construction and laydown areas would serve various construction needs including parking, construction trailers, material storage and fabrication, and other activities to support the influx of workers and project construction activities. Approximately 97.0 acres of land would be required for temporary construction and laydown areas within the Minnkota-owned property. Following construction, the construction and laydown areas would be restored to original conditions, with the exception of an approximately 7.0-acre area that would be retained for overflow parking for MRY and project operations.

There are four existing 230 kV transmission lines that cross the MRY property. MRY is accessed via 24th Street SW. The MRY station is located on the southern end of Nelson Lake in central Oliver County, North Dakota. Oliver County does not provide publicly available mapping information on their zoning and land use designations. Land cover in Oliver County near the project is largely a mix of herbaceous areas and cultivated crops, with small areas of forest, hay/pasture, and open water (USGS 2019). Current land use in and around the area includes industrial activities associated with power generation and coal mining. Land uses in the temporary construction areas are predominantly reclaimed industrial lands with some areas under active hay production. Hay production would be temporarily ceased during construction; lands would eventually be reclaimed post-construction unless otherwise requested by the landowner. No isolated rural homes are near the proposed project. The highest concentration of homes in the area occurs in the city of Center, located approximately 4.5 miles northwest of the proposed project.

3.10.2 Environmental Consequences

Anticipated land use impacts from the project would be minor. With the exception of the deep subsurface monitoring well (classified as agricultural land, but on Minnkota-owned property), all aboveground infrastructure would be located within an existing industrial footprint that is large enough to accommodate the carbon capture facility. Construction of the project would result in the permanent disturbance of approximately 25.8 acres of land within the MRY property to accommodate the project facilities. Additionally, approximately 97.0 acres of land would be required for temporary construction and laydown areas. Following construction, the construction and laydown areas would be restored to original conditions, with the exception of an approximately 7.0-acre area that would be retained for overflow parking for MRY and project operations. The project would be consistent with current land uses and would not conflict with surrounding land uses. The project would require the relocation of two 230-kV transmission lines within the MRY property as well as a buried distribution line and a local overhead distribution line. After construction is complete, disturbed areas would be stabilized as appropriate in accordance with applicable construction and stormwater approvals. As a result, additional erosion during operation of the project would be minimal or avoided.

There is no publicly available Comprehensive Plan for Oliver County, and the County is not a part of a Metropolitan Planning Organization or Council of Governments. The new aboveground infrastructure would be located within the existing industrial footprint of the MRY on Minnkota-owned property in Oliver County. This would avoid potential impacts to farmland, scenic views, and environmental features. Following decommissioning of the project, lands affected by the project would be restored to the original condition.

3.11 Visual Resources

3.11.1 Affected Environment

The affected environment for visual resources would include the current view of the proposed project site, which is an existing power plant in a generally rural landscape in central North Dakota. The project would be an addition to the power plant site and therefore is in character with the existing viewshed. No tribally sensitive or other scenic vistas have been identified in the proposed project area (Burns & McDonnell 2022).

The Sakakawea Scenic Byway is located more than 18 miles north of the project area and is adjacent to the Missouri River. It follows Highway 200A from Washburn to Stanton. Approximately 72 miles south of the project areas is Standing Rock National Native America Scenic Byway, which is situated at the Cannonball River in Fort Yates following Highways 1806 and 24 to the South Dakota state line. On the western side of the project area is Old Red Old Ten Scenic Byway beginning at the Mandan Depot in Mandan, North Dakota, and generally extending west along Old Highway 10 to Dickinson, North Dakota.

The area surrounding the MRY is generally undeveloped grassland/herbaceous areas and cultivated crops. The existing MRY facility is a developed, industrial area that is visible from surrounding roads, including Highway 25 to the north. Existing security and safety lighting at the facilities create a visual contrast at night.

3.11.2 Environmental Consequences

Construction of the project would introduce additional permanent structures to the existing environment; however, the dominant visual features would still be the existing facilities associated with MRY, particularly the exhaust stacks. New equipment at the site would be below this height. The new facilities would be visible to landowners and community residents who live and travel near the project site. The project would not present a change to the visual landscape out of character with the existing and adjacent MRY. Lighting is currently in place at the MRY. The project would include additional lighting for maintenance, access, and egress in and around the new equipment as necessary. Some temporary lighting would also be installed to support construction activities. Other short- and long-term visual impacts associated with project construction and operation would include increased human activity and associated vehicles and equipment within the project area and the surrounding vicinity.

As noted previously, there are several designated Scenic Byways within North Dakota. Based on their distance from the project, it is anticipated that no scenic byways would be affected by the proposed project.

The preliminary design of the proposed cooling tower would be evaluated using the SACTI2 model to determine the potential impact of plume fogging and rime ice formation, as well as mineral deposition and elevated visible plumes. The purpose of the analysis is to determine what impacts the cooling tower would have on the surrounding area. Minnkota anticipates using five years of site-representative hourly meteorological data to determine plume impacts.

3.12 Cultural and Paleontological Resources

3.12.1 Affected Environment

The project area has been used by pre-tribal and tribal occupants for approximately 13,500 years. The earliest population of the area is the Clovis complex which is indicated by a distinct style of large, lanceolate spear points and other well-made stone tools of high-quality materials (Stanford 1999). Clovis artifacts are usually found in association with mammoth or other large megafaunal kill and butchering sites. These are usually found in grasslands and parklands adjacent to large natural lakes and major rivers. The Clovis complex is followed by the Folsom in which the emphasis on hunting changes from the megafauna, which was dying out, to bison (Bonnichesen and Turnmire 1999). The Folsom Culture spanned 1,700 years from 11,900 to 10,200 Before Present (BP). The artifact tool kit differed from Clovis by the use of smaller fluted or unfluted projectile points. Together with large kill sites of the large *Bison occidentalis*, these points are diagnostic of the Folsom Complex. The Folsom sites are usually found in riverine or lake environments.

The Paleoindian period is followed by the Plains Archaic Period, which breaks down into the Early Plains Archaic (7,500 to 5,000 BP), Middle Plains Archaic (5,000 to 3,000 BP), and Late Plains Archaic (3,000 to 2,500 BP) sub-periods. An extended episode of drought called the Altithermal took place during the Early Plains Archaic sub-period causing a reduction in biomass. Few sites from the Early Archaic sub-period have been dated because a decrease in game herds and other mammals triggered a depopulation of the area. During the Plains Middle Archaic sub-period, the drought ended and a cooling trend with rises in moisture levels produced an improvement in the climate. With the return of the vegetation, the bison herds grew, and the human populations rebounded as nomadic hunter/gathers that followed the bison herds. Sometime during this period, the atlatl came into use (Frison and Mainfort 1996). The Plains Late Archaic sub-period continued the hunting/gathering ways of life with the origins of regionalized projectile points styles, a decline of point knapping skills, and a reduction in the interaction between geographic areas and cultural groups (Frison 1991).

Plains Village Culture (2,000 to 220 BP) introduced horticulture within the Northern Great Plains. These inhabitants were semi-sedentary and lived in earth-lodge villages. These villages are usually found on low bluffs just above the riparian floodplains. At the same time, there were several nomadic cultures with a patterned subsistence that depended primarily upon hunting and procurement of the modern bison (*B. bison*). This is a period of increasing interaction between the tribes and Euro-Americans that were entering the area. Of all trade items, it was the introduction of the horse which had the greatest impact on native cultures (McNees and Lowe 1999; Ruebelmann 1983). The adoption of the horse caused a social upheaval and resulted in various degrees of consolidation, political realignment, and tension between the various Plains tribes. Horses also were a sign of wealth, used as pack animals for the transportation of shelters, were employed as cavalry, and they served, if necessary, as food (Ewers 1980). The horse offered an increased mobility that freed former hunter-gatherer groups from pedestrian transhumance required for the exploitation of various plant and animal resources located across the landscape. Larger winter villages in lowland areas were a direct result of this mobility (Ruebelmann 1983).

As part of the NEPA process, DOE is consulting with the North Dakota State Historical Society, State Historic Preservation Office (SHPO) and the following federally recognized tribes in the project area: Apache Tribe of Oklahoma; Fort Belknap Indian Community of the Fort Belknap Reservation of Montana; and Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota.

3.12.2 Environmental Consequences

A small number of sites, primarily lithic scatters, have been recorded within the footprint of the MRY at Nelson Lake. No significant known cultural resources sites are present on the MRY in the area for the proposed project facilities. No National Register of Historic Places (NRHP) listed historic resources are located in the proposed project site or surrounding region (National Park Service [NPS] 2023). Even if previously present, the development of this area over the years has likely compromised the integrity of any cultural and/or paleontological sites and they are likely no longer viable for information.

In the event of an inadvertent discovery of cultural or human remains during construction and/or operations, work would halt in the immediate area, the resource would be secured and protected, and the appropriate Minnkota and agency personnel would be notified in accordance with the procedures outlined in the Unanticipated Discoveries Plan (UDP) in Appendix I. The work would be allowed to resume after appropriate investigations are completed and clearance to resume activities is received from Minnkota's environmental specialist and the appropriate agency personnel as described in the UDP.

The temporary construction and laydown areas were evaluated for architectural and cultural significance pursuant to Section 106 of the National Historic Preservation Act. A Class III Intensive Cultural Resource Inventory was completed of the laydown areas and additional workspaces in August 2023 in accordance with the *North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects* (SHPO 2020). The cultural report was provided to SHPO for review and concurrence. On June 28, 2024, SHPO concurred with a determination of "No Historic Properties Affected" for the project provided identified sites are avoided and the project takes place as described in the documentation provided to SHPO (see Appendix C).

3.13 Socioeconomic Conditions

The project would be located within Oliver County in North Dakota. The project could contribute to socioeconomic activity in nearby Morton, Burleigh, and McLean Counties. Population and employment data for local, state, and national jurisdictions were pulled from publicly available sources.

3.13.1 Affected Environment

The proposed project site is in Oliver County, North Dakota, roughly 4.5 miles southeast of the city of Center. Table 3-20 below illustrates the demographic information in Center, Oliver County, North Dakota, and the United States (U.S. Census Bureau [USCB] 2022; USCB 2021).

Table 3-20: Demographic and Economic Information 2020

	City of Center	Oliver County	North Dakota	United States
Total Population	588	1,877	779,094	331,499,281
Percent of population under 18 years of age	34.5	24.6	23.6	22.1
Percent of population over 65 years of age	25.6	23.7	16.1	16.8
Percent of population identifying as Caucasian, non-Hispanic	98.5	93.6	83.2	59.3
Percent of population identifying as African American	0.3	0.5	3.5	13.6
Percent of population in civil labor force	45.0	57.8	68.5	63.1
Percent of population in poverty	21.5	11.1	11.1	11.6

As depicted in Table 3-20, the city of Center has similar demographic characteristics to Oliver County. Center has slightly higher non-participation in the civil labor force and people in poverty, as well as a larger percentage of people under the age of 18. Oliver County has minimal differences in these demographics to the state of North Dakota, with the exception of an older population with less participation in the civil labor force. North Dakota has a higher percent of population identifying as Caucasian, non-Hispanic and a lesser percent of the population identifying as African American in comparison to the overall United States (USCB 2021, USCB 2022).

The agricultural industry employs the largest percentage of people in Oliver County (14.4 percent), followed by construction (11.1 percent), healthcare (9.0 percent), and retail (8.1 percent) (Burns & McDonnell 2022). Oil & gas (6.3 percent), education (5.8 percent), and transportation & warehousing (4.4 percent) employ higher percentages of the working population than other services such as food services and manufacturing, which are less than 3 percent (Data USA, 2021). Other industries employ 36.3 percent of the Oliver County population.

3.13.2 Environmental Consequences

Construction and operation of the project would generate socioeconomic activity in Oliver County and potentially surrounding counties. Construction of the project would temporarily elevate the need for additional workers in construction trades such as electricians, welders, laborers, and carpenters. Length of employment would range from a few weeks to several months, depending on skill and or specialty with the given work needs. Most construction contractors and workers would temporarily relocate to the project area as construction of the project would require a specialized workforce. Peak labor force is anticipated to be approximately 600 to 700 persons during project construction of various trades and assignments, plus project management and administrative personnel. Construction contractors would use local labor to the extent practicable. A small number of local construction workers could be hired for more general activities such as clearing, grading, and earthwork. However, due to the specialized nature of services required and the limited workforce in the area, it is anticipated that much of the construction workforce would come from outside the region. Gas stations, convenience stores, restaurants, hotels, campgrounds, and retail shops in communities such as Center and the Bismarck area could experience temporary and minimal increases in business during the construction period in response to activity from construction workers. In addition to services directly related to workers, services related to the construction of the project would also benefit. Expenditures made for equipment, fuel, building supplies (concrete, lumber, general hardware), operating supplies, and other products and services obtained locally would benefit businesses in the counties and the state. Local material suppliers, mechanics, and business support services would benefit most from construction.

There would be short-term and minimal impacts on local housing. Many of the construction workers would seek temporary housing for varying time periods based on their individual roles in the project. Generally, housing options for construction crews would consist of area hotels, existing crew camps, or RV camps. Arrangement for longer-term housing could be established by the construction contractor, with crews rotating in and out as their assignments commence and complete. It is anticipated that there would be an adequate supply of temporary housing units available in the region for use by construction workers relocating on a temporary basis due to the relatively low number of workers necessary compared to the overall workforce in the counties and the continued development of housing capacity in the area. Temporary housing would be required during the approximately two years of construction and commissioning, after which demand from the project would end and lodging used would be available for other needs.

Local governments could also experience short- and long-term benefits from sales tax revenue collected during construction of the proposed project. Once the project is completed, only minimal property taxes would be collected, pursuant to State law. Property owners may benefit from payments for required right-of-way easements associated with use of pore space for the geologic storage of CO_2.

The project would require approximately 22 permanent employees for operation, maintenance, and supervision of the project. Additional local services would likely occur during project operations as part of maintenance and repair. A short-term temporary influx of workers could also occur during scheduled outages and maintenance, resulting in minor upticks in requirements for lodging and other local services. These staff levels would stimulate minimal economic growth in the area and provide minimal new permanent job opportunities within Oliver County and the surrounding counties. These employment opportunities would not result in a noticeable increase in new permanent residents. Therefore, impacts on the job market, permanent resident population, and overall socioeconomic status of the counties from the project would be minimal.

3.14 Noise

3.14.1 Affected Environment

The primary existing noise sources at this location are activities occurring at the existing MRY, and include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, public address systems, and construction and materials-handling equipment). Other sources of noise include neighboring industrial facilities, occasional traffic on nearby roadways, and agricultural activities in the surrounding areas. The MRY location is nearly 2 miles from the nearest noise sensitive receivers (residences). The closest business is the Square Butte Creek Golf Course, located approximately one mile northwest of MRY. Center, North Dakota is located approximately 4.5 miles northwest of MRY. Once operational, the project would not be likely to adversely alter the level of noise beyond the levels currently produced by existing activities at MRY.

Neither Oliver County nor North Dakota have established noise regulations. To prevent activity interference or annoyance, EPA guidelines recommend an average day-night level of 55 decibels or less (EPA 1974).

3.14.2 Environmental Consequences

The project would include noise sources similar to the existing MRY facility. The project's major noise sources would include the cooling tower, the electrical substation, the boiler, emissions control equipment, and compressors. The noise generated by this equipment would increase noise levels on the project site, particularly in areas near the new equipment and facilities. However, with the equipment being similar in nature and operation to the existing MRY facility noise-emitting equipment, sound levels offsite would be expected to remain similar to the existing environment. Sound levels generated by the project would attenuate significantly over the 2-mile distance to the nearest noise sensitive receptors, and at that distance the project noise contribution would be indistinguishable from the existing MRY facility noise. No distinguishing noise characteristics would increase during operation of the proposed project.

3.15 Environmental Justice

3.15.1 Affected Environment

Under EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," federal agencies are responsible for identifying and addressing the possibility of disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. Minority populations refer to persons of any race self-designated as Asian, Black, Native American, or Hispanic. Low-income populations refer to households with incomes below the federal poverty thresholds.

Environmental justice concerns the environmental impacts that proposed actions may have on minority and low-income populations, and whether such impacts are disproportionate to those on the population as a whole in the potentially affected area. The threshold used for identifying minority populations surrounding specific sites was developed consistent with CEQ guidance (CEQ 1997, Section 1-1) for identifying minority populations using either the 50-percent threshold or another percentage deemed "meaningfully greater" than the percentage of minority individuals in the general population. CEQ guidance does not provide a numerical definition of the term "meaningfully greater." CEQ guidance was supplemented using the Community Guide to Environmental Justice and NEPA Methods (EJ IWG 2019) and provides guidance using “meaningfully greater” analysis. For this analysis, meaningfully greater is defined as 20 percentage points above the population percentage in the general population.

The significance thresholds for environmental justice concerns were established at the state level. The average minority population percentage in North Dakota is 15.3-percent (USCB 2022). Comparatively, a meaningfully greater minority or low-income population percentage relative to the general population of the state would exceed an 18.36-percent threshold. Therefore, the lower threshold of 18.36 percent is used to identify areas with meaningfully greater minority populations surrounding the project. Meaningfully greater low-income populations are identified using the same methodology described above for identification of minority populations. The average in-poverty population percentage in North Dakota is 11.1 percent (USCB 2022). Comparatively, a meaningfully greater low-income population percentage using this value would be 20 percentage points greater than the state low-income population (i.e., 13.32 percent).

Oliver County has a larger percentage of Caucasian, non-Hispanic peoples (93.6 percent) in comparison to North Dakota (83.2 percent; USCB 2022). Oliver County has the same percentage of people in poverty as North Dakota (11.1 percent; USCB 2022). The City of Center has a larger percentage of Caucasian, non-Hispanic peoples (98.5 percent) and a larger percentage of peoples living in poverty (21.5 percent; USCB 2022). Based on calculations for "significance" using CEQ guidance, the City of Center would exceed the significance threshold (13.32 percent) for in-poverty populations. However, additional data were referenced from the CEQ’s Climate and Economic Justice Screening Tool (CJEST) and the EPA’s EJScreen tool. These tools detail potential burdens within affected communities. To be considered a disadvantaged community, a census tract must rank in the 80th percentile of the cumulative sum of 36 burden indicators and have at least 30 percent of households classified as low-income. According to CJEST, the City of Center is not considered a community that is economically disadvantaged.

3.15.2 Environmental Consequences

Environmental impacts from most projects tend to be highly concentrated at the actual project site and are nearly non-existent as distance from the project site is increased. The geologic storage of CO_2 would lead to a wider spread of impacts to a larger number of people in Oliver County. During project construction and operation, it is anticipated that environmental, health, and occupational safety impacts would be minimal, temporary, and confined to the project area. Based on the impacts analysis for resource areas, no adverse effects would be expected from project construction or operation. It is expected that any impacts would affect all populations in the area equally. There would be no discernable adverse impacts to any populations, land uses, visual resources, noise, water, air quality, geology and soils, ecological resources, socioeconomic resources, or cultural resources that would cumulatively impact environmental justice. In the long term, as DOE modernizes carbon capture facilities in the United States, the expected releases of CO_2 into the environment would be reduced, thus further reducing potential impacts to the environment and any low-income and minority populations.

According to CJEST, Center is not considered a community that is economically disadvantaged or overburdened by pollution. It is not anticipated that Center would experience high adverse health or environmental effects from air emissions associated with the MRY facility or project. The project would be constructed and operated in a manner consistent with environmental justice considerations. Additionally, it would have positive socioeconomic effects on minority and economically disadvantaged populations, as well as the general population in the socioeconomic impact area because it would generate new temporary and permanent jobs and economic activity while reducing air pollutant emissions in the local community. See Section K.4.6 of Appendix K for more detailed information.

3.16 Resource Areas Dismissed from Further Review

All resources areas were included as a part of the DOE EA review and submittal.

3.17 Cumulative Impacts

As defined by CEQ, cumulative effects are those that "result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, without regard to the agency (federal or non-federal) or individual who undertakes such other actions" (40 CFR 1508.7). Cumulative effects analysis captures the effects that result from the Proposed Action in combination with the effects of other actions taken during the duration of the Proposed Action at the same time and place. Cumulative effects may be accrued over time and/or in conjunction with other pre-existing effects from other activities in the area (40 CFR 1508.25); therefore, pre-existing impacts and multiple smaller impacts should also be considered. Overall, assessing cumulative effects involves defining the scope of the other actions and their interrelationship with the Proposed Action to determine if they overlap in space and time.

The NEPA and CEQ regulations require the analysis of cumulative environmental effects of a Proposed Action on resources that may often manifest only at the cumulative level. Cumulative effects can result from individually minor, but collectively significant actions taking place at the same time, over time. As noted above, cumulative effects are most likely to arise when a Proposed Action is related to other actions that could occur in the same location and at a similar time.

The social cost of greenhouse gas (SC-GHG) is a metric designed to quantify climate damages, representing the net economic cost of CO_2 emissions. Estimates of SC-GHG emissions provide an aggregated monetary measure (in U.S. dollars) of the net harm to society associated with an incremental metric ton of emissions in a given year. These estimates include, but are not limited to, climate change impacts associated with net agricultural productivity, human health effects, property damage from increased risk of natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. In this way, SC-GHG estimates can help the public and federal agencies understand or contextualize the potential impacts of GHG emissions and, along with information on other potential environmental impacts, can inform the comparison of alternatives.

The Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under EO 13990 published February 2021 by the United States Interagency Working Group (IWG) on Social Cost of Greenhouse Gases (IWG Report) was referenced to prepare the analysis below. The analysis contains interim estimates of the SC-GHG split to reflect the cost of carbon, methane, and nitrous oxide emissions individually (SC-CO_2, SC-CH_4, SC-N_2O). These estimates are provided by the IWG to allow analysts to incorporate, when appropriate, net social benefits or costs of GHG emissions in benefit-cost analyses and in policy decision making processes.

In the 2021 IWG Report, the SC-GHG monetary values were calculated for discount rates 5 percent, 3 percent, and 2.5 percent. Discount rates are used to determine how much weight is placed on impacts that occur in the future. High discount rates reflect future effects of an action, in this case the emission of GHGs, as less significant than present effects. Low discount rates reflect that future and present impacts are closer to equally significant. Discount rates are used to convert the damages of future actions into present-day values. The social cost values are found in Appendix A-1 through A-3 of the IWG Report. A representation of these tables can be seen in Table 3-21 below. The IWG Report presents the SC-GHG in 2020 dollars per metric ton. For consistency, the results of this analysis are also presented in 2020 dollars.

For this analysis, the build scenario represents the operation of the proposed project. The no-build scenario represents the continued operation of the MRY facility without the construction of the project. The operation start date for the proposed plant is targeted for 2028 and the design life of the project is 20 years. Therefore, this analysis calculates the SC-GHG from 2028 to 2048 (analysis lifespan). Annual emission values in metric tons were estimated based upon fuel consumption projections at the MRY facility and the annual expected amount of CO_2 to be sequestrated. The MRY facility utilizes coal and fuel oil. The coal use projections were limited to the year 2043. The consumption data for the remaining five years of the analysis lifespan were estimated using the average of the last five years of available data. Both fuel oil consumption and the amount of CO_2 sequestered were assumed to be the same for every year of the analysis. Since both boilers may send flue gas to the carbon capture system, the emissions from both boilers were considered for the analysis together.

Table 3-21: IWG Tables A-1, A-2 and A-3, Annual [unrounded] Social Cost of Greenhouses Gases 2025-2050

Emission Year	$SC\text{-}CO_2$ (2020 dollars per metric ton of CO_2)			$SC\text{-}CH_4$ (2020 dollars per metric ton of CO_2)			$SC\text{-}N_2O$ (2020 dollars per metric ton of CO_2)		
	5.0%	3.0%	2.5%	5.0%	3.0%	2.5%	5.0%	3.0%	2.5%
2025	17	56	83	802	1,720	2,230	6,789	20,591	29,914
2026	17	57	84	829	1,767	2,286	6,991	21,028	30,471
2027	18	59	86	856	1,814	2,341	7,193	21,465	31,028
2028	18	60	87	884	1,861	2,397	7,395	21,902	31,585
2029	19	61	88	911	1,908	2,452	7,597	22,339	32,141
2030	19	62	89	938	1,954	2,508	7,799	22,776	32,698
2031	20	63	91	972	2,010	2,572	8,047	23,268	33,309
2032	21	64	92	1,007	2,065	2,635	8,295	23,760	33,921
2033	21	65	94	1,041	2,121	2,699	8,542	24,252	34,532
2034	22	66	95	1,075	2,176	2,763	8,790	24,744	35,144
2035	22	67	96	1,110	2,231	2,827	9,038	25,236	35,755
2036	23	69	98	1,144	2,287	2,891	9,285	25,728	36,366
2037	23	70	99	1,179	2,342	2,955	9,533	26,219	36,978
2038	24	71	100	1,213	2,397	3,019	9,781	26,711	37,589
2039	25	72	102	1,247	2,453	3,083	10,029	27,203	38,201
2040	25	73	103	1,282	2,508	3,147	10,276	27,695	38,812
2041	26	74	104	1,319	2,564	3,210	10,567	28,225	39,456
2042	26	75	106	1,357	2,620	3,273	10,857	28,754	40,100
2043	27	77	107	1,394	2,676	3,336	11,147	29,283	40,745
2044	28	78	108	1,432	2,732	3,399	11,437	29,813	41,389
2045	28	79	110	1,469	2,788	3,462	11,727	30,342	42,033
2046	29	80	111	1,507	2,844	3,524	12,018	30,872	42,677
2047	30	81	112	1,544	2,900	3,587	12,308	31,401	43,321
2048	30	82	114	1,582	2,955	3,650	12,598	31,930	43,965
2049	31	84	115	1,619	3,011	3,713	12,888	32,460	44,610
2050	32	85	116	1,657	3,067	3,776	13,179	32,989	45,254

The build scenario incorporates the expected annual reduction of CO_2 emissions due to the proposed project. These calculated annual emission values are used in conjunction with the social cost estimates provided in the IWG Report to calculate the $SC\text{-}CO_2$, $SC\text{-}CH_4$, $SC\text{-}N_2O$ for each scenario for the analysis lifespan as well as the difference between the two scenarios.

SC-GHG Results

Presenting GHG emissions as a monetary value allows for the ability to directly compare social costs to the economic benefits provided by the project. Annual SC-CO_2, SC-CH_4, SC-N_2O values were calculated for discount rates of 5 percent, 3 percent, and 2.5 percent for years 2028 to 2048. Additionally, an estimate is provided for the 95th percentile of an applied 3-percent discount rate for future economic effects. This is a low probability but high damage scenario that represents an upper bound of damages within the 3-percent discount rate model. These values were then summed to represent a lifespan total cost of GHGs emitted by the site in 2020 dollars. These values are presented in Table 3-22. Results are displayed by discount rate. Tables showing calculation results on an annual basis and by GHG (CO_2, CH_4, N_2O) are included in Table 3-21.

Table 3-22: Lifespan Total Cost of Greenhouse Gases Emitted in 2020 Dollars

Discount Rates	**5%**	**3%**	**2.5%**	**3%**
Statistic	Average	Average	Average	95th Percentile
No-Build Scenario SC-GHG	$1,717,000,000	$6,106,000,000	$9,071,000,000	$18,629,000,000
Build Scenario SC-GHG	$393,000,000	$1,391,000,000	$2,066,000,000	$4,231,000,000
Difference	**-$1,324,000,000**	**-$4,715,000,000**	**-$7,005,000,000**	**-$14,398,000,000**

The addition of the project to the MRY facility operations has been projected to reduce total GHG emissions compared to the no-build scenario. Note that this difference is due to the expected reduction of CO_2 emissions; the addition of the project to the site is not expected to affect N_2O or CH_4 emissions. For discount rates high to low over the analysis lifespan, the reduction in the SC-GHG was calculated to be approximately -$1.3, -$4.7, and -$7.0 billion in 2020 dollars if the proposed project is constructed and operational. For the 95th percentile of an applied 3-percent discount rate, the reduction in the SC-GHG that would be attributed to the proposed project is approximately -$14 billion.

Subsequent to the close of the comment period for the revised Draft EA, DOE directed all Departmental Elements to include the EPA's 2023 SC-GHG estimates in final environmental documents to the extent practical. Table 3-23 provides the total present and annualized values of all GHG emission changes (CO_2, CH_4, and N_2O) for the no-build and build scenarios using EPA's 2023 SC-GHG estimates. Using the annualized value (21 years, 2020 dollars), the results indicate the project would result in a 77.4 percent reduction in Annual Social Cost to the public.

Table 3-23: Total Annualized Value (21 Years) of Greenhouse Gas Emission Changes (Millions, 2020 Dollars)

Discount Rates	**2.5%**	**2.0%**	**1.5%**
No-Build Scenario SC-GHG	$932.92	$1,448.11	$2,349.31
Build Scenario SC-GHG	$211.17	$327.29	$530.30
Difference	**-$721.75**	**$1,120.82**	**$1,819.01**

3.17.1 Environmental Consequences

This section identifies reasonably foreseeable proposed projects that may have cumulative, incremental impacts in conjunction with the Proposed Action.

3.17.1.1 Future Planned Operation of the Facility

The project has a design life of 20 years. There currently is no plan for continued operation of the project past the useful life of the project. As proposed, when the useful life is reached, the project would be decommissioned and removed from Minnkota grounds. Another consideration to be made near the end of the project's useful life would be considerations for renovations or reconstruction to extend the useful life of the project. Decommissioning activities or reconstruction activities would result in temporary and minor adverse cumulative impacts to air quality, noise, materials and wastes, and health and safety.

3.17.1.2 Future Planned Projects at MRY

MRY completes infrastructure maintenance and upgrades to maintain the existing infrastructure and support potential future growth opportunities at MRY. These maintenance/upgrade activities may include:

- Expansion of cell 5 and construction of cell 6
- Dam gate replacement
- BNI permitting for additional coal in Section 9 south of MRY
- Water well replacement
- DCC West flowline (not associated with this project)
- Summit Carbon Solutions Project
- Rare earth elements study
- Potential wind farm projects in the area
- Transmission line installation

The infrastructure modifications would result in temporary minor adverse cumulative impacts to air quality, noise, materials and wastes, and health and safety.

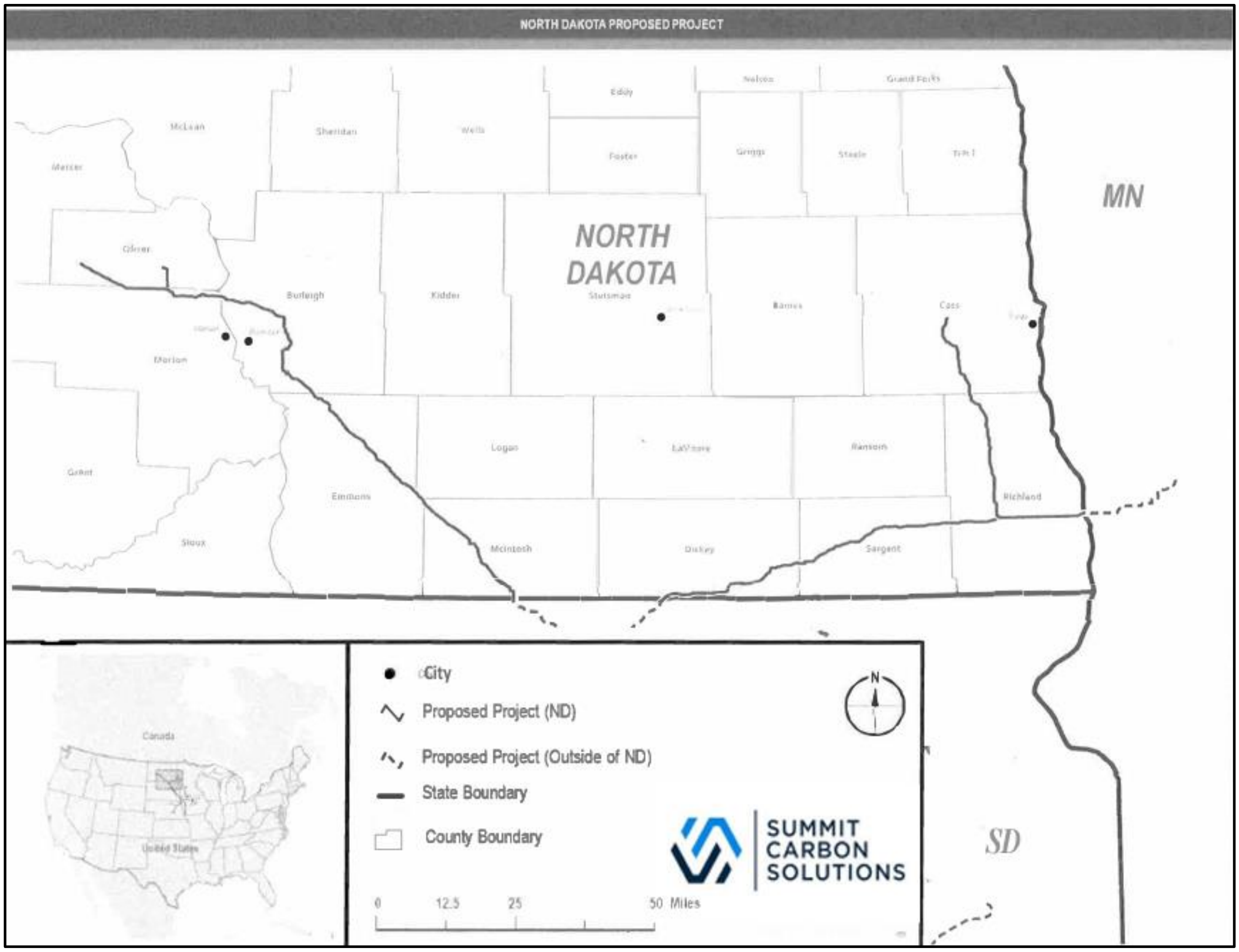
3.17.1.3 City of Center & Oliver County Projects

According to the city of Center and Oliver County websites, there are no additional projects currently proposed in the vicinity of the project.

There is a permitted storage facility approximately 7 miles to the west of the proposed Project Tundra sequestration site. The applicant is an affiliate of Minnkota and the storage facility will consist of incremental storage for Minnkota or third-party storage. There is no planned construction date for the development of this storage facility because the Class VI permit has not yet been issued. Should Minnkota continue to be affiliated with the entity, it is possible Minnkota could coordinate construction activities for efficiency.

Additionally, Summit Carbon Solutions has a pending application for a CO_2 transport pipeline in North Dakota, referred to as the Midwest Carbon Express CO_2 Pipeline Project (see Public Service Commission Case PU-22-39). The route for this pipeline crosses through Oliver County and there is a planned connection proximate to the Project Tundra sequestration site for potential use of the above-identified pending sequestration permit (see Figure 3-10). The construction timeline is not known for Summit Carbon Solutions pipeline project and is dependent on permits being issued in North Dakota, South Dakota, and Iowa.

Figure 3-10: Summit Carbon Solutions Published Route Map, PU-22-391.1, file 22



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Federal Agencies (via email)

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U.S. Forest Service

U.S. Department of the Interior

U.S. Environmental Protection Agency, Region 8

U.S. Army Corps of Engineers

State/Local Agencies (via email)

National Association of State Energy Officials

National Association of Tribal Historic Preservation Officers

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515 North 5th Street
Bismarck, ND 58501

North Dakota State Library
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Bismarck, ND 58505

Non-governmental Organizations (via email)

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Sierra Club

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Clean Water Action

Earthjustice

Environmental Defense Fund

Friends of the Earth

Institute for Energy and Environmental Research

The Nature Conservancy

Trout Unlimited

The Wilderness Society

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