SUMMIT CARBON SOLUTIONS

Supplement of the Application to the South Dakota Public Utilities Commission for a Permit for the SCS Carbon Transport LLC (SCS) Pipeline Under the Energy Conversion and Transmission Facility Act

Project Name:
SCS Midwest Carbon Express

Document Number:
SCS-0700-ENV-05-PE-009-D

Date:
October 13, 2022

EXHIBIT A-1

Revision History

DATE	REVISION	REVISION DESCRIPTION	PREPARED BY:	REVIEWED BY:	APPROVED BY:
10-13-2022	0	Final Application – Supplement	SB	JS	JZ

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Acronym List

ACRONYM/TERM	DESCRIPTION
AIMP	Agricultural Impact Mitigation Plan
APE	Area of Potential Effect
API	American Petroleum Institute
Applicant	SCS Carbon Transport LLC
ARMS	Archaeological Resources Management System
ARSD	Administrative Rules of South Dakota
ATWS	Additional Temporary Workspace
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
CCS	Carbon Capture and Storage
CFR	Code of Federal Regulations
CWA	Clean Water Act
DGC	Dakota Gasification Company
DWR	Department of Water Resources
ECDs	Erosion Control Devices
ECP	Environmental Construction Plan
EI	Environmental Inspectors
ESA	Endangered Species Act
Environmental Survey Area	Environmental Survey Area
FBE	Fusion Bonded Epoxy
FT	Federally Threatened
FWS	Fish and Wildlife Service
GIS	Geographic Information System
GPSP	Great Plains Synfuels Plant
HCAs	High Consequence Areas
HDD	Horizontal Directional Drill
ICBM	Intercontinental Ballistic Missile
ICCP	Impressed Current Cathodic Protection
II	Integrated Inspections
IMP	Integrity Management Program
IPaC	Information for Planning and Consultation
LEWIS	Local Employment and Wage Information System
LP	Liquefied Propane
MBTA	Migratory Bird Treaty Act
MCE	Midwest Carbon Express
MLV	Mainline Valve
MMTPA	Million Metric Tons Per Annum
MOP	Maximum Operating Pressure
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
OES	Occupational Employment Statistics
OSHA	Occupational Safety and Health Administration

ACRONYM/TERM	DESCRIPTION
PEM	Palustrine Emergent (Wetlands)
PER	Problem Evaluation Reports
PFO	Palustrine Forested (Wetlands)
PHMSA	Pipeline and Hazardous Materials Safety Administration
Project	MCE (Midwest Carbon Express)
PSC	Public Service Commission
PSS	Palustrine Scrub Shrub
PUC	Public Utilities Commission
SD	South Dakota
SE	State Endangered
SCADA	Supervisory Control and Data Acquisition
SDC	South Dakota Code
SDCL	South Dakota Codified Law
SD DANR	South Dakota Department of Agriculture and Natural Resources
SDGFP	South Dakota Game Fish and Parks
SDGS	South Dakota Geological Survey
SDSHPO	South Dakota State Historical Preservation Office
SEFMA	Southeast Fisheries Management Area
SHPO	State Historic Preservation Office
SHSND	State Historical Society of North Dakota
SOW	Scope of Work
SPCC	Spill Prevention Control and Countermeasure
ST	State Threatened
SW	Slightly Weathered
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Properties
TMDL	Total Maximum Daily Load
UDP	Unanticipated Discovery Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WEG	Wind Erodibility Group
WQC	Water Quality Certification
WRP	Wetland Reserve Program

Administrative Rules Checklist

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20:10:22:12	Alternative sites.	4.0
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(2)	An evaluation of alternative sites considered by the applicant for the facility;	4.0
(3)	An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	4.3
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(3)	A written summary of the geological features of the plant, wind energy, or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area;	5.1.2
(4)	A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plant, wind energy, or transmission site;	5.1.3
(5)	A description of the soil type at the plant, wind energy, or transmission site;	5.1.4, Appendices 6B and 7
(6)	An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control;	5.1.4.6
(7)	Information on areas of seismic risks, subsidence potential and slope instability for the plant, wind energy, or transmission site; and	5.1.5
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20:10:22:15	Hydrology.	5.2

RULE	DESCRIPTION	SECTION
(1)	A map drawn to scale of the plant, wind energy, or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility;	N/A, 5.2.1
(2)	Using plans filed with any local, state, or federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects;	5.2.3
(3)	A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission;	5.2.3, Appendix 6C
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(5)	A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; and	N/A
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RULE	DESCRIPTION	SECTION
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20:10:22:39	Testimony and exhibits.	7.2

1 Introduction

SCS Carbon Transport LLC (Applicant) hereby submits its application to the South Dakota Public Utilities Commission (PUC) for a permit under the *South Dakota Energy Conversion and Transmission Facilities Act*, with respect to the proposed South Dakota pipeline aspects of the Midwest Carbon Express Project (Project).

1.1 Project Purpose

The Applicant proposes to build a carbon capture and sequestration Project that will have the capability of moving up to 18 million metric tons per annum (MMTPA) of carbon dioxide (CO_2) from participating industrial facilities in South Dakota, as well as CO_2 from facilities in Minnesota, North Dakota, Iowa, and Nebraska to a sequestration site in North Dakota, where the CO_2 will be safely and permanently stored.

The Project greatly benefits South Dakota's critical ethanol and agriculture industries, enhancing their long-term economic and environmental sustainability. Summit Carbon Solutions has long-term offtake agreements with 32 participating ethanol plants in its five-state footprint, including 7 ethanol plants in South Dakota. Utilizing the Project enables participating ethanol plants to reduce their carbon intensity or footprint by as much as fifty percent (50%) putting them on the path towards producing a net-zero carbon fuel. Doing so greatly improves ethanol's environmental impact and improves its ability to compete in low carbon fuel markets, which have increasingly stringent carbon reduction goals. Those markets represent a significant growth opportunity for low carbon fuels, such as ethanol, into the future.

Without the Project, ethanol plants in South Dakota lack a viable option to capture and permanently store their CO_2 emissions because South Dakota does not have proven subsurface geologic formations capable of economically storing the volume of CO_2 the plants produce. The Project provides a CO_2 transportation solution, which otherwise would not exist, and without which South Dakota's ethanol plants would be at a significant long-term disadvantage to ethanol plants in states like North Dakota and Illinois, which contain proven subsurface geologic storage formations.

The Project provides benefits not only for the ethanol industry, but for an even broader segment of the public -- the agriculture industry with which it partners. As the Applicant's 7 South Dakota ethanol partners earn more for producing low-carbon renewable fuel, it strengthens the economic prosperity and long-term viability of ethanol, and as a result, benefits South Dakota's family farms, and ultimately the entire state. The ethanol industry is the largest purchaser of South Dakota corn, consuming approximately 50% of South Dakota's corn crop each year. A stable ethanol industry provides South Dakota's farmers with a reliable market for their corn and underpins the value of South Dakota farmland.

The Applicant has offered, and will continue to offer, carbon transportation and storage services to a variety of industrial facility owners in South Dakota and surrounding states, which for the first time gives them a viable opportunity to reduce their carbon emissions. These facilities include other ethanol plants, nitrogen production, and more, which are undergoing pressure to reduce their carbon footprints.

In addition to these benefits, the Project will generate significant tax revenue, including from the sale and use of goods and services during construction, and long term as required to operate and maintain the pipeline, along with significant local property taxes.

The Project will play an important role in reducing greenhouse gas emissions. As governments, industries, and consumers seek to reduce carbon emissions, a dramatic increase in carbon capture and sequestration (CCS), as well as associated pipelines, is crucial to achieving that goal. Initially, the Project pipeline will be capable of moving up to 18 MMTPA of CO_2 for safe and permanent storage, which is the equivalent of

removing approximately 3.9 million cars from our roads on an annual basis. Once operational, the Project will provide the largest and single most meaningful technology-based reduction of carbon emissions in the world.

The Project pipeline also represents the safest mode for transporting CO_2. As compared to rail and truck transportation, pipelines are the safest and most efficient means to transport hazardous liquids, according to statistics compiled by the United States Depart of Transportation (DOT). Pipelines are heavily regulated and are subject to intense scrutiny and oversight. Time and time again, pipelines have proven to be the safest and most reliable form of transporting hazardous liquids.

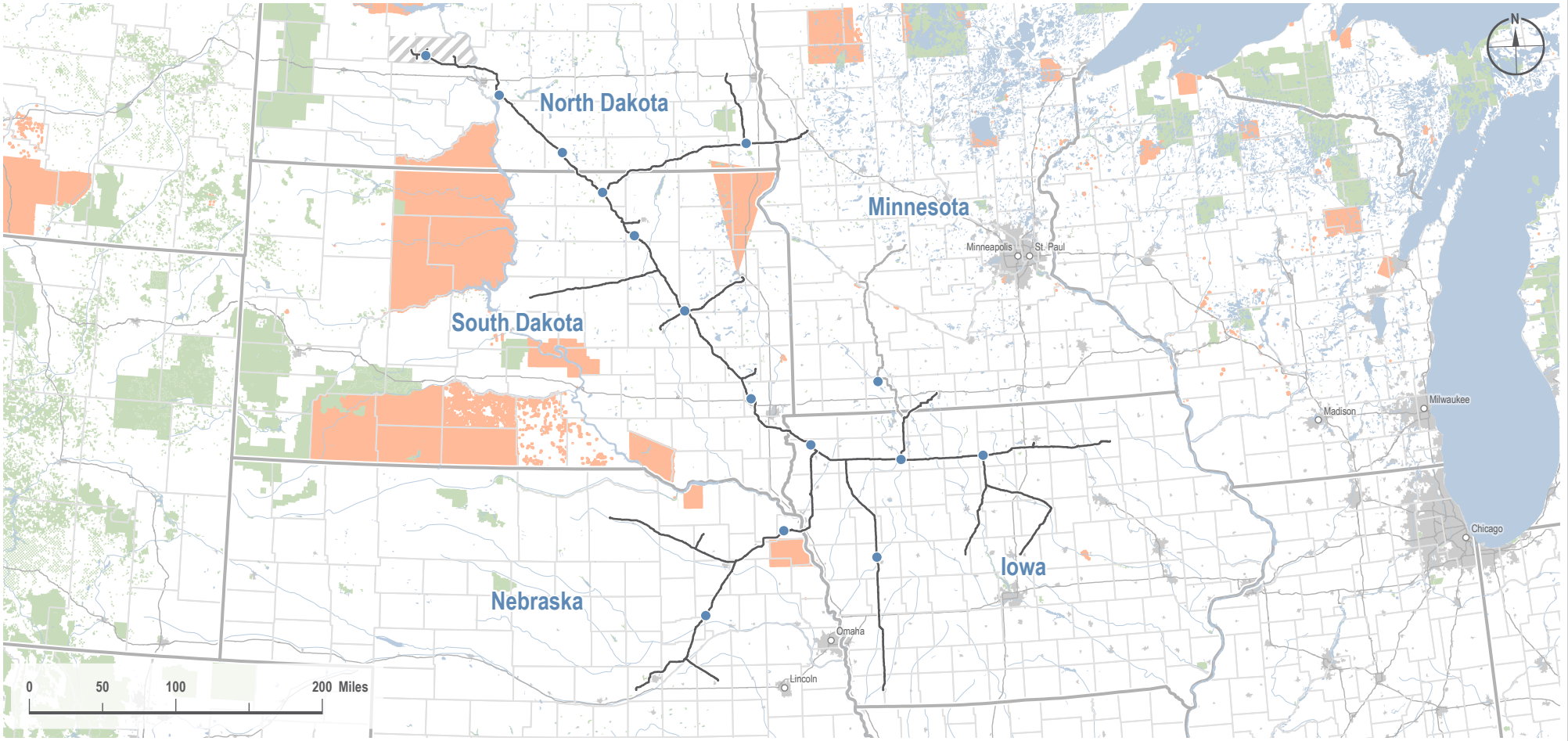
1.2 Project Overview and General Site Description

The complete Project as proposed includes approximately 2,000 miles of pipelines for the transportation of CO_2 from more than 30 ethanol plants across five state to underground injection control facilities in North Dakota for safe and permanently sequestration (see **Figure 1**). Only the Project's South Dakota pipeline facilities are covered by this application. The injection and sequestration facilities are not covered under this application since they will be located in North Dakota.

Ethanol plants where CO_2 will be captured are located near cities and towns in the five-state Project footprint, including South Dakota. The CO_2 gathering and mainline pipelines will be of varying diameters, installed at a minimum of four feet (top of pipe) below ground surface, and will cross primarily agricultural and undeveloped lands. The Project pipelines will be constructed under roads, railroads, rivers, and other resources as required. Following construction, land will be restored to pre-construction conditions and will remain suitable for farming, pasture, and recreation activities; however, there will be a permanent easement that will limit construction of surface structures after the system is built.

Aboveground facilities required to support the operation of the pipeline system will be installed and fenced. Generally, the Project pipeline operation-related aboveground facilities will include, but are not necessarily limited to, pump stations, mainline valves (MLVs), launcher and receiver sites, and cathodic test stations, as well as permanent access roads to pump stations, trap sites, MLVs, and the pipeline right-of-way (ROW) as required. These sites will be fenced to facilitate safe operations and will not be physically accessible to the public or landowners. The surface sites will be designed and constructed to the smallest practical footprint necessary to minimize the permanent surface impacts while also ensuring safe operations. The pipeline route and aboveground facilities are depicted in **Figure 2**.

PROJECT OVERVIEW MAP



VICINITY MAP

LEGEND

- Proposed Project Route
- Pump Station
- City / Town
- State Boundary
- County Boundary
- Highway
- River / Stream
- Waterbody
- Urban Area
- Federal Land
- American Indian Reservation or Trust Land
- Sequestration Evaluation Area (Site TBD)

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SUMMIT CARBON SOLUTIONS

REVISIONS

Date	Revised by	Checked by	
2022-02-07	GS	PD	0 - Issued for SDPUC Application
2022-10-12	PD	SB	1 - Re-Issued for SDPUC Application

MIDWEST CARBON EXPRESS PROJECT

Figure Title: Project Overview Map

Figure Number: Figure 1

Scale: 1 : 6,500,000
1 inch equals 102.59 miles

Projection: Transverse Mercator
NAD 1983 UTM Zone 14N

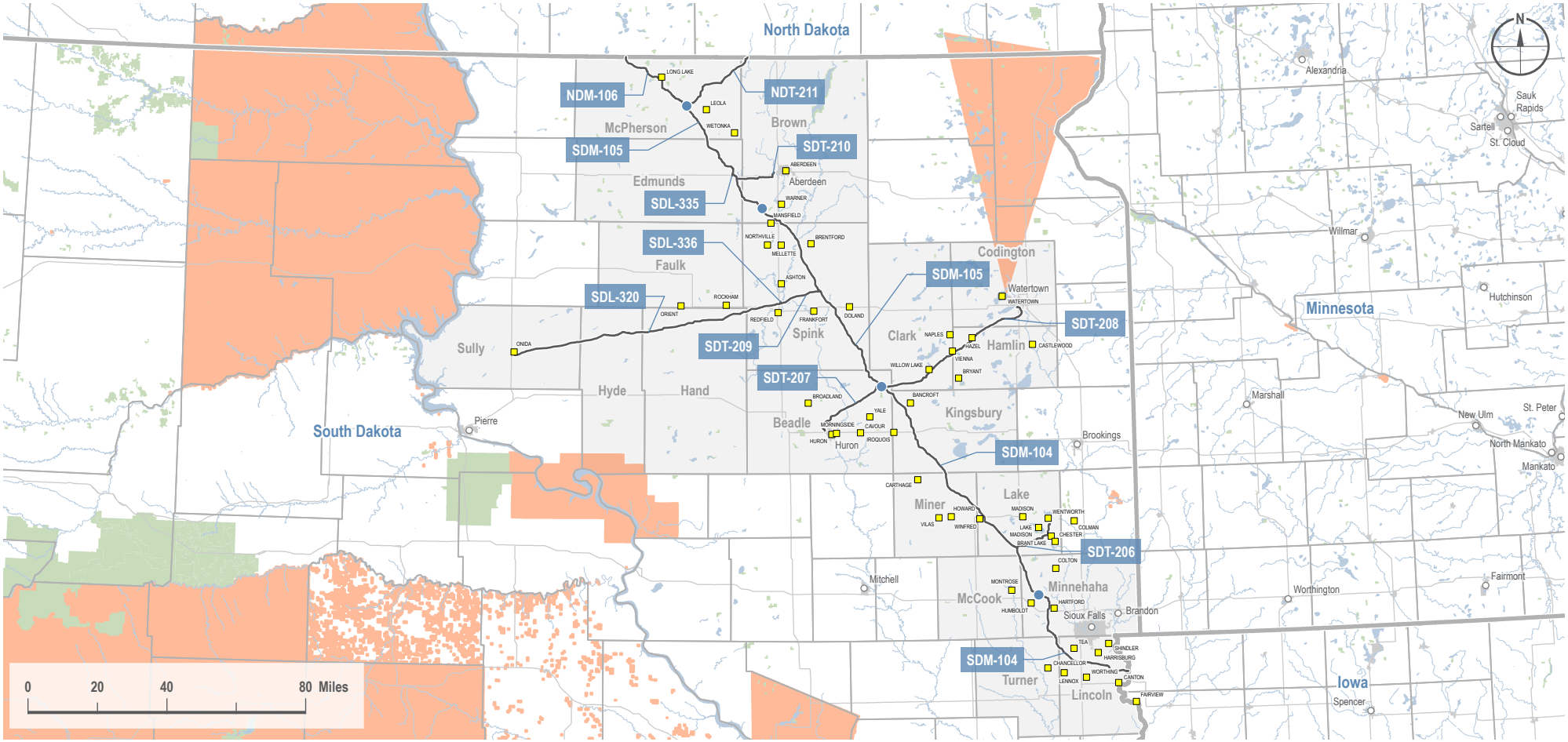
Sheet: 1
1 of 1

Drawing Number: 1002-06-001
Revision

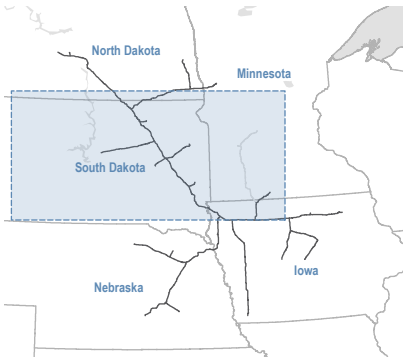
EXHIBIT A-1

Path: I:\Projects\TAL-21015451-00 - Summit Carbon - MCE Project\0800 GEO\10_Mapping\02 Overview\06 Regulatory\1002-06-001\1002-06-001 State Filing Overview.aprx

PROJECT OVERVIEW MAP - SOUTH DAKOTA



VICINITY MAP



LEGEND

- Proposed Project Route (as of 2022-07-15)
- Populated Place within 10 miles of the Project
- Pump Station
- County Boundary
- State Boundary
- City / Town
- Urban Area
- Highway
- River / Stream
- Waterbody
- Federal Land
- American Indian Reservation or Trust Land

Pipeline Naming Convention
[State Abbreviation][Line Designation] - [Line Number]
(e.g. SDT-207)
-State Abbreviation: Iowa (IA), Minnesota (MN), North Dakota (ND), South Dakota (SD)
-Line Designation: Lateral (L), Main (M), Trunk (T)
-Line Number: 3-digit series

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REVISIONS

Date	Revised by	Checked by	
2022-02-07	GS	PD	0 - Issued for SDPUC Application
2022-10-03	PD	SB	1 - Re-Issued for SDPUC Application

MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Project Overview Map
South Dakota

Figure Number: Figure 2

Scale: 1 : 2,750,000
1 inch equals 43.4 miles

Projection: Transverse Mercator
NAD 1983 UTM Zone 14N

Sheet: 1
1 of 1

Drawing Number: 1003-01-004
Revision

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1.3 Estimated Capital Costs

The total estimated cost for the equipment and installation of the Project pipeline in South Dakota is $795 million.

1.4 Project Schedule

The Applicant proposes to commence construction of the Project pipeline in South Dakota in the third quarter of 2023 and to complete construction in the third quarter of 2024. Construction will require all or portions of five spreads in South Dakota (i.e., overall Project construction spreads 2, 4, 5, 6 and 7). A drawing illustrating the construction spreads in South Dakota is provided in **Appendix 1**. The Applicant proposes to place its pipeline in service by 2024. This timing is consistent with the requirements of the shippers making the contractual commitments that underpin the Project.

1.5 Project Participants

The permit Applicant is SCS Carbon Transport LLC, a limited liability company, organized under the laws of the State of Delaware, and owned by Summit Carbon Solutions, LLC, a limited liability company, organized under the laws of the State of Delaware. SCS Carbon Transport's primary business address is 2321 N Loop Drive, Suite 221, Ames, Iowa 50010 (email: info@summitcarbon.com).

1.6 Individuals Authorized to Receive Communications

The following Project contact information includes those individuals authorized to receive communications relating to the application.

Mr. James Powell
Chief Operating Officer
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Email: jpowell@summitcarbon.com

Mr. Jess Vilsack
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Email: jsatterfield@summitcarbon.com

1.7 Ownership and Management

The Applicant and owner of the Project pipeline is SCS Carbon Transport LLC, which is a subsidiary of Summit Carbon Solutions, LLC. The Applicant and Project Chief Operating Officer is:

Mr. James Powell
Chief Operating Officer
2321 N Loop Drive, Suite 221
Ames, Iowa 50010
Ph: (515) 531-2603
Email: jpowell@summitcarbon.com

1.8 Other Required Permits and Approvals

In addition to the siting permit under the *South Dakota Energy Conversion and Transmission Facility Act*, **Table 1** lists federal and state permits identified for the construction and operation of the Project within South Dakota. Coordination is ongoing with the agencies identified below. The table also includes estimated timeframes for the formal submittal of applications, reports, requests for clearance, etc.

Table 1: Anticipated Permits or Reviews for the Project in South Dakota

AGENCY	PERMIT	AGENCY ACTION	ESTIMATED APPLICATION SUBMITTAL DATE
Federal			
U.S. Army Corps of Engineers (USACE), Omaha District - South Dakota Regulatory Office	Sections 404 Clean Water Act for discharge of fill in water of the U.S.; Section 10 Rivers and Harbors Act Permit for crossing navigable waters of the U.S.	Authorization of discharge of fill material into waters of the U.S. and structures crossing navigable waters	Submitted October 2022
	Section 408 Review	Process request to make alterations to, or temporarily or permanently occupy or	Submitted January 2022

Table 1: Anticipated Permits or Reviews for the Project in South Dakota			
AGENCY	PERMIT	AGENCY ACTION	ESTIMATED APPLICATION SUBMITTAL DATE
		use, any USACE federally authorized Civil Works Project under 33 USC 408	
U.S. Fish and Wildlife Service	Section 7 Consultation - Endangered Species Act	Federally listed threatened and endangered species affect determination review and concurrence.	October 2022
State Historic Preservation Officer	Section 106 Consultation - National Historic Preservation Act	Effects Determination and associated mitigation.	Initial review of 2021 survey results February 2022; Submitted field report with USACE Section 404/10 Application in October 2022
Pipeline Hazardous Materials Safety Administration (PHMSA)	49 CFR Part 195	Integrity Management Plan and Emergency Response Plan	Prior to operations
Federal Highways Administration	Crossing Permit	Issuance of permits for the crossing of federally funded highways.	1st Quarter 2023
State			
South Dakota Department of Agriculture and Natural Resources	Surface Water Discharge General Permit for Temporary Discharge Activities and a Temporary Water Rights Use Permit (SDG070000)	Issuance of permit for hydrostatic test water discharge and construction dewatering to waters of the State, and Temporary Water Use Permit.	March 2023
	Surface Water Discharge General Permit for Stormwater Discharges Associated with Construction Activities Permit (SDR100000)	Issuance of permits for discharges associated with activity that causes land disturbance equal to or greater than one acre.	March 2023
	Standard Water Rights Permit	Review and make a recommendation for appropriation of water from a state jurisdictional waterbody during construction activities if authorization is not issued under the Temporary Water Rights Use Permit.	March 2023

Table 1: Anticipated Permits or Reviews for the Project in South Dakota			
AGENCY	PERMIT	AGENCY ACTION	ESTIMATED APPLICATION SUBMITTAL DATE
South Dakota Department of Transportation	Application for Permit to Occupy Right of Way	Issuance of permits to occupy right of way.	1st Quarter 2023
South Dakota Department of Game, Fish, and Parks	State Listed Species Review	Review and authorization.	October 2022
Local			
County Road Departments	Crossing Permits	Issuance of permits for crossing county roads.	1st Quarter 2023
	Road Haul Agreements	Negotiated agreements between counties and the Applicant.	1st Quarter 2023
County and Local Authorities	Floodplain, Conditional Use, and building permits	Review and approval.	1st Quarter 2023

Applicable local regulatory agencies will be contacted prior to any excavation, construction, and improvements activities to ensure the Project pipeline complies with local ordinances. The Applicant will apply for conditional use permits where applicable prior to construction. The Project will be responsible for repairing damage to roads and restoring them to preconstruction or better condition. The Applicant will negotiate road haul agreements with counties impacted by construction use of their roads. This will culminate in the requirement for construction bonds to cover the potential impacts to public roads.

Three counties are believed to have pipeline construction and operation Moratoria in place at the time of this filing. The relevant documents are attached in **Appendix 13**. They are Spink, Brown and McPherson counties. Hyde County enacted a moratorium, but let it expire in September 2022. None of the actions are seen by Applicant as reasonably restrictive in view of existing technology, factors of cost, or economics or needs of parties where located in or out of the county or municipality. Applicant intends to introduce evidence at hearing and seek a finding from the Commission pursuant to SDCL 49-41B-28 and applicable cases.

On April 12, 2022, the Edmunds County Board of Supervisors increased permit fees associated with their County Highway Utility Crossing Ordinances:

> (1) the "Hazardous Utility (occupancy)" permit fee from $250.00 to $5,000.00 (a 1,900% increase);
>
> (2) the "Hazardous Utility 'Plus additional per each crossing'" permit fee from $1,500.00 to $50,000.00 (a more than 3,233% increase); and
>
> (3) the "Hazardous Utility 'Plus additional per each longitudinal parallel mile'" permit fee from $1,800.00 to $100,000.00 (a more than 5,455% increase) (together, the "Permit Fees").

These fees, when applied to the proposed route, are unreasonably restrictive in terms of factors of costs or economics or needs of parties where located in or out of the county. Applicant intends to introduce evidence at hearing and seek a finding from the Commission pursuant to SDCL 49-41B-28 and applicable cases. A copy of the Edmunds County's County Highway Utility Crossing Ordinance is attached in **Appendix 13**.

2 Project Description

2.1 Nature of Proposed Project

2.1.1 Facility Description Overview

The Project will include approximately 477.31 miles of pipelines (mainline, trunk lines, and laterals) in South Dakota as well as 4 pump stations, 51 MLVs, 6 launcher-receiver sites, and 8.15 miles of access roads (see **Table 2**). The Applicant has removed the eight contractor/laydowns yards from the Project facilities covered by this application because the Contractor will lease, permit, and operate all construction/laydown yards in South Dakota.

Table 2: Project Facilities in South Dakota

ID	FACILITY TYPE	LENGTH (miles)	NOMINAL DIAMETER (inches)	COUNTY	BEGINNING MILEPOST	END MILEPOST	ASSOCIATED PIPELINE
Pipelines							
NDM-106	Main Line	25.77	24	McPherson	0.00	25.77	NA
NDT-211	Trunk Line	3.00	12	Brown	88.48	91.48	NA
NDT-211	Trunk Line	21.92	12	McPherson	91.48	113.40	NA
SDL-320	Lateral	19.74	6	Sully	0.00	19.74	NA
SDL-320	Lateral	18.81	6	Hyde	19.74	38.55	NA
Pipelines (cont.)							
SDL-320	Lateral	31.35	6	Hand	38.55	59.90	NA
SDL-320	Lateral	10.38	6	Spink	69.90	80.29	NA
SDM-104	Main Line	23.21	24	Lincoln	26.65	49.86	NA
SDM-104	Main Line	3.06	24	Turner	49.86	52.92	NA
SDM-104	Main Line	27.58	24	Minnehaha	52.92	80.50	NA
SDM-104	Main Line	2.24	24	McCook	80.50	82.74	NA
SDM-104	Main Line	18.99	24	Lake	82.74	101.73	NA
SDM-104	Main Line	15.25	24	Miner	101.73	116.98	NA
SDM-104	Main Line	29.44	24	Kingsbury	116.98	146.43	NA
SDM-104	Main Line	4.10	24	Beadle	146.43	150.53	NA
SDM-105	Main Line	7.54	24	Beadle	0.00	7.54	NA
SDM-105	Main Line	51.14	24	Spink	7.54	58.68	NA
SDM-105	Main Line	15.22	24	Brown	58.68	73.89	NA
SDM-105	Main Line	22.11	24	Edmunds	73.89	96.00	NA
SDM-105	Main Line	12.01	24	McPherson	96.00	108.02	NA

Table 2: Project Facilities in South Dakota							
ID	FACILITY TYPE	LENGTH (miles)	NOMINAL DIAMETER (inches)	COUNTY	BEGINNING MILEPOST	END MILEPOST	ASSOCIATED PIPELINE
SDT-206	Trunk Line	14.15	6	Lake	0.00	14.15	NA
SDL-335	Trunk Line	0.52	4	Edmunds	0.00	0.52	NA
SDL-336	Trunk Line	0.53	4	Spink	0.00	0.53	NA
SDT-207	Trunk Line	23.57	6	Beadle	0.00	23.57	NA
SDT-208	Trunk Line	13.25	6	Codington	0.00	13.25	NA
SDT-208	Trunk Line	13.11	6	Hamlin	13.25	26.36	NA
SDT-208	Trunk Line	22.01	6	Clark	26.36	48.37	NA
SDT-208	Trunk Line	2.54	8	Beadle	48.37	50.91	NA
SDT-209	Trunk Line	12.43	8	Spink	0.00	12.43	NA
SDT-210	Trunk Line	10.51	6	Brown	0.00	10.51	NA
SDT-210	Trunk Line	1.81	6	Edmunds	10.51	12.31	NA
Pump Stations							
MPS-05	Pump Station	NA	NA	Beadle	150.53	150.53	SDM-105
MPS-04	Pump Station	NA	NA	Minnehaha	68.85	68.85	SDM-104
MPS-06	Pump Station	NA	NA	Brown	66.90	66.90	SDM-105
MPS-07	Pump Station	NA	NA	McPherson	0.07	0.07	NDM-106
Mainline Valves							
MLV-106-01*	MLV	NA	NA	McPherson	0.10	0.10	NDM-106
MLV-106-02	MLV	NA	NA	McPherson	15.07	15.07	NDM-106
MLV-211-09	MLV	NA	NA	Brown	89.40	89.40	NDT-211
MLV-211-09-A	MLV	NA	NA	McPherson	103.63	103.63	NDT-211
MLV-211-10*	MLV	NA	NA	McPherson	113.27	113.27	NDT-211
MLV-320-01*	MLV	NA	NA	Scully	0.00	0.00	SDL-320
MLV-320-01-A	MLV	NA	NA	Scully	3.77	3.77	SDL-320
MLV-320-02	MLV	NA	NA	Hyde	22.83	22.83	SDL-320
MLV-320-03	MLV	NA	NA	Hand	42.58	42.58	SDL-320
MLV-320-04	MLV	NA	NA	Hand	61.29	61.29	SDM-320
MLV-320-05*	MLV	NA	NA	Spink	80.28	80.28	NEL-320
MLV-335-01*	MLV	NA	NA	Edmunds	0.00	0.00	SDL-335
MLV-335-02*	MLV	NA	NA	Edmunds	0.50	0.50	SDL-335
MLV-336-01*	MLV	NA	NA	Spink	0.00	0.00	SDL-336

Table 2: Project Facilities in South Dakota							
ID	FACILITY TYPE	LENGTH (miles)	NOMINAL DIAMETER (inches)	COUNTY	BEGINNING MILEPOST	END MILEPOST	ASSOCIATED PIPELINE
MLV-336-02*	MLV	NA	NA	Spink	0.53	0.53	SDL-336
MLV-104-06	MLV	NA	NA	Lincoln	26.90	26.90	SDM-104
MLV-104-07	MLV	NA	NA	Lincoln	43.00	43.00	SDM-104
MLV-104-08*	MLV	NA	NA	Minnehaha	68.81	68.81	SDM-104
MLV-104-08-A*	MLV	NA	NA	Minnehaha	68.88	68.88	SDM-104
MLV-104-08-B	MLV	NA	NA	Minnehaha	60.29	60.29	SDM-104
MLV-104-09*	MLV	NA	NA	Lake	84.91	84.91	SDM-104
MLV-104-10	MLV	NA	NA	Lake	99.77	99.77	SDM-104
MLV-104-11	MLV	NA	NA	Kingsbury	118.12	118.12	SDM-104
MLV-104-12*	MLV	NA	NA	Beadle	150.50	150.50	SDM-104
MLV-104-13*	MLV	NA	NA	Beadle	0.03	0.03	SDM-10
MLV-105-01	MLV	NA	NA	Spink	19.02	19.02	SDM-105
MLV-105-01-A*	MLV	NA	NA	Spink	35.28	35.28	SDM-105
MLV-105-02*	MLV	NA	NA	Brown	66.88	66.88	SDM-105
MLV-105-03	MLV	NA	NA	Spink	50.78	50.78	SDM-105
MLV-105-04	MLV	NA	NA	Spink	52.77	52.77	SDM-105
MLV-105-06	MLV	NA	NA	Spink	65.20	65.20	SDM-105
MLV-105-07*	MLV	NA	NA	Spink	81.83	81.83	SDM-105
MLV-105-09*	MLV	NA	NA	Spink	108.01	108.01	SDM-105
MLV-206-01*	MLV	NA	NA	Lake	0.00	0.00	SDT-206
MLV-206-02	MLV	NA	NA	Lake	2.95	2.95	SDT-206
MLV-206-03	MLV	NA	NA	Lake	4.65	4.65	SDT-206
MLV-206-04*	MLV	NA	NA	Lake	14.14	14.14	SDT-206
MLV-207-01*	MLV	NA	NA	Beadle	0.00	0.00	SDT-207
MLV-207-02	MLV	NA	NA	Beadle	8.82	8.82	SDT-207
MLV-207-03	MLV	NA	NA	Beadle	12.71	12.71	SDT-207
MLV-207-04*	MLV	NA	NA	Beadle	23.54	23.54	SDT-207
MLV-208-01*	MLV	NA	NA	Codington	0.00	0.00	SDT-208
MLV-208-01-A	MLV	NA	NA	Codington	6.11	6.11	SDT-208
MLV-208-02	MLV	NA	NA	Hamlin	20.38	20.38	SDT-208
MLV-208-02-A	MLV	NA	NA	Clark	27.83	27.83	SDT-208
MLV-208-03	MLV	NA	NA	Clark	39.09	39.09	SDT-208

Table 2: Project Facilities in South Dakota							
ID	FACILITY TYPE	LENGTH (miles)	NOMINAL DIAMETER (inches)	COUNTY	BEGINNING MILEPOST	END MILEPOST	ASSOCIATED PIPELINE
MLV-208-04*	MLV	NA	NA	Beadle	50.89	50.89	SDT-208
MLV-209-01	MLV	NA	NA	Spink	1.75	1.75	SDT-209
MLV-209-02*	MLV	NA	NA	Spink	12.40	12.40	SDT-209
MLV-210-01*	MLV	NA	NA	Brown	0.00	0.00	SDT-210
MLV-210-02*	MLV	NA	NA	Edmunds	12.29	12.29	SDT-210
Launcher-Receivers Sites							
PLR-01	Launcher-Receiver	NA	NA	Edmunds	12.31	12.31	SDT-210
PLR-02	Launcher-Receiver	NA	NA	Spink	12.42	12.42	SDM-105
PLR-04	Launcher-Receiver	NA	NA	Beadle	50.91	50.91	SDT-208
PLR-05	Launcher-Receiver	NA	NA	Lake	84.90	84.90	SDM-104
PLR-15	Launcher-Receiver	NA	NA	Edmunds	0.50	0.50	SDL-335
PLR-20	Launcher-Receiver	NA	NA	Spink	80.28	80.28	SDL-320

Notes:

There are 38 temporary access roads for construction and 42 permanent access roads for operation totaling 8.15 miles.

Main lines are pipelines that carry CO_2 from trunk lines to the sequestration facility.

Trunk lines are pipelines that carry CO_2 from ethanol plants to mainlines or from lateral pipelines to the mainline.

Laterals are pipelines that carry CO_2 from ethanol plants to trunklines.

*Indicates valves located within pump stations, launcher/receivers, or capture facilities.

The Project South Dakota pipeline will require approximately 6,384 acres for construction and 2,912 acres for operations (see **Table 3** below and **Figure 2** above). Detailed Project facility land requirements are included in Section 5.5 Land Use and Local Land Controls. A summary of land requirements for all construction and operation Project components is included in **Table 3**.

Table 3: Land Requirements for the Project (Acres)		
FACILITY	CONSTRUCTION [1]	OPERATIONS [2]
Pipelines	5892.6	2,886.1

Table 3: Land Requirements for the Project (Acres)		
FACILITY	CONSTRUCTION [1]	OPERATIONS [2]
Pump Stations	12.0	12.0
MLVs	1.5	1.5
Launcher-Receivers	2.8	2.8
Access Roads	28.8	10.0
ATWS	446.3	0.00
TOTAL	**6,384.0**	**2,912.4**

Notes:
[1] Acreage for construction includes both construction (temporary) and operations (permanent) footprint.
[2] Acreage for operations includes only permanent footprint.

2.1.2 Future Expansion and Other Industrial Facilities

The Project as depicted in the maps and text within this application are for a total system capacity of 18 MMTPA of CO_2. There are no additional facilities contemplated at this time for future expansion.

2.2 Engineering Design

The proposed facilities will be designed, constructed, inspected, tested, and operated in accordance with applicable requirements and regulations, including the U.S. Department of Transportation (US DOT) regulations in 49 Code of Federal Regulations (CFR), Part 195, Transportation of Hazardous Liquids by Pipeline, American Society of Mechanical Engineers (ASME) Standard B31.4, and other standards, practices, and guidelines referenced by the US DOT and ASME.

These regulations and standards specify pipeline material and qualification; minimum design and operating requirements; inspection and testing requirements; protection from internal, external, and atmospheric corrosion; and other controls to ensure adequate protection for the public and environment and prevent pipeline incidents.

To comply with the regulations, standards, and the Applicant's internal quality standards, the Applicant will implement a quality assurance and quality control plan (QA/QC Plan). The QA/QC Plan will establish technical inspection policies and procedures during manufacturing and construction and will delineate the duties and responsibilities of each QA/QC inspector assigned to the Project. The Applicant's QA/QC Plan will include periodic audits by manufacturing and construction management to confirm that inspections are being properly performed and documented.

Typical workspace configurations and layout are provided for aboveground facilities (i.e., pump stations, MLVs, and launcher and receiver facilities) in **Appendix 2** and for the pipeline ROW in Appendix B of the Project's Environmental Construction Plan (ECP) found in **Appendix 3** of this application.

2.2.1 Pipeline

The pipeline component of the Project receives CO_2 from industrial facilities and delivers the CO_2 to the sequestration facilities proposed in North Dakota via a series of laterals, trunklines, and main lines (see **Figure 2**). Main lines are pipelines that carry CO_2 from trunk lines to the sequestration facility. Trunk lines are pipelines that carry CO_2 from ethanol plants to mainlines or from lateral pipelines to the mainline. Laterals are pipelines that carry CO_2 from ethanol plants to trunklines. The pipelines will be constructed

of high-strength carbon steel pipe, meeting the American Petroleum Institute 5L Pipe Specification (API 5L). Based upon volume requirements and pressure service, pipe segments will range in size from 4.5- to 24-inches outside diameter (OD) and have a wall thickness ranging from 0.189 inches to 0.750 inches. Pipe wall thickness categories are conventional pipeline installation (Design Factor 0.72), road crossings (Design Factor 0.6), railroad (RR) crossings (Design Factor 0.5), and horizontal directional drills (HDDs) (Design Factor 0.5). To protect against corrosion, the Applicant will apply an external fusion bonded epoxy (FBE) coating to the pipeline and an impressed current cathodic protection (ICCP) system will be used. Pipeline installed in HDDs will also have an Abrasion Resistant Overcoat (ARO) installed as a secondary coating over the FBE.

The pipeline has been designed as follows:

- Maximum Operating Pressure (MOP): 2,183 pounds per square inch gauge (psig).
- Maximum operating temperature: 120 degrees Fahrenheit.
- Maximum design flow rate: 936 million standard cubic feet (MMSCF)/day which is approximately equivalent to 18 MMTPA of CO_2.

Figure 3 is a system schematic for the overall system. The design of the pipeline system is based on a maximum 2,150 psig discharge pressure at pump stations or capture facilities. The MOP of the pipeline and pipeline facilities is 2,183 psig.

All Project pipelines will have a design factor of 0.72, except at road, RR, and waterbody crossings where more conservative design factors are applied, as discussed above. The design factor for hazardous liquid pipelines is a safety factor which controls the operating pipelines at stress levels below a certain range of the specified minimum yield strength (SMYS) of the pipe material. The design factor is one of several key components used to calculate the internal design pressure of a pipeline and is defined in CFR Title 49 Part 195.106.

All pipeline segments will allow the passage of internal inspection devices (commonly referred to as "smart pigs"), which are designed to detect certain internal and external anomalies in the pipe such as corrosion, dents, and scratches. Launchers and receivers are designed to launch and receive these internal inspection devices along with other types of pigs (e.g., maintenance pigs). The launchers and receivers will be located within pump stations and at stand-alone sites, generally spaced as needed along the pipeline length as identified in **Figure 2**.

2.2.2 Pump Stations

The four pump stations in South Dakota (Mainline Pump Stations [MPS] -04, -05, -06, and -07) will be located in Minnehaha, Beadle, Brown, and McPherson counties (preliminary locations are indicated on the route maps provided in **Figure 2** and in the system schematic in **Figure 3**).

Pump station sites will be acquired by the Applicant in fee, where possible. Construction of pump stations would start with civil pad work, followed by foundation installation, pipe and electrical installation, and finally commissioning activities. Pump stations will have security fence around the perimeter. All pumps and major equipment will be installed within a shelter.

Pump stations would be accessed using temporary access roads during construction and permanent access roads during operations. Pump stations will be designed and constructed to meet the requirements of American Society of Mechanical Engineers' *Pipeline Transportation Systems for Liquids and Slurries Standard* (ASME B31.4), and relevant standards published in the National Electric Code (NEC). Each pump station will be fenced and contain up to four pumps driven by electric motors, an electrical building,

electrical substation, a pump shelter building, communications equipment, and parking area for station personnel. The Applicant will purchase electricity for its pump stations from local power providers. It is anticipated that the installed horsepower will range between 4,000 and 6,000 horsepower, including a fully redundant hot spare pump and motor. Actual power use will range between 2,000 and 3,000 horsepower, requiring 1,500 to 2,500 kW of electricity.

Pump stations will utilize electricity for all pumps, lights, and heating in the buildings. Pump stations will be fully automated for unmanned operation. Remote start/stop set point controls, unit monitoring equipment, and station information will be installed at each location. The pipe entering and exiting the pump station sites will be located below grade; however, some of the piping within the pump station yard (after entering and prior to exiting the pump station facilities) will be aboveground.

Backup power at the pump stations will consist of batteries to maintain communications equipment for communications between the pump station and the pipeline control center and to provide lighting and power for minor facility procedures if the local utility power supply is disrupted. Backup power is not designed to keep the pumps operating.

There will be MLVs within each fenced pump station facility. In some cases, launchers and receivers and deep well anode ground beds for the ICCP will also be located within the fenced pump station facility. Other, stand-alone launcher-receiver and ICCP facilities will be fenced on a permanent easement or land purchased from landowners on or near the pipeline routes (see description of launcher-receivers below). This would include any permanent access to the sites.

The Applicant is currently evaluating communication systems. It is anticipated that valve sites will utilize a cell modem with satellite backup for communications back to the pipeline control center. The preferred method for pump stations would be through a local Internet Service Provider (ISP), where applicable, with cell modem or satellite backup. It is expected that reliable communications can be established without the use of any communications towers greater than 50 feet.

SUMMIT CARBON SOLUTIONS PIPELINE

SUMMIT CARBON SOLUTIONS

No.	Pipeline Name	Pipeline Type	Segments	Segment Length Miles	Total Length Miles	Pipe OD NPS	Pipe WT Inches
1	IAM-101	Main Line	IAM-101A	29.06	93.22	8"	0.218
			IAM-101A2	27.39		12"	0.323
			IAM-101B	36.77		12"	0.323
2	IAM-102	Main Line	-	-	57.75	20"	0.434
3	IAM-103	Main Line	IAM-103A	37.66	60.01	20"	0.434
			IAM-103B	22.35		24"	0.520
4	SDM-104	Main Line	SDM-104A	27.19	151.16	24"	0.520
			SDM-104B	123.97			
5	SDM-105	Main Line	SDM-105A	26.26	108.65	24"	0.520
			SDM-105B	82.40		24"	0.520
6	NDM-106	Main Line	-	-	176.57	24"	0.520
7	IAT-201	Trunk Line	-	-	3.49	6"	0.203
8	IAT-202	Trunk Line	-	-	20.57	16"	0.347
9	IAT-203	Trunk Line	-	-	30.42	10"	0.272
10	IAT-204	Trunk Line	-	-	47.40	12"	0.323
11	IAT-205	Trunk Line	-	-	31.04	20"	0.434
12	SDT-206	Trunk Line	-	-	14.50	6"	0.203
13	SDT-207	Trunk Line	-	-	23.57	6"	0.203
14	SDT-208	Trunk Line	-	-	50.61	8"	0.218
15	SDT-209	Trunk Line	-	-	12.43	8"	0.218
16	SDT-210	Trunk Line	-	-	12.31	6"	0.203
17	NDT-211	Trunk Line	-	-	113.53	12"	0.323
18	IAL-301	Lateral	IAL-301A	49.83	90.61	12"	0.323
			IAL-301B	40.78		8"	0.218
19	IAL-302	Lateral	IAL-302A	30.46	54.02	12"	0.323
			IAL-302B	23.56		8"	0.218
20	MNL-303	Lateral	MNL-303A	4.67	54.67	6"	0.203
			MNL-303B	50.00		8"	0.218
21	MNL-304	Lateral	-	-	88.55	10"	0.272
22	MNL-305	Lateral	-	-	33.77	8"	0.218
23	IAL-306	Lateral	-	-	30.65	8"	0.218
24	IAL-308	Lateral	IAL-308A	58.73	92.34	12"	0.323
			IAL-308B	33.61		10"	0.272
25	NEL-309	Lateral	-	-	46.98	8"	0.218
26	NEL-310	Lateral	-	-	28.35	10"	0.272
27	NEL-312	Lateral	NEL-312A	44.06	79.29	16"	0.347
			NEL-312B	35.24		16"	0.347
28	NEL-313	Lateral	-	-	65.61	6"	0.203
29	NEL-314	Lateral	-	-	11.84	6"	0.203
30	NEL-315	Lateral	-	-	29.79	8"	0.218
31	NEL-316	Lateral	-	-	16.18	16"	0.347
32	IAL-318	Lateral	IAL-318A	33.70	74.05	16"	0.347
			IAL-318B	40.35			
33	SDL-320	Lateral	-	-	80.30	6"	0.203
34	MNL-321	Lateral	MNL-321A	28.11	31.57	4"	0.189
			MNL-321B	3.46			
35	NDL-323	Lateral	-	-	16.96	4"	0.189
36	NDL-324	Lateral	-	-	54.75	8"	0.218
37	NDL-325	Lateral	NDL-325A	2.48	5.77	24"	0.520
			NDL-325B	3.29		16"	0.347
38	NDL-326	Lateral	-	-	4.86	24"	0.520
39	NDL-327	Lateral	NDL-327A	6.23	9.25	24"	0.520
			NDL-327B	3.02		20"	0.434
40	NDL-328	Lateral	-	-	6.80	24"	0.520
41	IAL-329	Lateral	-	-	0.62	6"	0.203
42	IAL-331	Lateral	-	-	0.02	6"	0.203
43	NEL-333	Lateral	-	-	0.21	6"	0.203
44	NEL-334	Lateral	-	-	0.38	6"	0.203
45	SDL-335	Lateral	-	-	0.42	6"	0.203
46	SDL-336	Lateral	-	-	0.53	6"	0.203
47	MNL-337	Lateral	-	-	46.77	8"	0.218
48	IAL-340	Lateral	-	-	0.04	4"	0.189
Total Length, Miles					2063.19		

Not for Construction

LEGEND:

- ▲ LAUNCHER
- ▲ RECEIVER
- ● CAPTURE FACILITY
- ● SEQUESTRATION SITE
- ● PUMP STATION - ACTIVE
- ● PUMP STATION - FUTURE

PIPELINE

- 4"
- 6"
- 8"
- 10"
- 12"
- 16"
- 20"
- 24"

NOTES:

1. COORDINATE SYSTEM IS BASED ON NAD83, UTM ZONE 14 NORTH, U.S. FEET.
2. THE ENTIRE SYSTEM MOP IS 2183 PSIG.
3. DATA DISPLAYED IS CURRENT AS OF 10/10/22.

0 10.25 20.5 41
Miles
1 inch equals 20.5 miles

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APP'D
13	ISSUED FOR USE	GIE	10/10/22	VK	YK
12	ISSUED FOR USE	GIE	10/03/22	VK	YK
11	ISSUED FOR USE	GIE	08/01/22	VK	YK
10	ISSUED FOR USE	GIE	06/22/22	VK	YK
9	ISSUED FOR USE	GIE	06/09/22	VK	YK
8	ISSUED FOR USE	GIE	05/12/22	VK	YK

GULF INTERSTATE ENGINEERING

DWN. BY: CB	DATE: 10/10/22
CHK. BY: VK	10/10/22
PROJ. ENGR: YK	10/10/22
PROJ. MGR: DA	10/10/22
CLIENT APP: LM	10/10/22

SUMMIT CARBON SOLUTIONS

Summit Carbon Solutions Pipeline

CO2 SYSTEM SCHEMATIC

DWG NO: 1927-000-PL-DWG-7003 | SHT: 1 OF 1 | REV: 13

EXHIBIT A 1

Document Path: P:\1927\GIS\MapFiles\Overall Maps\CO2 Pipeline System Schematic\1927-000-PL-DWG-7003.mxd

2.2.3 Mainline Valves

The Applicant plans to construct MLVs at each pump station, capture facility, and launcher-receiver facility, as well as 25 MLVs as intermediate MLVs capable of remote operation. When not located at a pump station, MLVs will be sectionalizing block valves constructed within a 50-foot-wide by 50-foot-long site located within the 50-foot-wide, permanently maintained pipeline ROW. These intermediate valve sites will be located within a permanent aboveground easement obtained from landowners. The spacing intervals between the MLVs along the pipeline ROW will be in accordance with Title 49 part 195, as well as, based upon the location of pump stations; CO_2 dispersion calculations and modeling; high consequence areas, including densely populated areas and highly sensitive environmental areas; and other topographic and environmental considerations. Remotely activated valves are located at pump stations, major river crossings, and sensitive waterbodies. In the unlikely event of an emergency, these valves can be remotely activated from the Ames Control Center, to isolate sections of the pipeline and minimize potential discharges.

2.2.4 Launcher-Receivers

As mentioned above, some launcher-receiver facilities will be located within the fenced pump station facility. Other, stand-alone launcher-receiver facilities and ICCP facilities will be fenced on permanent easements or land purchased or leased from landowners on or near the pipeline ROW.

2.2.5 Access Roads

The Project pipeline will require 38 temporary access roads for construction and 42 permanent access roads for operations. Permanent access roads will provide access to 51 MLVs, 6 launcher-receivers sites, and pump stations. Access roads will be 30 feet wide and will be constructed by grading and applying gravel as required to provide a drivable surface and to prevent erosion. Temporary access roads will be removed, and the area restored to previous conditions after construction unless otherwise agreed upon with individual landowners.

2.2.6 General Construction Procedures

The ECP (**Appendix 3**) provides Project procedures to reduce the occurrence of off-site sedimentation and erosion and to increase the success and efficiency of revegetation and restoration methods on lands crossed by the Project. The ECP identifies generally recognized best management practices (BMPs) that will be implemented to minimize and mitigate impacts, particularly to wetlands, waterbodies, and agricultural areas. Mitigation measures for agricultural impacts include establishing original contours and drainage patterns after construction and other measures as described below and in Section 3.0 of the ECP.

Areas to be cleared and graded will be flagged, this includes the pipeline ROW, aboveground facilities, access roads, and ATWS. The construction ROW width will vary with pipe diameter but will generally be 100 or 110 feet wide depending on pipe diameter, with 50 feet of this maintained and acquired as permanent easement for pipeline operations. Qualified inspection personnel will inspect the clearing and grading activities to ensure the contractor stays within the authorized limits of disturbance.

Agricultural areas with crops present will be mowed or disced to ground level unless the landowner requests the crops be removed. Bushes and trees will be felled or sheared to prevent damage to adjacent trees and structures. Bushes and trees may be disposed of, burned, or chipped and spread over the ROW outside of wetlands and active agricultural fields. Burning may be conducted in accordance with all permits, regulations, and approvals.

In addition, agricultural areas that have terraces will be surveyed to determine pre-construction contours to ensure restoration will be successful when establishing original contours and drainage patterns.

Trenching depth for pipeline construction will be sufficient to comply with the minimum depth of cover requirements described in PHMSA requirements and/or landowner agreements. Additional conditions may be implemented if requested by local, state, or federal agencies in areas adjacent to wetlands or waterbodies or in sensitive habitat. Civil surveys will occur post-installation of the pipeline to ensure that the depth of cover meets state and federal requirements.

To allow the passage of wildlife, livestock, and to facilitate the natural drainage pattern, spoil piles will have gaps that align with the breaks of the strung pipe. Bridges may also be constructed to allow the passage of wildlife and livestock. If blasting is required to excavate the trench, a Blasting Plan will be developed, and the procedures followed. See 2.2.8 below for special construction procedures. Trenching procedures will be followed to minimize the length of time the trench is left open.

If required, dewatering will occur in accordance with state regulations and the BMPs stated in Section 6.2 of the ECP. The trench will be backfilled using the excavated and separated material from the trenching process and then stabilized as soon as possible. Stream bottoms will be restored to near as pre-construction condition as possible during the backfilling process, with no impediments to normal water flow. Final grading will occur to ensure that the pre-construction contours are matched with the surrounding topography and that the disturbed area is stabilized.

If any excess subsoil remains after the backfilling process, it will be removed and disposed of at an approved location to ensure contours are restored to the pre-construction condition. Subsoil will not be placed on topsoil. Cleanup will immediately follow the backfilling operation as weather conditions allow. Waste will be disposed of in a manner that meets regulations and the conditions listed in Section 9 of the ECP. Temporary erosion and sediment control structures will be removed in stabilized areas and permanent structures will be installed, if necessary.

Following the cleanup procedure, seed bed preparation will begin. Restoration and seeding are included in Section 6 of the ECP.

Pump station construction activities at each new facility would follow the same procedure. Construction would start with civil pad work, followed by foundation installation, pipe and electrical installation, and finally commissioning activities. All facilities will have security fence around the perimeter. All pumps and major equipment will be installed within a shelter.

2.2.7 Special Construction Procedures

Where required, the HDD and bore crossing methods will be utilized for designated major or sensitive waterbodies, USFWS-protected wetlands, USFWS grassland easements, and other features where surface disturbance is to be avoided or reduced. The Contractor will construct each directional drill waterbody crossing in accordance with a site-specific plan. A typical configuration of an HDD crossing is provided in Appendix B of the ECP (**Appendix 3)**. Construction of the HDD method includes staging the drilling equipment on one or both sides of the stream/river/feature and the made-up pipe string for the crossing length on the other side. After the hole has been drilled and the pipe string is welded up, the string pipe will be pulled through the hole by the drill rig to complete the crossing. Water for mud make up and hydrotesting of the pipe string may be acquired from the stream/river crossed or an alternate source.

If blasting is required for a stream crossing, the Applicant will ensure that the Project will be in compliance with local, state, and federal regulations during the blasting process. In the event blasting is necessary, the Applicant will prepare a Blasting Plan for the Project to include procedures, safety, use, storage, and

transportation of equipment. The Contractor and its blasting supervisor will be licensed and thoroughly familiar with and comply with the rules and regulations of Occupational Safety and Health Administration (OSHA) and all federal, state, county and local regulations governing blasting operations. Blast materials will be contained and collected to ensure proper disposal of the materials. Containers used will be covered to prevent impacts to stormwater runoff.

Typical drawings for construction of the pipeline ROW, waterbody and other sensitive area crossings, and water withdrawals are provided in Appendix B of the ECP (**Appendix 3**).

2.3 Operation and Maintenance

The Project will meet or exceed state and federal safety requirements and, at a minimum, will be designed in accordance with 49 CFR Part 195 – Transportation of Hazardous Liquids by Pipeline.

2.3.1 Normal Operations and Routine Maintenance

The Project will have a state-of-the-art Operations Control Center (OCC) located in Ames, Iowa (primary location). The OCC will employ experienced and trained staff who will continuously monitor and control pipeline operations. A Supervisory Control and Data Acquisition (SCADA) system will communicate with all field sites and provide real time status from every facility and/or data collection point along the pipeline system. Data such as pressure and flow will be trended to ensure pipeline operation is maintained within established, safe operating parameters. OCC personnel will have the capability to remotely shut down pump stations and isolate pipeline segments in the event abnormal operating conditions are observed.

A Real Time Transient Model (RTTM) leak detection system will be deployed. The RTTM is a real time hydraulic model of the pipeline system that runs in parallel. If the behavior of the pipeline does not match the hydraulic model, the OCC is notified that an issue must be analyzed. Alarms will be established for pipeline controllers when this analysis detects a potential leak profile.

Operating and Maintenance (O&M) procedures will be developed for OCC and field personnel prior to commencement of operation. These O&M procedures will include both normal and abnormal operating conditions.

Maintenance will include regular inspection and surveillance of the pipeline and appurtenances in accordance with the O&M procedures referenced above and requirements set forth in 49 CFR Part 195. The pipeline ROW will be patrolled and visually inspected every two weeks, weather permitting, and not less than 26 times annually. Aerial patrol will check for abnormal conditions/appearances or dangerous activity (unauthorized excavation, unauthorized construction, etc.)

2.3.2 Abnormal Operations

The Project will comply with federal Emergency Response requirements set forth in 49 CFR 195. An emergency response plan will be developed and in place prior to commencement of operation. All Summit field personnel will be trained in emergency response procedures and will coordinate with local 1st responders and local authorities to conduct training to ensure preparedness. The Applicant will conduct public education outreach programs, including damage prevention programs, that meet or exceed industry requirements concerning public awareness of pipelines and pipeline operation.

3 Demand for Facility

The Project seeks to fill a demand by midwestern ethanol producers to unlock access to low carbon fuel markets, predominantly on the west coast of the U.S. Lowering carbon intensity scores for ethanol greatly benefits South Dakota's ethanol and agriculture industries, enhancing their long-term economic and

environmental sustainability. Utilizing the Project to capture and permanently store their CO_2 emissions enables participating ethanol plants to reduce their carbon footprint by as much as fifty percent (50%), putting them on the path towards producing a net-zero carbon fuel. Doing so greatly improves ethanol's ability to compete in low carbon fuel markets, which have increasingly stringent carbon reduction goals. Those markets represent a significant growth opportunity for low carbon fuels into the future. Without the Project pipeline, the 7 partner ethanol plants in South Dakota would lack a viable option to capture and permanently store their CO_2 emissions because South Dakota does not have proven subsurface geologic formations capable of economically storing the volume of CO_2 the plants produce. The Project is necessary for these ethanol plants because it provides a CO_2 transportation solution, which otherwise would not exist, and without which South Dakota's ethanol plants would be at a significant long-term disadvantage to ethanol plants in states like North Dakota and Illinois, which contain proven subsurface geologic storage formations. The Project pipeline provides benefits not only for the ethanol industry, but for an even broader segment of the public - the agriculture industry with which it partners. As the Applicant's South Dakota ethanol partners earn more for producing low-carbon renewable fuel, it strengthens the economic prosperity and long-term viability of ethanol, and as a result, benefits South Dakota's family farms, and ultimately the entire state. The ethanol industry is the largest purchaser of South Dakota corn, consuming nearly 50% of South Dakota's corn crop each year. A stable ethanol industry provides South Dakota's farmers with a reliable market for their corn and underpins the value of South Dakota farmland those crops are grown on. The Project has, and will continue to offer, carbon transportation and storage services to a variety of industrial facility owners in Iowa and surrounding states, which for the first time gives them a viable opportunity to reduce their carbon emissions. These facilities include other ethanol plants, nitrogen producers, and more, which are under growing pressure to reduce their carbon footprints.

The Project will also play an important role in reducing greenhouse gas emissions in the effort to combat climate change. As governments, industries, and consumers seek to reduce carbon emissions, a dramatic increase in carbon capture and sequestration (CCS) is crucial to achieving that goal. The Project is capable of moving up to 18 MMTPA of CO_2 for safe and permanent storage, which is the equivalent of removing approximately 3.9 million cars from our roads on an annual basis. Once operational, the Project will provide the largest and single most meaningful technology-based reduction of carbon emissions in the world.

4 Proposed Route and Alternative Routes

The purpose of the Project in South Dakota is to capture CO_2 from ethanol facilities and transport it via pipeline efficiently and safely to locations where it can be sequestered in North Dakota. The geologic formations proposed for sequestration in North Dakota are well known and were chosen because of the high level of associated information available and likelihood of success. The CO_2 cannot be economically sequestered onsite at ethanol facilities in South Dakota because of the lack of comparable and favorable geologic formations.

The transport of CO_2 by tanker truck and rail tankers is technically feasible but is better suited for the movement of small quantities. Using the maximum anticipated transport capacity for the Project of 18 MMTPA of CO_2, this would equate to 7,929,515 to 1,651,376 tanker truck loads or 213,523 rail tankers per year. These surface transport systems are not practical nor cost-effective and would not be feasible for the large-scale capture and storage of CO_2 required to meet the Project's purpose and need.

The criteria used to evaluate possible alternatives included minimizing the lengths of laterals and trunk lines from ethanol plants to a possible mainline route and minimizing the distance to the entry and exit

locations for the pipeline mainlines on the borders between South Dakota, Iowa, and North Dakota—fixed by those regulatory processes (Iowa Utilities Board and the North Dakota Public Service Commission).

The process for selecting the proposed route for the Project included: development of a preliminary route, route analysis, and finally, route variations and route selection.

4.1 Development of the Preliminary Route

The first step in establishing a proposed pipeline route was the development of a preliminary route using a Geographic Information System (GIS)-based routing program to determine the preferred routes for the mainline through South Dakota and laterals to each ethanol plant. Alternatives that were eliminated in this step did not meet the purpose and need of the Project because they did not minimize overall length of the pipelines and did not minimize the distance to possible entry and exit locations for the pipeline mainlines on the border between South Dakota, Iowa, and North Dakota that are fixed by those respective state regulatory processes.

The GIS routing program inputs included publicly available and purchased datasets. The development of the preliminary route included the following inputs: engineering (e.g., existing pipelines, railroads, karst, and powerlines, etc.); environmental (e.g., critical habitat, wetlands, state parks, national forests, brownfields, national registry of historic places, etc.); and land (e.g., dams, airports, cemeteries, schools, mining, and military installations, etc.). Each of these datasets was weighted based on the desire to collocate with certain features (low values) and the risk of crossing, or desire to avoid others (higher the risk, the higher the value), while minimizing overall length of the route (see **Appendix 5**). The GIS program utilized the weighted datasets to produce the preferred baseline route. For example, the existing pipelines dataset was assigned the lowest value so that the routing tool followed existing pipelines to the extent possible to minimize potential greenfield impacts (see **Table 4**). An example of a high weighted feature is the national wildlife refuge dataset; therefore, the GIS routing program excluded any national wildlife refuges from the preferred pipeline route to avoid impacts to these federal lands.

The preliminary route selection method maximized collocation with existing linear features, estimated at approximately 23% for all pipelines, and includes collocation with roads, overhead powerlines, and existing pipelines, see **Table 4**.

Table 4: Collocation of Pipelines in South Dakota

ROUTE	PIPELINE LENGTH (miles)	COLLOCATION LENGTH (miles)	PERCENT COLLOCATED
SDL-320	80.28	2.85	3.54%
SDL-335	0.52	0.19	36.32%
SDL-336	0.53	0.00	0.00%
NDT-211	24.92	1.80	7.24%
SDT-206	14.15	1.78	12.57%
SDT-207	23.57	2.56	10.86%
SDT-208	50.91	25.67	50.42%
SDT-209	12.43	0.29	2.33%
SDT-210	12.31	4.20	34.07%
SDM-104	123.89	57.30	46.25%
SDM-105	108.02	6.54	6.05%

Table 4: Collocation of Pipelines in South Dakota			
ROUTE	PIPELINE LENGTH (miles)	COLLOCATION LENGTH (miles)	PERCENT COLLOCATED
NDM-106	25.77	5.41	21.00%
ALL PIPELINES	477.31	108.58	22.75%

4.2 Route Analysis and Minor Route Modifications

The next step in selecting a proposed route for the Project included identifying a corridor of 1,500 feet around the proposed pipeline route and completing desktop analysis to determine opportunities to minimize impacts. During the desktop analysis, and using their professional knowledge of the proposed Project area, the Applicant identified several route modifications, including the following alternatives that were eliminated from further consideration (identified as Alt-SD-001 through Alt-007; see **Figures 4-1 through 4-4** in **Appendix 4**):

Alt-SD-001 & Alt-SD-002 (Figure 4-1, Appendix 4)

These alternatives were evaluated due to issues encountered by the Dakota Access Pipeline going north of Sioux Falls. These alternatives extend northeast of Brandon, SD to avoid population constraints between Sioux Falls and Brandon. The alternatives that were derived in this area are shorter (i.e., Alt-SD-001 by approximately 5.3 miles and Alt-SD-002 by approximately 3.5 miles), yet the current selected route paralleled the Dakota Access Pipeline while avoiding potential economic zoning issues and landowner denials to routing around Sioux Falls and Brandon. The preferred route, although longer in overall length, has less impact on streams that may provide suitable habitat for the federally endangered Topeka Shiner. The preferred route parallels an existing pipeline corridor for roughly 80% more in overall length compared to the identified alternatives.

Alt-SD-003, Alt-SD-004, & Alt-SD-005 (Figure 4-2, Appendix 4)

These alternatives were evaluated to avoid residential areas, schools, wetlands, and conservation easements in and around Round Lake, Brant Lake, and the city of Chester, SD and to avoid utilizing an HDD to cross Round Lake while avoiding conservation easements and population constraints within the area. The preferred route is approximately 4.2 miles shorter than Alt-SD-003, 3.9 miles shorter than Alt-SD-004, and 4.4 miles shorter than Alt-SD-005 and requires an HDD under Round Lake. It also impacts fewer landowners and avoids traversing within 1,500 feet of Chester High School.

Alt-SD-006 (Figure 4-3, Appendix 4)

This alternative was evaluated paralleling Highway 12 due to the number of conservation easements within the area. This alternative was roughly 0.30 miles longer and was within 500 feet of three additional houses compared to the preferred route. This alternative adds roughly 2.24 miles of conservation easement crossings to the project compared to the preferred route.

Alt-SD-007 (Figure 4-4, Appendix 4)

This alternative evaluated paralleling existing infrastructure as much as possible, however, this alternative would be approximately one mile longer and would add approximately 0.28 miles of

additional freshwater emergent wetland impacts to the project, or approximately 0.15 acres of additional wetlands.

4.3 Route Variances and Route Selection

The next step in optimizing the proposed route for the Project was to coordinate with state and federal agencies, collect field data, and engage landowners. The information gathered during this step was intended to identify where to additionally avoid or minimize impacts to:

- U.S. Fish and Wildlife Service (USFWS) grassland easements;
- Other environmental features such as wetlands and waterbodies;
- Cultural resource sites from the SD SHPO;
- Incompatible land uses (e.g., recently expanded quarries or landfills);
- Known landowner conflicts;
- Home/farm sites, buildings, irrigation systems, power poles/towers and other structures, trees planted for windbreaks, and property corners.

Route optimization resulted in many minor route variations that minimized environmental impacts and reduced the need for eminent domain. These variations were incorporated into the selection of the proposed route. Route variation development will continue up through construction from input by landowners and agencies.

The following "route variances that were under consideration" at the time of the initial application filing (February 7, 2022), have been implemented into the current Project design in South Dakota and are reflected in all mapping and impact acreage included in this supplemental filing. There are several areas where route variances are under active consideration to improve routing across private property, avoid tracts where the Project has been denied, and to minimize environmental impacts. Those still under active consideration are listed below, along with the justification for eventually incorporating these into the base route. Landowners within 0.5 mile on either side of these route variances will be properly notified. They are depicted in the maps found in **Appendix 4**.

SDM-104 MP 28 to 44 Reroute (Figure 4-5, Appendix 4) – Variance has been implemented into the Project design.

This route variance is being considered to move the route further south from the City of Sioux Falls in Lincoln County to avoid conflicts with future development plans. Additionally, the route variance would prevent numerous crossings of the existing DAPL pipeline. The route variance also moves the pipeline to property of landowners that are more favorable of the Project.

SDM-104 MP 60.9-1, MP 61 to 68 Reroute (Figure 4-6, Appendix 4) – Variance has been implemented into the Project design.

This route variance is being considered to avoid a USFWS fee land crossing associated with the Voelker I Waterfowl Protection Area in Minnehaha County. The route variance was designed to avoid South Dakota Game Fish and Parks (SDGFP) land associated with Scotts Slough. The route variance also moves the pipeline to property of landowners that are more favorable of the Project. SDM-104 would be routed approximately 2 miles to the east of the proposed route.

SDT-206 MP 4 to 8 Reroute (Figure 4-7, Appendix 4) – Variance has been implemented into the Project design.

This route variance is being considered to minimize impacts to development properties and agricultural leases at the request of impacted landowners in Lake County. The route variance was developed based on guidance from impacted landowners to minimize the impacts of the project on current and future uses of their parcels.

SDM-104 MP 105 to 115 Reroute (Figure 4-8, Appendix 4) – Variance has been implemented into the Project design.

This route variance moves the pipeline to property of landowners that are more favorable of the Project in Miner County.

SDT-207 MP 0.5 to 2.5 Reroute (Figure 4-9, Appendix 4) – Variance has been implemented into the Project design.

This route variance is being considered to minimize impact to land that is part of future expansion of the Huron Regional Airport in Beadle County. The route variance also moves the pipeline to property of landowners that are more favorable of the Project.

SDT-206, SDM-104, SDM-105 Reroute (Figure 4-10, Appendix 4) – Variance has been implemented into the Project design.

This route variance is being considered in Beadle County to reduce impacts to properties by optimizing the proposed locations of the launcher-receivers and pipeline to the edge of property boundaries to reduce the impact to each parcel. The repositioning of the launcher-receiver site would reduce the length of the required permanent access roads that would be needed, further reducing the impact to affected landowners.

NDT-211 Reroute (Figure 4-11, Appendix 4) – Variance has been implemented into the Project design.

This route variance is being considered in McPherson County to move the route farther away from the City of Leola. The route would be approximately 4 miles away from the city of Leola, or 1.7 miles farther than initially proposed. The route variance was also designed to avoid impacts to USFWS Grassland Easements.

Additional route modifications were implemented since the March filing date and are described in Table 5. Map books showing the filing date route and the current route are shown in **Appendix 6D**. Modifications will continue through permitting and land acquisition processes to further reduce environmental impacts, accommodate landowner preferences, better collocate the centerline with existing utilities, and reduce the need for eminent domain. The Applicant will comply with all notification procedures of route modifications required by the SD PUC. The Applicant is also committed to working with individual landowners along the route to minimize conflicts. The purpose of this process is to meet the overall purpose and need for the Project pipeline, to transport CO_2 from ethanol plants as efficiently as safely as possible to locations where it can be sequestered while minimizing overall Project length and minimizing impacts to the natural and built environment.

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
NDM-106	0.00	2.88	-3,841.9	Extension of route to new location of MPS-07 and to tie to route in North Dakota and avoidance of sensitive resources
NDM-106	3.47	4.86	+278.7	Avoidance of sensitive resources
NDM-106	4.93	5.09	-0.0	Avoidance of protected wetlands
NDM-106	5.40	6.21	+17.9	Avoidance of sensitive resources and protected wetlands
NDM-106	6.67	13.22	+579.2	Avoidance of sensitive resources and grassland easement.
NDM-106	15.08	15.17	+32.7	Adjusted route for road crossing
NDM-106	16.16	17.01	-2.0	Engineering change to better the route
NDM-106	17.42	17.99	+11.6	Engineering change for road crossing
NDM-106	19.17	20.01	-0.6	Removal of additional workspace
NDM-106	20.87	21.61	+15.8	Engineering/Construction change for road crossing
NDM-106	23.80	23.90	+30.6	Engineering/Construction change for road crossing
NDM-106	25.70	25.77	+21.6	Avoidance of wetlands
NDT-211	88.48	88.53	+24.4	Adjusted route for road crossing
NDT-211	88.75	90.49	+173.7	Adjusted route for waterbody crossing method (HDD) and road crossing
NDT-211	91.00	91.07	+31.0	Adjusted route for road crossing
NDT-211	91.47	91.55	+11.8	Adjusted route for road crossing
NDT-211	93.50	94.17	+75.6	Agreement with landowner
NDT-211	97.72	97.82	+6.5	Adjusted route for road crossing
NDT-211	99.01	99.43	+566.4	Avoidance of grassland easement
NDT-211	99.76	113.40	+4,504.1	Avoidance of landowner's property
SDL-320	0.00	0.42	-86.3	Adjustment to route for avoidance of existing MLV and to straighten the line

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDL-320	1.21	3.73	+0.1	Adjustment of workspace and addition of road bore/HDD
SDL-320	3.73	15.68	+44.4	Avoidance of power pole
SDL-320	18.14	24.38	+22.9	Adjusted route for road crossing
SDL-320	24.96	26.64	+0.0	Adjusted workspace for wetland crossing
SDL-320	27.17	30.74	+576.1	Additional HDD to cross USFWS grassland easement
SDL-320	31.36	31.46	+2.2	Avoided irrigation pivot
SDL-320	31.53	32.69	-7.4	Avoidance of wetlands
SDL-320	33.87	34.75	+233.1	Avoidance of sensitive resources and wetlands
SDL-320	34.93	35.56	+9.1	Adjusted route for road crossing
SDL-320	36.16	42.59	-166.3	Avoidance of federal land and USFWS grassland easements. Additional HDD will be added.
SDL-320	44.54	49.86	+68.1	Avoidance of property
SDL-320	50.80	61.35	+1,079.8	Avoidance of USFWS grassland easement.
SDL-320	61.37	63.55	-1,622.0	Landowner requested an adjustment to the route to avoid a drain tile.
SDL-320	63.75	68.16	-27.4	Avoidance of USFWS grassland easement.
SDL-320	68.70	70.92	+443.7	Avoidance of USFWS grassland easement. Additional HDD was added.
SDL-320	70.92	72.05	+10.1	Adjustment of additional workspace for road crossing
SDL-320	72.83	73.06	+0.0	Engineering change to improve workspace and avoid wetland features
SDL-320	74.49	75.44	-70.8	Avoidance of federal land and add a bore crossing to avoid impacts to USFWS grassland easement
SDL-320	76.49	76.63	+0.2	Addition of temporary trap setup

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDL-320	77.64	80.29	-1,549.9	Landowner requested an adjustment to the route to avoid gravel pit. Added workspace for HDD.
SDL-335	0.00	0.05	-236.6	Reroute to accommodate new location of the capture facility
SDL-335	0.15	0.52	+54.8	Avoidance of protected wetlands
SDL-336	0.00	0.03	+29.6	Avoidance of protected wetlands
SDM-104	26.65	53.57	+3,373.9	Avoidance of denied property tracts and avoidance of Sioux Falls City properties. Adhere to landowner requests and reduce crossings.
SDM-104	53.60	53.99	+33.5	Adjustment of additional workspace for road crossing
SDM-104	54.21	57.31	+1,019.8	Adhere to landowner requests and modification of route off of existing ROW
SDM-104	58.11	80.57	+3,762.5	Improved collocation with the Dakota Access Pipeline (DAPL) and avoidance of two additional crossings of DAPL. Avoidance of sensitive areas and U.S. fee owned property.
SDM-104	80.98	90.91	-288.9	Moved centerline away from existing pipeline
SDM-104	91.48	102.37	+953.8	Avoidance of multiple crossings and reduce wetland impacts
SDM-104	102.60	102.73	+18.7	Adjusted route for road crossing
SDM-104	104.42	105.84	-119.7	Avoidance of denied property tracts
SDM-104	106.08	106.28	+24.4	Avoidance of powerline
SDM-104	106.56	120.44	+2,853.7	Avoidance of denied property tracts
SDM-104	120.50	124.76	-63.0	Moved centerline away from existing pipeline; avoid denied property

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDM-104	125.95	126.96	+21.8	Moved centerline away from existing pipeline
SDM-104	127.34	130.87	+590.5	Reroute to accommodate new pump station location
SDM-104	131.65	133.52	+152.6	Adjusted route for road crossing; reroute to accommodate new pump station location
SDM-104	133.91	134.22	+23.7	Adjusted route for road crossing
SDM-104	136.13	136.96	+10.6	Avoidance of trees
SDM-104	137.36	137.47	+60.2	Adjusted route for road crossing
SDM-104	137.95	138.05	-9.8	Moved centerline to get workspace on southern property
SDM-104	138.49	138.73	-101.7	Adjusted route for road crossing; avoidance of power pole
SDM-104	140.91	143.59	-213.1	Removal of additional Points of inflection (PIs) in the route
SDM-104	144.21	144.29	+50.2	Adjusted route for road crossing
SDM-104	145.15	145.29	+12.0	Adjusted route for road crossing
SDM-104	146.23	146.31	+8.4	Adjusted route for road crossing
SDM-104	146.37	146.54	+32.0	Adjusted route for road crossing
SDM-104	147.46	147.55	+13.0	Adjusted route for road crossing
SDM-104	148.45	148.64	+38.4	Adjusted route for road crossing
SDM-104	149.24	150.53	+3,101.1	Alternative considered in original SD PUC application
SDM-105	0.00	1.86	-3,310.0	Moved centerline to allow better pig/receiver site, straighten centerline
SDM-105	2.74	6.56	+1,120.7	Combine portions of previous route variances. Avoidance of portions of property to avoid site of future cattle pens.
SDM-105	6.68	8.81	-87.3	Straightened route and mitigated one PI
SDM-105	10.29	10.39	+74.2	Adjusted route for road crossing

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDM-105	12.80	13.25	-9.4	Adjustment of workspace for road crossing
SDM-105	15.30	15.43	+7.9	Adjusted route for road crossing
SDM-105	16.74	16.80	+8.3	Adjusted route for road crossing
SDM-105	17.08	17.29	+42.2	Adjusted route for road crossing
SDM-105	18.27	18.33	+17.9	Adjusted route for road crossing
SDM-105	19.60	19.74	+42.5	Adjusted route for road crossing
SDM-105	20.74	20.82	+5.9	Avoidance of heritage site
SDM-105	22.98	23.10	+66.5	Adjusted route for road crossing
SDM-105	24.25	25.29	+145.3	Agreements with landowner to avoid home; avoided power pole and irrigation pivot
SDM-105	25.80	28.33	+9.2	Moved centerline from power line, fence, and road
SDM-105	29.12	29.25	+88.5	Adjusted route for road crossing
SDM-105	31.37	31.45	+17.6	Adjusted route for road crossing
SDM-105	34.08	36.20	+605.0	Straighten centerline
SDM-105	36.82	36.88	+44.0	Adjusted route for road crossing
SDM-105	37.24	39.27	+128.5	Moved centerline toward property line, route modification to pump station
SDM-105	40.56	43.07	+107.3	Adjusted route for road crossing
SDM-105	44.09	44.83	+34.3	Avoidance of park
SDM-105	46.52	50.79	+85.9	Adjusted route for road crossing; move centerline toward property line
SDM-105	51.49	52.77	+123.3	Adjusted route for better HDD crossing
SDM-105	53.16	53.23	+13.2	Adjusted route for road crossing
SDM-105	54.36	54.45	+39.7	Adjusted route for road crossing
SDM-105	56.27	57.50	-101.9	Avoidance of property at landowner's request.
SDM-105	57.68	57.73	+13.7	Adjusted route for road crossing

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDM-105	58.67	59.15	+55.1	Adjusted route for road crossing; moved HDD away from trees
SDM-105	60.10	61.11	+23.2	Shift route to allow space for bore boxes
SDM-105	62.29	62.35	+23.3	Adjusted route for road crossing
SDM-105	65.05	66.12	+103.9	New PI location to move MLV site out of road ROW and provide room for a bore if needed
SDM-105	66.38	67.78	+154.5	Avoid irrigation pivot; adjusted route for road crossing
SDM-105	69.06	69.20	+107.2	Adjusted route for road crossing
SDM-105	70.32	73.11	+64.5	Adjusted route for road crossing
SDM-105	73.86	73.92	+24.1	Adjusted route for road crossing
SDM-105	80.26	80.72	+209.2	Adjusted route for railroad crossing and road crossing
SDM-105	81.78	81.84	-10,331.8	Avoided denied property, conservation easements, and wetland
SDM-105	81.84	83.92	+306.0	Modification of PLR-15; better accommodate location of pig trap site on lateral from capture facility
SDM-105	85.30	86.76	+23.0	Avoidance of grassland easements and minimize wetland impacts
SDM-105	87.27	88.39	-4.9	Avoidance of protected wetlands
SDM-105	88.75	89.07	+23.8	Avoidance of protected wetlands
SDM-105	89.94	91.21	-0.2	Adjustment of additional workspace for HDD
SDM-105	91.44	96.40	-203.7	Improved crossing of landowner's property.
SDM-105	98.13	99.85	+392.1	Minimized impact on denied property tracts
SDM-105	100.45	100.51	+9.8	Adjustment of workspace for road crossing
SDM-105	101.63	101.73	+28.9	Adjustment of workspace for road crossing

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDM-105	102.48	108.02	+5,355.9	Extension of route to new location of MPS-07; avoid protected wetland, moved centerline parallel to existing pipeline
SDT-206	0.00	9.01	+1,939.3	Adjustment to route at the request of landowners to minimize impacts; reduced county highway crossings; avoidance of tree clearing
SDT-206	9.32	9.84	+52.3	Avoidance of landowner's property
SDT-206	10.15	10.79	+86.1	Moved centerline away from property corner
SDT-206	12.35	14.15	-690.7	Moved route away from landowner's property
SDT-207	0.00	4.57	+1,763.1	Avoidance of municipal airport expansion lands.
SDT-207	4.92	5.82	+179.8	Moved centerline toward property line
SDT-207	6.85	6.91	-13.6	Straighten centerline
SDT-207	8.00	8.93	+212.7	Moved centerline from irrigation pivot; adjusted route for road crossing
SDT-207	9.40	13.30	+55.7	Adjusted route for road crossing
SDT-207	13.30	13.38	+60.3	Adjusted route for road crossing
SDT-207	13.88	13.95	+16.4	Adjusted route for road crossing
SDT-207	15.41	15.53	+90.0	Adjusted route for road crossing
SDT-207	16.20	16.28	+38.0	Adjusted route for road crossing
SDT-207	17.20	20.23	+24.5	Adjusted route for road crossing; moved centerline away from power pole
SDT-207	20.96	21.54	+2.9	Avoidance of denied tract
SDT-207	22.08	23.57	+1,912.2	Alternative Considered in original SD PUC Application; better route for pig receiver
SDT-208	0.00	9.35	+6,356.6	Reroutes as a result of landowner meetings

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDT-208	10.40	10.77	-31.4	Straighten centerline but keep distance from existing pipelines
SDT-208	11.40	11.95	+12.9	Adjusted route for road crossing
SDT-208	12.53	12.64	+12.8	Adjusted route for road crossing
SDT-208	13.13	13.29	+48.2	Adjusted route for road crossing; avoidance of power pole
SDT-208	13.46	13.98	+28.4	Avoidance of power pole; adjusted route for road crossing
SDT-208	14.86	14.93	+32.8	Avoidance of crossing existing pipeline twice.
SDT-208	14.94	18.03	+443.4	Adjusted route for road crossing; avoid trees; moved centerline away from existing pipeline
SDT-208	18.73	22.74	-192.3	Moved centerline from existing pipeline
SDT-208	23.13	23.58	+38.0	Modification of route to relocate out of existing ROW
SDT-208	23.95	25.49	-36.6	Moved centerline to avoid trees
SDT-208	25.70	25.76	+58.3	Agreement with landowner and to minimize impact with drain tiles
SDT-208	26.29	26.39	+28.7	Installed bore to cross sensitive resource
SDT-208	28.33	30.08	-139.0	Avoidance of denied tract; avoidance of trees; straightened centerline
SDT-208	30.19	31.58	+140.4	Moved centerline because of existing pipeline ROW; adjusted route for road crossing
SDT-208	31.72	36.78	+362.3	Moved centerline to parallel existing pipeline; adjusted route for better crossing angle
SDT-208	37.13	37.30	+23.0	Adjusted to parallel with existing pipeline
SDT-208	37.30	38.78	+43.9	Avoidance of trees and move centerline away from existing pipeline; avoidance of tract to avoid water wells

Table 5: Route Variance Log				
ROUTE ID	MILEPOST START	MILEPOST STOP	LENGTH CHANGE (+/- IN FT)	REASON FOR CHANGE
SDT-208	39.01	42.34	-550.3	Adjusted route for road crossing; avoidance of wetlands; agreements with landowners
SDT-208	45.74	47.04	+0.0	Adjustment of workspace around sensitive features
SDT-208	47.89	48.54	+154.9	Agreements with landowners to avoid impact to crops
SDT-208	48.88	49.30	-8.4	Modification of route to move 250+ feet away from a residential building.
SDT-208	49.49	50.91	+1,778.5	Avoided denied properties, move centerline to better location and access to PLR-04, move centerline to be close to fence line
SDT-209	0.00	0.53	+2,411.1	Extend route to tie SDL-320 into SDT-206, adequate spacing for railroad HDD
SDT-209	1.14	1.90	+39.4	Adjusted route for road crossing
SDT-209	2.73	3.46	+60.1	Adjusted route for road crossing
SDT-209	3.84	9.42	+22.9	Adjusted route for road crossing
SDT-209	11.20	12.43	+1,848.1	Avoidance of denied property; reroute lateral to PLR-02
SDT-210	0.00	9.28	+2,604.3	Avoidance of grassland easement.
SDT-210	9.51	12.31	+12.9	Modification of route to move 250+ feet away from residential buildings.

5 Environmental Information and Impact on Physical Environment

This section provides a description of the existing environment at the time of the submission of this application and estimates potential short-term and long-term benefits and adverse impacts as result from construction and operation of the Project pipeline in South Dakota. General measures to avoid, minimize, and mitigate impacts are discussed within each section.

Summaries of potential environmental impacts as a result of the construction and operation of the Project pipeline in South Dakota can be found in subsequent sections of this application. Most impacts are anticipated to be minor and temporary during construction. The Applicant will implement BMPs and mitigation measures identified in each section to minimize those impacts.

5.1 Physical Environment

5.1.1 Landforms and Topography

In South Dakota, the Project pipeline is located entirely to the east of the Missouri River within the Interior Plains Physiographic Region. Much of the Project west of the James River is within the Glaciated Missouri Plateau Section of the Great Plains Physiographic Province. This includes the Project pipeline route that crosses McPherson, Hand, Hyde, and Sully counties. The Glaciated Missouri Plateau landscape is characterized by hummocky rolling hills and prairie potholes formed in glacial moraine and till deposits (USGS 2004).

The remaining portions of the Project are located within the Central Lowland Physiographic Province. The Central Lowland is further divided into the Western Lake and Dissected Till Plains sections, among others. Portions of the Project cross these sections in McPherson, Edmunds, Brown, Hand, Spink, Beadle, Clark, Codington, Hamlin, Kingsbury, Miner, Lake, McCook, Minnehaha, Turner, and Lincoln counties. The landscape of the Western Lake and Dissected Till Plains is characterized by flat to gently rolling hills formed in glacial till deposits dissected by many streams (USGS 2004).

Elevation relief along the route is approximately 850 feet; from around 2,100 feet above mean sea level (MSL) in McPherson County to around 1,250 feet above MSL along the James River in Beadle Country. Aerial photography and USGS topographic maps showing the Project pipeline route in South Dakota are provided in **Appendix 6A** (Appendix 6 submitted with this filing supersedes all previous submittals to the SD PUC)**.**

5.1.2 Geology

Surficial overburden deposits expected to be found at the trench depth across glaciated Eastern South Dakota are composed primarily of Quaternary age alluvium, eolian deposits, lacustrine sediments, moraine (till), and outwash. Alluvium consists of clay and silt, with lesser amounts of sand and gravel deposited by streams and is typically black or dark-brown and rich in organic matter. Eolian deposits form via the sorting of clay, silt, and sand-sized particulates from surficial sediments. Lacustrine sediments accumulate in areas containing ponded glacial meltwater and are often found in association with outwash deposits. Lacustrine sediments range in grain size from clay to fine sand and range in color from green to gray to black to white to possibly pink. Moraine is a relatively flat to gently rolling surface formed of debris (till) released from beneath a glacier. Till consists of non-stratified, unsorted debris that has been transported and deposited directly by glacial ice. Outwash is sand and gravel, with minor silt and clay, deposited by meltwater streams (Martin, et. al. 2004).

Beneath the surficial overburden, which can range in thickness from a thin veneer up to 1,000 feet thick, is lithic bedrock (Tomhave et. al. 2004). Lithic bedrock in the Project area consists primarily of Late Cretaceous and Early Proterozoic rocks. The primary and upper most bedrock unit found in the Project area is the Pierre Shale. The Pierre Shale is described as fissile and blocky with persistent beds of bentonite, black organic shale, and light-brown chalky shale with thickness up to 2,700 feet and is considered to have high shrink-swell potential. Shrink-swell potential along the route is further discussed in section 5.1.4.4. Bedrock units in glaciated Eastern South Dakota are known to outcrop along rivers and creeks where the glacial sediment overburden has been eroded away; however, no known bedrock outcrops were identified within the Project area. It is unlikely that Pierre Shale will be encountered at the trench depth. Minor lower units include the Niobrara Formation, the Carlile Shale, undifferentiated Cretaceous units, and the Sioux Quartzite (Martin et. al. 2004; Tomhave et. al. 2004).

According to the Soil Survey Geographic Database (SSURGO), a total of approximately 9 acres of the Project workspace has a depth of bedrock less than 3 feet, while the majority of the Project area has a depth to bedrock greater than 6 feet. See **Appendix 7** for the soil map units crossed by the Project, including depth to bedrock for each soil map unit. **Appendix 7** submitted with this filing supersedes all previous submittals to the SD PUC.

Construction Impacts

The impacts from construction will include disturbances to the topography at aboveground facilities and access roads. Disturbances along the pipeline ROW to topography will be minor and temporary because the Applicant will restore topographic contours and drainage patterns as closely as possible to pre-construction conditions.

It is unlikely that Pierre Shale will be encountered at the trench depth in upland areas along the Project pipeline route. In the event that Pierre Shale is encountered at trench depth, testing will be performed to identify the presence and extent of expansive soils and appropriate chemical, or physical stabilization measures will be put in place to mitigate and minimize impacts. Blasting has the potential to impact the geologic and physiographic environment. Limited blasting could be required in areas where shallow bedrock or boulders are encountered that cannot be removed by conventional excavation with a track hoe trencher, ripping with a bulldozer followed by track hoe excavation, or hammering with a track hoe-mounted hydraulic hammer followed by excavation. In the event blasting is necessary, the Applicant will prepare a Blasting Plan for the Project.

Operation Impacts

There will be only minor impacts to geology from operations. Impacts from maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. Clay rich geologic units can shrink as they dry and swell as they get wet, causing significant problems for road and structural foundations. See Section 5.1.5 for further discussion on the shrink-swell and landslide potential in South Dakota.

5.1.3 Rock, Sand, Gravel, and Economic Mineral Deposits

Of South Dakota's primary non-fuel resources, approximately 41 percent of the total non-fuel production value in 2017 originates from a combination of cement, clay (common clay and/or shale), feldspar, gemstones (natural), gypsum (crude), lime, mica (crude), sand and gravel (industrial), silver, and stone (dimension). These non-fuel resources are grouped together by USGS. Crushed stone accounts for approximately 13 percent of the state's non-fuel production value and gold amounts to approximately 32 percent of the state's non-fuel production value, while the remaining 14 percent comes from construction sand and gravel (USGS 2017).

According to South Dakota's Construction Aggregate and Mining database, there are seven sand and gravel mining sites within a quarter mile of the Project footprint (State of South Dakota 2021); however, none are crossed or will otherwise be impacted by the Project. A review of the South Dakota Department of Agriculture and Natural Resources' Oil and Gas Well database shows that there are no oil and gas wells within a quarter mile of the Project footprint.

Construction Impacts

Construction will have negligible and short-term impact on current mineral extraction activities due to the temporary and localized nature of pipeline construction activities and since no mines or wells will be

crossed by the Project. The Applicant will utilize the One Call system to locate underground utilities and conduct due diligence to identify and contact oil and gas well operators and pipeline gathering/transmission/distribution system owners prior to construction activities.

It is anticipated that the pipeline trench will be backfilled with materials excavated from the trench. Occasionally, it might be necessary to obtain construction sand and gravel from local, existing commercial sources for use such as pipe padding, road base, or surface facility pads. These short-term and localized demands for sand and gravel will not substantially affect the long-term availability of construction materials in the area, nor require new or additional mine sites to be constructed.

Operation Impacts

There will be no significant impacts to economic mineral deposits from pipeline operation. Impacts from routine maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include vegetation maintenance of the permanent pipeline ROW of vegetation. No existing oil and gas wells are within a quarter mile of the Project footprint and therefore will not be impacted by the Project during operations.

5.1.4 Soils

The majority of the Project is located in physiographic regions marked by soil series which belong to Udic Haploboroll, Typic Argiboroll, and Glossic Natriboroll subgroups in the north and Typic Argiustoll, Typic Haplustoll, Pachic Haplustoll, Pachic Argiustoll, and Typic Natrustoll subgroups in the south. The remaining areas of the Project are located in areas marked by soil series which belong to Udic Haplustolls, Typic Calciboroll, Typic Endoaquoll, and Udertic Haploboroll taxonomic subgroups and soil series with deep, silty profiles within Mollic Udifluvent, Vertic and Aerie Fluvaquent, and Vertic Endoaquoll subgroups.

The majority of the Project is in areas with soils classified as fine-loamy (40 percent), fine (30 percent), and fine-silty (25 percent). Fine-loamy soils are defined with a clay content between 18 and 35 percent, sand and silt make up the remainder; fine soils have 35 to 60 percent clay in the subsoil; and fine-silty soils are defined with a clay content between 18 and 35 percent and there is less than 15 percent sand that is coarser than very fine, the remainder is silt. The remaining areas of the Project consist of various soil texture classifications.

Soil characteristics relevant to the assessment of impacts from construction and operation of the Project include prime farmland status, hydric properties, compaction potential, erosion potential, presence of restrictive soil layers, presence of shallow bedrock, and revegetation properties. The Project Maps depicting the limits of the soil map units within the Project area as delineated by the Natural Resources Conservation Service (NRCS) are provided in **Appendix 6B**. A list of soil types within Project footprint is provided in **Appendix 7** and includes the acres of each soil type found within Project footprint and the important characteristics of each of the soil types. A summary of the acres of soil types within the Project footprint with these characteristics is provided in **Table 6**.

Table 6: Potential Soil Hazards Summary Table

SOIL CHARACTERISTIC	CONSTRUCTION FOOTPRINT (Acres)			OPERATIONS FOOTPRINT (Acres)		
	PIPELINE	ABOVE GROUND FACILITIES	ACCESS ROADS	PIPELINE	ABOVE GROUND FACILITIES	ACCESS ROADS
Prime Farmland	1,424.8	3.4	6.6	642.6	3.4	2.0

Table 6: Potential Soil Hazards Summary Table						
SOIL CHARACTERISTIC	CONSTRUCTION FOOTPRINT (Acres)			OPERATIONS FOOTPRINT (Acres)		
	PIPELINE	ABOVE GROUND FACILITIES	ACCESS ROADS	PIPELINE	ABOVE GROUND FACILITIES	ACCESS ROADS
Farmland of Statewide Importance	1,771.7	9.7	3.2	800.6	9.7	2.0
Prime Farmland if Irrigated or Drained	1,272.6	0.4	5.7	577.1	0.4	1.3
Hydric	378.3	0.8	2.6	185.6	0.8	1.5
Saline	130.3	0.1	0.7	65.8	0.1	0.5
Sodic	77.1	0.0	0.4	38.2	0.0	0.0
Shallow Bedrock/ Restrictive Layer	9.1	0.0	0.0	4.0	0.0	0.0
Poor Revegetation Potential	1,004.8	1.2	20.8	471.3	1.2	2.0
Severe Wind Erosion	25.8	0.0	0.5	13.4	0.0	0.0
Severe Water Erosion	88.1	0.0	2.9	45.0	0.0	0.0

Notes:
[1] Acres are rounded up for presentation purposes.
[2] Construction footprint includes impacts from both construction and operation.

5.1.4.1 Prime Farmland

The U.S. Department of Agriculture (USDA) defines prime farmland as "land best suited to food, feed, forage, fiber, and oilseed crops" (NRCS 2014). This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. Urbanized land and open water are excluded from prime farmland. Prime farmland typically contains few to no rocks, is permeable to water and air, is not excessively erodible or saturated with water for extended periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., artificial drainage). In addition, the USDA defines farmland of statewide importance as farmland for the "production of food, feed, fiber, forage, and oil seed crop" are those that are nearly prime farmland and that produce high yields of economic important crops when treated and managed according to acceptable farming methods" (NRCS 2014).

Construction Impacts

Approximately 1,435 acres (22.5 percent) of the lands crossed by the Project during construction have soils identified as prime farmland, and approximately 1,785 acres (28.0 percent) are identified as farmland of statewide importance. Another 1,279 acres (20 percent) of the footprint have soils considered to be prime farmland if irrigated or drained (NRCS 2021).

Impacts on these areas of prime farmland soils will be minimized by mitigation measures to be implemented according to the ECP (**Appendix 3**). During construction activities, topsoil on agricultural land, including on prime farmland areas associated with the pipeline ROW, will be stripped to a maximum depth of 12 inches and segregated from the subsoil. Topsoil will be stripped over the pipeline trench and the adjacent subsoil storage areas based on landowner stipulations. Segregated topsoil will be returned

following backfilling of the subsoil, re-establishment of pre-construction contours, ensuring preservation of topsoil within the construction area. Short-term impacts such as excavation and handling, and small isolated spills of fuels or lubricants may temporarily alter the capability of Prime Farmland following construction.

Operation Impacts

The footprint associated with permanent aboveground facilities (pump stations, mainline valves, and launcher/receivers) would occupy 3.4 acres of soils identified as prime farmland representing a permanent loss of prime farmland soils. Following the completion of construction, areas of prime farmland disturbed by the installation of the pipelines and temporary access roads will be restored to pre-construction uses; therefore, construction activities in these areas will not adversely impact prime farmland. Impacts from maintenance activities in these areas will be minor and short-term. Mitigation measures, as described above, will be implemented to minimize temporal disturbances.

5.1.4.2 Hydric Properties and Compaction Potential

Hydric soils are defined as "soils that formed under conditions of saturation, flooding, or ponding long enough during growing season to develop anaerobic conditions in the upper part" (USACE 1987). Soils that are artificially drained or protected from flooding (i.e., by levees) are still considered hydric if the soils are poorly or very poorly drained. Due to extended periods of saturation, hydric soils can be prone to compaction and rutting particularly if the operation of heavy equipment occurs when soils are saturated. Fine texture along with poor drainage are the primary factors that contribute to compaction in soils.

Construction Impacts

Soil compaction and rutting can occur with the movement of heavy construction vehicles along the pipeline ROW and on temporary access roads during construction. Compaction can damage soil structure, reduce infiltration, and increase runoff and erosion. The degree of compaction will depend on the moisture content and texture of the soil at the time of construction. Compaction will be most severe where heavy equipment operates on moist to wet soils with fine textures and where multiple passes are made by heavy equipment. If soils are moist or wet where trench-line only topsoil trenching has occurred, topsoil will likely adhere to tires and/or tracked vehicles and be carried away.

Rutting occurs when the soil strength is not sufficient to support the applied load from vehicle traffic. Ruts that exceed topsoil depth can mix topsoil with subsoil, thereby reducing soil productivity. Rutting affects the surface hydrology of a site as well as the rooting environment. The process of rutting physically cuts plant roots and reduces the aeration and infiltration of the soil, thereby degrading the rooting environment. Rutting also disrupts natural surface water hydrology by damming surface water flows, creating increased soil saturation upgradient from ruts, or by diverting and concentrating water flows creating accelerated erosion.

Approximately 381.7 acres (6 percent) of the lands that would be disturbed during construction have soils rated as hydric soils and approximately 676 acres (10.6 percent) of these lands have fine textured and poorly drained soils making them prone to compaction. Compaction and rutting impacts will be mitigated in wetland areas with hydric soils using timber mats and special crossing techniques. In the event of wet weather, the Applicant may cease work on the Project until it is deemed safe to continue work without causing more than minimal rutting to areas where topsoil has not been stripped. The Applicant and Contractors will restrict certain construction activities and work in cultivated agricultural areas in excessively wet soil conditions to minimize rutting and soil compaction. Work may be suspended during wet weather when there is potential of material mixing soil horizons or the potential for excessive

compaction. To minimize potential impact to soil resources, soil will be prepared after final grading to facilitate revegetation in undeveloped areas. This could include tilling compacted soil or other measures depending on the extent and severity of compaction.

Operations Impacts

Impacts from maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. The same mitigation measures discussed above for construction will be applied to maintenance activities that require soil disturbance.

5.1.4.3 Saline and Sodic Soils

Salinity is caused by the concentration of soluble salts (ionic charged particles) in the soil and is measured by electrical conductivity (EC). EC values in excess of 8 Deci Siemens per meter (dS/m) indicate saline soil conditions. Sodic soils are detrimental to plant productivity due to the toxicity of sodium and hydroxyl ions (OH). Sodic soils are caused by the lack of neutral soluble salts, thereby allowing exchangeable sodium (Na) to occupy more than 15 percent of the total exchange capacity, also known as exchangeable sodium percentage (ESP). Sodicity is measured using the sodium adsorption ratio (SAR), the ratio between sodium and other exchangeable soluble salts. A soil is considered sodic if the SAR is greater than 13.

A review of the SSURGO database indicates that approximately 131acres (2 percent) of soils crossed by the Project are considered saline within the top 6 feet and approximately 78 acres (1.2 percent) are considered sodic within the top 6 feet. **Appendix 7** identifies soil map units that are saline and sodic within the Project area, and soil units are mapped in **Appendix 6B**.

Construction Impacts

There are areas minimal areas that contain soils that are saline and/or sodic within the Project pipeline route. While it is unlikely that saline and/or sodic soils will significantly impact construction, the success of stabilization and restoration efforts in sodic and/or saline soils may be limited unless additional treatments and practices are employed to offset the adverse physical and chemical characteristics of the soils. In the event that saline and/or sodic soils are encountered at trench depth, testing will be performed to identify the presence and extent of the soils. Common chemical and physical mitigation measures will be put in place to mitigate and minimize impacts.

Operation Impacts

There will be negligible impacts to saline or sodic soil from operation of the Project because these soils will only be encountered during disturbances from maintenance. Disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. The same mitigation measures will be put in place if saline or sodic soils are encountered during operations.

5.1.4.4 Restrictive Soil Layers and Shallow Bedrock

Introducing stones or rocks to surface layers may reduce the capacity of the soil to retain moisture, resulting in a reduction of soil productivity. Additionally, areas with shallow depth to bedrock (less than 6 feet) are identified as areas that have potential to introduce rock to topsoil.

According to the SSURGO database, approximately 9.1 acres (<1 percent) of the Project area have soils with a depth to bedrock of 3 feet or less. Of the acreage impacted with shallow bedrock, Pierre Shale

bedrock could be found if it is the uppermost layer on the bedrock. As discussed above, bedrock in Eastern South Dakota is overlain by glacial deposits at the surface that can range in thickness up to 1,000 feet. Although it is unlikely that Pierre Shale will be encountered along the Project pipeline route at the trench depth, where shallow depth to bedrock coincides with areas underlain by the Pierre Shale formation could be areas where Pierre Shale will be encountered at trench depth. The remaining Project pipeline route has a depth to bedrock that exceeds 6 feet. **Appendix 7** identifies the depth to bedrock for each of the soil map units and soil map units are depicted on maps in **Appendix 6B**.

Construction Impacts

In stony or rocky soils, revegetation recovery rates may be slow. Similarly, in areas of shallow bedrock (relative to the trench excavation depth), excavation may result in rock fragments remaining on the surface or within the trench backfill at levels that will limit the success of restoration efforts. Where the pipeline route crosses soils with lithic bedrock, blasting or rock saws may be required for trenching. The overall impact from shallow bedrock is anticipated to be minimal because only 9.1 acres (<1 percent) were identified as having depth to bedrock less than 3 feet.

Operation Impacts

Permanent facilities, such as pump stations, MLVs, launcher-receivers, and permanent access roads, are located on sodic and saline soils. No permanent facilities are in areas where a shallow depth to bedrock was identified. Operations of permanent facilities will likely result in permanently altered soils or loss of soil resources within the specific facility's footprint. However, the acreage anticipated to be converted is small and negligible compared to the extent of the Project area. Impacts from maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections.

5.1.4.5 Revegetation Potential

The crop productivity index rating provides a relative ranking for crop production. Assumptions made in the crop productivity index are adequate management, natural weather conditions (no irrigation), artificial drainage where required, no frequent flooding on the lower lying soils, and no land leveling or terracing. The index ranges from 0 to 100, with higher values indicating higher production potential. For the purposes of this evaluation, a crop productivity index less than 50 is considered to have poor revegetation potential. More than 80 percent of the soil within Project footprint has a crop productivity index rating greater than 50. Detailed information regarding revegetation potential for each map unit crossed by the Project is provided in **Appendix 7** and mapped in **Appendix 6B**.

Construction Impacts

Successful restoration and revegetation of the Project workspace is important for the Applicant, landowner relations, maintaining productivity and protecting the underlying soil from potential damage. Fertility and erosion are generally the two main factors that will limit the re-growth of vegetation, but these can be mitigated through the application of fertilizers and/or seeding nets. The Applicant plans to minimize or mitigate potential impacts to soils by implementing the soil protection measures identified in the ECP (**Appendix 3**). The measures include procedures for segregating and replacing topsoil, trench backfilling, relieving areas compacted by heavy equipment, removing surface rock fragments, and implementing water and wind erosion control practices. In addition, the Applicant will work closely with landowners and soil conservation agencies to identify and implement recommended soil conservation practices in specific areas where they are needed. Damaged irrigation and tile drainage systems will be repaired in accordance with the ECP.

To accommodate potential discoveries of preexisting contaminated soils during construction, the Applicant will develop unanticipated contaminated soil discovery procedures. These procedures will be added to the ECP prior to construction if research indicates a potential for contaminated soils that exist along the pipeline ROW. If hydrocarbon contaminated soils are encountered during trench excavation, the appropriate federal and state agencies will be contacted. A remediation plan of action will be developed in consultation with appropriate agencies. Depending on the level of contamination found, affected soil may be replaced in the trench or removed to an approved landfill for disposal.

Operation Impacts

Operation of permanent aboveground facilities will result in permanently altered soils or loss of soil resources within the specific facility's footprint. However, the acreage of the above-ground facilities is small and negligible compared to the extent of the Project area. Impacts from maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections.

5.1.4.6 Erosion and Sedimentation

Erosion is a continuing process that can be accelerated by human disturbances. Factors that can influence the degree of erosion include soil texture, structure, length and percent of slope, vegetative cover, as well as rainfall or wind intensity. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles. Characterization of erosion potential includes both water and wind as agents of erosion.

Soils that are classified as having high erosion potential can be highly erodible but do not always exhibit this condition because of the multitude of parameters that require evaluation. Typically, field determinations of the length of the slope class crossed are needed before a soil can be definitively identified as having high erosion potential. For example, a soil map unit may have a slope class of 2 to 5 percent. If most of the map units crossed actually have a slope of 2 percent, the soils will most likely not have high erosion potential. However, if most of the map units being crossed had actual slopes of 5 percent, the soils will most likely be considered as having high erosion potential.

Construction Impacts

To minimize or avoid potential erosion impacts, contractors will utilize erosion and sedimentation control devices as provided in the ECP (**Appendix 3**). Clearing, grading, and equipment movement from Project construction have the potential to accelerate the erosion process. Without adequate protection this could result in discharge of sediment to waterbodies and wetlands. Soil loss due to erosion could also reduce soil fertility and impair revegetation. Environmental Inspectors will be retained during construction, by the Applicant, to oversee and report on construction compliance. The effectiveness of revegetation and permanent erosion control devices will be monitored by the Applicant's operating personnel during the long-term operation and maintenance of the Project.

Although accelerated erosion due to construction-related soil disturbance could occur at any stage of construction, the maximum potential for erosion within the construction ROW will be expected after final grading has occurred but before a vegetative cover had been reestablished.

The Kw Factor was used to determine areas along the Project pipeline route with soils susceptible to sheet and rill erosion by water. The Kw Factor quantifies the susceptibility of soil particles to detachment and movement by water. Soil properties affecting the Kw factor include soil texture, organic matter content,

structure, and saturated hydraulic conductivity (NRCS 2019). Kw factor values range from 0.02 for the least erodible soils to 0.64 for the most erodible soils, with 0.02 to 0.25 considered resistant, 0.25 to 0.40 considered moderately susceptible, and 0.40 to 0.64 considered high susceptibility to erosion. Approximately 91 acres (<2 percent) of soil along the Project pipeline route have Kw values greater than 0.4 indicating that high susceptibility to water erosion. **Table 7** below provides a summary of the soils determined to be susceptible to erosion by water (Kw greater than 0.40).

Table 7: Areas of Soils in the Project Area with High Susceptibility to Water Erosion

SOIL TYPE	Kw [1]	FACILITY	PIPELINE ID	MILEPOST[2]	LENGTH [3] (feet)	AREA [3] (acres)
Aquents loamy, ponded, 0-2 % slopes	0.49	Pipeline	SDM-105	61	1,748.8	0.8
Durrstein silty clay loam, nearly level	0.4	Pipeline	SDL-320	58, 59, 61, 64	15,029.6	6.6
Durrstein and Egas soils	0.49	Pipeline	SDL-320	18	3,630.6	1.4
Exline-Aberdeen-Nahon silt loams, 0-2 % slopes	0.43	Pipeline	SDL-320	79, 80	16,917.4	8.1
Exline-Aberdeen-Nahon silt loams, 0-2 % slopes	0.43	Pipeline	SDM-105	35, 45, 63, 64, 65	16,852.9	6.0
Exline-Aberdeen-Nahon silt loams, 0-2 % slopes	0.43	Pipeline	SDT-209	4	12,914.6	6.9
Exline-Aberdeen-Nahon silt loams, till substratum, 0-2 % slopes	0.43	Pipeline	SDT-209	7,8,9	33,348.4	17.3
Exline-Aberdeen-Nahon silt loams, till substratum, 0-2 % slopes	0.43	Pipeline	SDL-320	80	2,453.7	0.9
Exline-Heil silt loams, till substratum, 0-2 % slopes	0.49	Pipeline	SDT-209	7	2,392.6	0.8
Exline-Putney silt loams, 1-6 % slopes	0.49	Pipeline	SDM-105	62, 63, 64	28,188.9	10.8
Exline-Putney silt loams, 1-6 % slopes	0.49	Access Road	SDM-105	--	3,892.5	1.3
Heil silt loam, till substratum, 0-1% slopes	0.43	Pipeline	SDT-209	8,9	2,201.8	0.9
Heil silt loam, till substratum, 0-1% slopes	0.43	Pipeline	SDC-105	35	1,948.9	0.7
Heil silt loam, till substratum, 0-1% slopes	0.43	Pipeline	NDT-211	89	1,381.4	0.6
Hoven silt loam, 0-1 % slopes	0.43	Pipeline	SDL-320	0, 1, 17, 20, 21, 22, 26, 28, 32, 33, 36, 38, 44, 47, 48	31,695.2	12.9
Hoven silt loam, 0-1 % slopes	0.43	Pipeline	SDM-105	0, 2	5,439.9	2.1
Hoven silt loam, 0-1 % slopes	0.43	Pipeline	SDT-207	6,7	8,947.2	4.1

Table 7: Areas of Soils in the Project Area with High Susceptibility to Water Erosion						
SOIL TYPE	Kw [1]	FACILITY	PIPELINE ID	MILEPOST[2]	LENGTH [3] (feet)	AREA [3] (acres)
Jerauld-Houdek complex, undulating	0.43	Pipeline	SDL-320	65, 66	11,510.2	5.4
Jerauld-Houdek complex, undulating	0.43	Access Road	SDL-320	--	4,047.8	1.4
Miranda-Heil complex, 0- 3 % slopes	0.43	Pipeline	NDT-211	100	2,659.1	1.0
Zell-Great Bend silt loams, 6- 25 % slopes	0.43	Pipeline	SDM-105	53	2,261.6	0.8
Zell-Great Bend silt loams, 6- 25 % slopes	0.43	Access Road	SDM-105	--	632.0	0.2

Notes:
[1] Kw = erodibility in water factor; Kw over 0.40 considered highly susceptible to erosion by water.
[2] Approximate milepost, in which soils are present; soils are scatted within these areas.
[3] Approximate total length and area totaled over all polygons; -- signifies the polygon is not crossed by the pipeline centerline.
[4] Acres are rounded.

The soil characteristic Wind Erodibility Group (WEG) was used to determine the susceptibility of soils in Project footprint to wind erosion. The WEG groups soils into one of eight groups based on properties of the soil surface making them susceptible to wind erosion such as texture, organic matter content, calcareous content, rock fragment content, and mineralogy (NRCS 2019). Soil assigned to groups 1 and 2 are considered highly susceptible to erosion by wind, groups 4 through 6 are considered moderately susceptible, and groups 7 and 8 are considered the least susceptible to wind erosion. Less than 27 acres (<1 percent) of soil along the Project footprint are in WEG group 2 indicating that they are highly susceptible to erosion by wind. **Table 8** below provides a summary of the soils determined to be susceptible to erosion by wind (WEG 1 and 2).

Table 8: Areas of Soils in the Project Area with High Susceptibility to Wind Erosion						
SOIL TYPE	WEG [1]	FACILITY	PIPELINE ID	MILEPOST [2]	LENGTH [3] (feet)	AREA [3] (acres)
Dickey-Buse-Embden complex, 6-15 % slopes	2	Pipeline	NDT-211	92	998.1	0.4
Doger loamy fine sand	2	Pipeline	SDT-207	3, 5	6,140.0	2.9
Elsmere loamy fine sand, loamy substratum	2	Pipeline	SDT-207	5	7,719.2	3.1
Forestburg-Doger loamy fine sands, 0-3 % slopes	2	Pipeline	SDT-207	4, 6	14,069.8	6.5
Loup loamy fine sand	2	Pipeline	SDT-207	2, 4, 5	6,121.7	2.2
Shue loamy fine sand	2	Pipeline	SDT-207	5, 6	24,847.6	10.1
Telfer-Lihen loamy fine sands, 9- 15 %	2	Pipeline	NDM-106	23	2,751.9	1.1

Notes:
[1] WEG = wind erodibility group

Table 8: Areas of Soils in the Project Area with High Susceptibility to Wind Erosion						
SOIL TYPE	WEG [1]	FACILITY	PIPELINE ID	MILEPOST [2]	LENGTH [3] (feet)	AREA [3] (acres)

[2] Approximate milepost, soils are scattered in the area.
[3] Approximate total length (feet) and area (acres); -- means the polygon is not crossed by the pipeline centerline.
[4] Acres are rounded.

The contractors will use erosion and sedimentation control devices to reduce impacts from erosion. The Applicant will monitor the effectiveness of erosion mitigation measures to maximize revegetation efforts following construction. The overall impact from soil erosion is anticipated to be minor because only 27 acres of the pipeline ROW have soils identified as susceptible to wind erosion and 108 acres have soils identified as susceptible to water erosion.

Operation Impacts

The Applicant will address surface erosion issues in accordance with the ECP (**Appendix 3**). Operations of permanent above-ground facilities will likely result in permanently altered soils or loss of soil resources within the specific facility footprint, accounting for less than one percent of the total acreage of the Project.

Impacts from maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. The Applicant will routinely monitor the pipeline ROW to identify areas where erosion occurs. The Applicant will address surface erosion issues in accordance with the ECP (**Appendix 3**).

5.1.5 Seismic, Subsidence, and Slope Stability Risks

Seismic hazards include ground motion, surface faulting, and soil liquefaction. Soil liquefaction is a condition that typically occurs when loose, saturated soil is subjected to vibration or shockwaves, typically from a seismic event. The USGS ground motion hazard mapping indicates that the potential ground motion hazard in the Project area is low. Based on historical seismic activity in the area, the USGS estimates that an earthquake with a 10 percent probability of occurring within any 50-year interval will result in a maximum peak ground acceleration of 1-2 percent of the acceleration of gravity. In general, South Dakota historically has little earthquake activity that will be considered threatening or cause damage to property (SDGS n.d.). There are no identified active faults within 100 miles of the Project footprint. The low probability of a seismic event occurring within the Project area makes the occurrence of soil liquefaction unlikely.

Karst terrain results from the dissolution of highly soluble bedrock such as limestone and dolomite. Land subsidence is the sinking of the Earth's surface, either gradually or sudden, due to the subsurface movements of materials such as water or soil. Areas with karst terrain are more susceptible to subsidence events (Galloway et al., 2005). Several areas along the Project pipeline route in South Dakota are located where karst hazards are present. Karst in the area is described as having fissures, tubes, and cave less than 1,000 feet long and 50 ft or less vertical extent in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 feet to 200 feet thick (USGS 2014). One area along the Project pipeline route was identified with high karst hazard and high potential for the presence of sinkholes. The area is underlined by carbonate rock covered with less than 50 feet of glacially derived

sediments. **Table 9** below provides the locations where karst hazards are present along the Project pipeline route.

Approximately 29 percent (1,976 acres) of the soils along the Project pipeline route contain clay minerals such as smectite or montmorillonite. Clay has the property whereby when they are exposed to successive cycles of wetting and drying, they shrink and swell, and the soil fluctuates in volume and strength. Additionally, the Pierre Shale underlies the surficial overburden along approximately 78 percent of the Project pipeline route. Although it is unlikely that Pierre Shale will outcrop along the Project pipeline route in upland areas at the trench depth, it is known to outcrop along rivers and creeks where the glacial sediment overburden has been eroded away (Tomhave et. al. 2004). **Appendix 7** identifies soils along the Project pipeline route which are clay-rich and where the Pierre Shale is present with a shallow depth to bedrock and mapped in **Appendix 6B**.

Slope instability occurs when unconsolidated soils and sediments located on steep slopes become saturated, usually following a precipitation event. According to the USGS Landslide Hazard Inventory, the majority of the Project pipeline in South Dakota is in an area designated as having low susceptibility to landslides (less than 1.5% of the area is involved in landslides). Approximately 216.3 miles of the Project pipeline route is in an area designated as having a moderate susceptibility and low incidence to landslides (between 1.5% and 15% of the area is involved in landslides). There are no known areas along the Project pipeline route in South Dakota identified with high susceptibility to landslides. **Table 8** provides the relative locations for where land slide risks may occur.

Table 9: Areas with Potential Geologic Hazards

HAZARDS PRESENT	PIPELINE / FACILITY	APPROXIMATE MILEPOST START	TEMPORARY IMPACTS ACREAGE	PERMANENT IMPACTS ACREAGE	HAZARD RISK
Karst	SDT-206	0, 10	30.6	28.9	Low
	SDT-207	0, 1, 4, 10	19.6	22.6	Low
	SDT-209	10	1.7	1.7	High
	SDM-104	28, 31, 35, 84, 97	165.8	122.7	Low
	SDM-105	40, 49, 52, 60, 63, 67	76.4	60.3	Low
	SDL-320	66, 74	5.0	4.6	Low
	SDT-210	2	1.6	1.4	Low
Landslides	SDT-206-	0	92.2	88.3	Low Incidence
	SDT-207	0	181.6	144.4	Low Incidence
	SDT-208	0	364.5	310.8	Low Incidence
	SDT-209	0	79.9	75.1	
	SDT-210	0	116.4	75.1	Low Incidence
	SDM-104	27	1,158.3	754.4	Low Incidence

Table 9: Areas with Potential Geologic Hazards					
HAZARDS PRESENT	PIPELINE / FACILITY	APPROXIMATE MILEPOST START	TEMPORARY IMPACTS ACREAGE	PERMANENT IMPACTS ACREAGE	HAZARD RISK
	SDM-105	0, 82	895.8	658.3	Low Incidence
	SDL-320	0	109.0	107.3	Moderate Susceptibility & Low Incidence
	SDL-320	18	382.6	379.8	Low Incidence
	SDL-335	0	3.2	4.8	Low Incidence
	SDL-336	0	3.2	5.7	Low Incidence
	NDT-211	88	163.4	150.3	Low Incidence
	NDM-106	0	214.0	161.0	Low Incidence

Notes:
[1] Acres are rounded.

Construction Impacts

Special pipeline construction practices described in the ECP will minimize slope stability concerns during construction. In areas where geologic conditions such as ground swelling, or slope instability, could pose a potential threat, the Applicant will conduct appropriate pre-construction site assessments and subsequently will design facilities to account for various ground motion hazards as required by federal regulations. The main hazard of concern during construction of the pipeline will be unintentional undercutting of slopes or construction on steep slopes resulting in instability that could lead to landslides. Other hazards may result from construction on ground with shrink-swell potential. The high swelling hazard may cause slope instability during periods of precipitation. When selecting the proposed pipeline route, has attempted to minimize the number of steep slopes crossed by the pipeline.

Landslide hazards can be mitigated by:

- Returning disturbed areas to pre-existing conditions or, where necessary, reducing steep grades during construction;
- Preserving or improving surface drainage;
- Preserving or improving subsurface drainage during construction;
- Removing overburden where necessary to reduce weight of overlying soil mass; and
- Adding fill at toe of slope to resist movement.

The Applicant will conduct pre-construction training to educate construction personnel on the identification of karst features during excavation. If karst features are identified along the route, the Applicant will take steps to ensure the integrity and safety of the pipeline, which may include realignment or specialized construction techniques.

Operation Impacts

Portions of the pipeline route and several of the permanent aboveground facilities—pump stations, MLVs, launcher-receivers—are underlain by clay-rich soils (see **Appendix 7**) which have potential shrink-swell properties. Pipelines are less susceptible to damage by shrinking and swelling soil, but surface structures may be vulnerable. Structures built on soils with shrink-swell potential can be damaged as soils shrink and swell during wetting and drying episodes. The risk of shrinking and swelling soils can be mitigated by excavating the susceptible soil and back filling with select non-swelling material. The Applicant will design facilities to current Uniform Building Code standards and will account for swelling soils as appropriate.

Risks to permanent structures from shrinking and swelling of soils, karst hazards, and landslide hazards will be minor. Impacts from maintenance activities will minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. Once the pipeline is installed and the pipeline ROW reclaimed, the operation of the Project will not contribute to seismic, subsidence, or slope instability.

5.2 Hydrology

The Land Use Map Book in **Appendix 6C** includes wetlands and waterbodies in the Project area.

5.2.1 Surface Water Drainage

The Project footprint lies within four South Dakota River basins. Construction of the Project will involve 19 crossings of named waterbodies within these basins, including 1 lake, 5 ephemeral stream crossings, 1 intermittent stream crossing, and 12 perennial stream crossings. Project construction will involve 173 additional crossings of other types of waterbodies including small ephemeral unnamed streams, named streams with no defined channel, roadside and field ditches, prairie potholes, and man-made ponds. A listing of all waterbody crossings is provided in **Appendix 8** (**Appendix 8** submitted with this filing supersedes all previous submittals to the SD PUC). Additional information on the impact of these crossings is provided in Section 5.6, Water Quality. Crossing methods, locations, and lengths of named perennial stream crossings are indicated below in **Table 10**. Typical drawings of waterbody crossings are found in Appendix B of the ECP (**Appendix 3**).

Table 10: Perennial Streams Crossed by the Project by River Basin

BASIN[1]	PERENNIAL STREAM	LINE / MILEPOST	CROSSING LENGTH (feet)	COUNTY	CROSSING METHOD [2]
Fort Randall Reservoir	Medicine Knoll Creek	SDL-320 / 17.7	26	Sully	Wet open cut
James	Redstone Creek	SDM-104 / 127.9	54	Kingsbury	Wet open cut
	Dry Run Creek	SDM-105 / 40.1	106	Spink	Wet open cut
	Dry Run Creek	SDT-209 / 9.6	99	Spink	Wet open cut
	James River	SDT-209 / 1.0	117	Spink	HDD
	James River	SDM-105/ 51.6	149	Spink	HDD
	James River	SDT-207 / 11.0	258	Beadle	HDD
	Shue Creek	SDT-207 / 17.8	80	Beadle	Wet open cut
	Snake Creek	SDM-105B / 73.7	22	Brown	Wet open cut

Table 10: Perennial Streams Crossed by the Project by River Basin					
BASIN[1]	**PERENNIAL STREAM**	**LINE / MILEPOST**	**CROSSING LENGTH (feet)**	**COUNTY**	**CROSSING METHOD [2]**
	Timber Creek	SDM-105B / 30.7	100	Spink	Wet open cut
Big Sioux	Tributary to Big Sioux River	SDT-208 / 8.5	30	Codington	Wet open cut
	Big Sioux River	SDM-104B / 26.7	93	Lincoln	HDD
	Tributary to Skunk Creek	SDM-104B / 53.5	8	Minnehaha	Wet open cut
	Tributary to Beaver Creek	SDM-104B / 46.7	4	Lincoln	Wet open cut
Lewis and Clark Lake	East Fork Vermillion River	SDM-104B / 96.4	89	Lake	Wet open cut

Notes:

[1] Identified by the hydrologic unit code (HUC) 6.

[2] Crossing method planned at this time; methods are described in Section 2.2.

Wetlands are discussed in Section 5.4 Aquatic Ecosystems. A Project report (Perennial 2022b) on the delineation of waterbodies and wetlands is provided in **Appendix 9**.

Construction Impacts

Construction of the Project will have only minor and temporary impacts on surface drainage. BMPs (**Appendix 3**) will be implemented to ensure that any impacts on surface drainage and hydrology are minor.

Potential impacts to surface water drainage from Project construction could result from such things as altering the contours of the ground thereby altering surface water runoff paths, changing the consistency and porosity of the surface which can alter the amount and rate of surface water runoff, blocking existing drainage channels such as agricultural drainage tiles and culverts which can lower surface drainage capabilities and result in ponding or flooding; or alteration of stream banks and bottoms which can cause the stream to widen, meander, or infill, resulting in changes to runoff and discharge.

The following measures will be implemented to reduce impacts to surface hydrology:

- Work with landowners to identify and repair drain tile systems within the pipeline ROW. Appropriate erosion and sediment control BMPs will be installed for those with potential to receive stormwater discharge due to the Project's activities.
- Work with landowners to ensure restoration of all terraces to pre-construction condition. Civil surveys will be conducted to document the terraces and contours before disturbance occurs. Preconstruction drainage along the terrace channel will be maintained and additional BMPs may be installed if necessary. Post-construction monitoring and inspection will be done to ensure restoration methods of the terraces are sufficient and that they are to their preconstruction elevation and condition.

- Permanent slope breakers will be constructed across the ROW, where necessary, to limit erosion (except in actively tilled agricultural fields). Slope breakers will divert surface runoff to adjacent stable vegetated areas or to energy-dissipating devises.

The HDD crossing method will be used at four river crossings: the James River at three different segments and the Big Sioux River at the South Dakota – Iowa border. The crossing of a branch of Brant Lake will also be constructed by HDD. Descriptions of HDD and other waterbody crossing methods are provided in Section 2.2.8, **Appendix 3, and Appendix 8**. Because HDD does not involve any intended direct contact with the waterbody, channel bed, or banks, no impacts to hydrology are expected at these crossings. Other crossing methods will involve disturbance of stream banks and channel bottoms, but the ECP (**Appendix 3**) includes procedures for limiting the extent of this disturbance, restoring disturbed areas, and minimizing hydrological impacts. For waterbody crossings these measures include:

- Waterbody banks will be restored to the preconstruction contour unless too steep for restoration, in which case the banks will be restored to a stable angle of repose.
- Stream bottoms will be restored to near pre-construction condition with no impediments to normal water flow.
- Wetland edges will be restored to the preconstruction contour to maintain the hydrology of the wetland and will be stabilized by installing permanent erosion control devices during final clean up.
- Trench breakers will be installed at wetland boundaries where the pipeline trench may cause a waterbody to drain.

Restoration includes grading, stabilization, and revetment BMPs. These BMPs embrace bioengineering concepts, which encourage the restoration of natural streambanks. After the installation of the pipeline, the disturbed ROW will be backfilled and restored to its pre-construction grade thus avoiding any change to the pre-existing surface water drainage patterns.

The pipeline will be constructed under river channels with potential for lateral scour. Engineering design will ensure that the pipeline will be buried at an adequate depth under channels, adjacent floodplains, and flood protection levees to avoid pipe exposure caused by channel degradation and lateral scour. Determination of the pipeline burial depth will be based on site-specific channel and hydrologic investigations were deemed necessary.

Stormwater Pollution Prevention Plans (SWPPPs) will be prepared for the pipelines and all facilities (e.g., pump stations) and will identify how surface runoff will be handled.

Operation Impacts

Operation should have no impact on surface drainage. Maintenance activities along the pipelines will not result in long-term substantive alterations of stream banks or channel morphology. Impacts from maintenance activities will be minor because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. If in-stream work is required, the same mitigation measures as for construction will be employed. Access roads along with any required culverts will be maintained as will SWPPP requirements at facilities.

5.2.2 Groundwater

Aquifer distribution in South Dakota is complex. In some areas, aquifers are present at several different depths. In eastern South Dakota, most wells are places in aquifers located in glacial drift deposits. Glacial

drift underlies most of the state east of the Missouri River. Alluvium found along major streams (Sarah Chadima, 1994). Alluvial deposits (alluvium) generally are adjacent to streams in the floodplain. Well-sorted unconsolidated material can store large quantities of ground water. The coarser materials sand and gravel readily yield water wells (Water-Resources Investigations Report 03-4049, 2003).

The Project crosses portions of 18 counties and several aquifer systems consisting of the same unconsolidated material, sand, gravel, and a portion of the Sioux Quartzite in Lake County. As the Project crosses into South Dakota from North Dakota the route crosses a portion of the Spring Creek Aquifer with an approximate well depth of 20-200 feet. The northern portion of the route crosses the Dakota Formation with an approximate well depth of 500 feet, in Brown, Spink counties and partially in Hand County. As the Project progresses south portions of the Niobrara Formation with an approximate well depth of 1000 feet is crossed in Beadle, Kingsbury, and Lake counties. The largest aquifer crossed by the Project is the Big Sioux aquifer in eastern South Dakota. The Big Sioux Aquifer is a shallow, unconfined aquifer in the Big Sioux River basin. This glacial outwash aquifer ranges in thickness from a few feet to over 100 feet but averages 20 feet thick (East Dakota Water Development District, 2021). The lateral line (SDT-208) route begins to cross the basin boundary in southeastern Clark County traversing the northwestern corner of Hamilin County with a terminus in southern Codington County. As the line progresses south into Lake County the mainline and lateral line (SDT-206) begin to cross the basin boundary. The route continues south within the Big Sioux Aquifer as it crosses through Minnehaha County and Lincoln County.

Groundwater is not currently proposed for use during construction and operation of the Project.

Construction Impacts

Reductions in groundwater quality from spills, leaks, or disposal practices are not anticipated during construction. Most of the aquifers along the route will be at least temporarily isolated from any spills on the land surface and attending personnel will be able to respond to an incident before contaminants migrate into groundwater. Most aquifers are more than 50 feet deep, which significantly reduces the chance of contamination reaching the aquifer. Additionally, the majority of the pipeline is underlined by confining materials (e.g., clays, shales) that inhibit the infiltration of released fuel into aquifers. Additional procedures and measures will be implemented as presented in the ECP (**Appendix 3**).

Operation Impacts

Groundwater will not be used during operation of the Project and routine operation will not affect groundwater resources. Maintenance activities will be infrequent, short-term, and localized and will not affect groundwater. Maintenance activities include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections.

The majority of the route is not susceptible to groundwater contamination from fuel leaks during pipeline repairs or maintenance due to the depths of most aquifers and presence of confining materials.

If a CO_2 release were to occur, the Project would immediately implement its emergency operations and shut in the pipeline segment where the release occurs. However, if a CO_2 release were to occur it would expand into a gaseous phase and escape into the atmosphere, seeping out of the ground or through surface water if the release occurred under a waterbody. Because of mainline valve placement, the release will be temporary and not long term.

This temporary release could result in a temporary increase of CO_2 within the groundwater or shallow aquifer but will dissipate through mixing within the groundwater. In most cases, there will be minor impacts to groundwater quality. Known occurrences of naturally CO_2 -charged potable water show that

the common chemical reaction products from dissolution of CO_2 into freshwater include rapid buffering of acidity by dissolution of calcite and slower equilibrium by reaction with clays and feldspars. Results from a series reaction of CO_2 with diverse aquifer rocks show geochemical response within hours to days after introduction of CO_2 (R. Smyth, et al, 2009).

5.2.3 Water Use and Sources

Review of the South Dakota Department of Agriculture and Natural Resources (SD DANR) and eastdakota.org websites identified Zone A Wellhead Protection and Source Water areas within Minnehaha County. These Zone A areas define the boundaries in which the land area contributes water to a drinking water well. These protection areas are in place to protect the local drinking water (SD DANR, 2021). The baseline centerline crossed/clipped seven of these areas. The Applicant is working with municipal and rural water system districts to identify any well or surface water protection conflicts.

Municipal and rural water supplies in the area of the Project are withdrawn from groundwater sources. Drinking water systems in South Dakota depend on groundwater for their source of drinking water or on surface water supplies, such as the Missouri River, Lake Oahe and other lakes and streams, for drinking water. In both instances, it is likely that the drinking water system is using that source because it is the most reliable, economical, high-quality source of water available.

The South Dakota Association of Rural Water Systems (SDARWS) supports water uses including clean drinking water and water for local agriculture and industries. These water uses are managed throughout the state in rural water system areas. The Project crosses ten rural water system areas within South Dakota including Web Water, Mid Dakota, Kingbrook, Minnehaha, South Lincoln, Lincoln County, Lewis & Clark, Big Sioux, Clark, and Sioux (see **Table 11** and **Figure 4**). The Applicant provided a project overview presentation to the SDARWS in January 2022.

Table 11: South Dakota Rural Water System Areas Crossed by the Project

RURAL WATER SYSTEM	PIPELINES
Web Water Development Association	NDM-106
	NDT-211
	SDM-105
	SDT-210
	SDT-209
	SDL-335
	SDL-336
Mid Dakota Rural Water System	SDM-105
	SDL-320
	SDT-207
	SDM-104
	SDT-208
Kingbrook Rural Water System	SDM-104
	SDT-206
	SDT-208

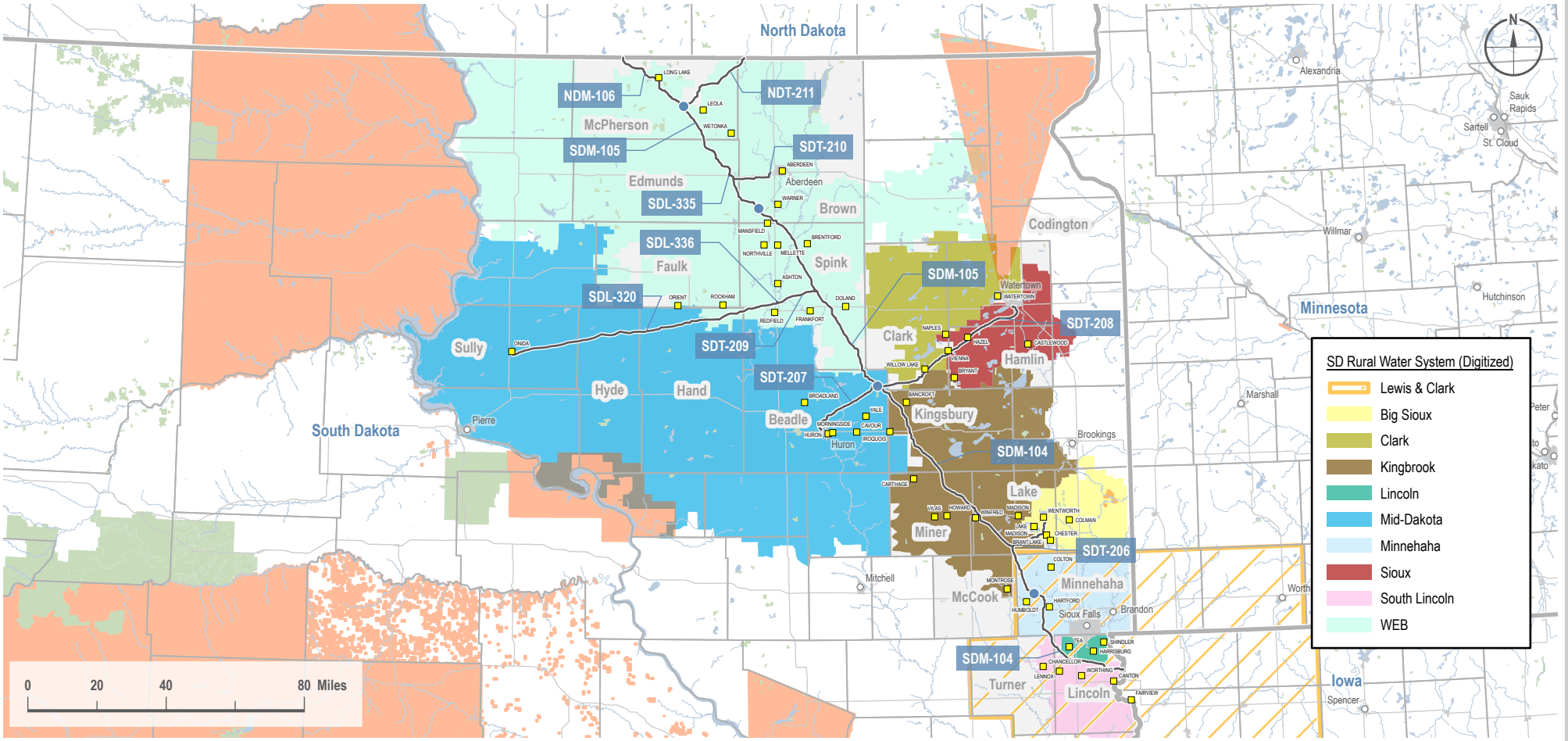
Table 11: South Dakota Rural Water System Areas Crossed by the Project	
RURAL WATER SYSTEM	**PIPELINES**
Minnehaha Community Water Corp.	SDM-104
South Lincoln Rural Water System	SDM-104
Lincoln County Rural Water System	SDM-104
Lewis & Clark Regional Water System	SDM-104
	SDT-206
Big Sioux Community Water System	SDT-206
Clark Rural Water System	SDT-208
Sioux Rural Water System	SDT-208

The two largest uses of water associated with Project construction will be the water required for conducting hydrostatic tests during the final phases of construction and for dust control. Water used for hydrostatic testing of the pipeline, which may be over 25 million gallons in total, will be obtained from surface water resources. Preliminarily identified water sources for hydrostatic tests are indicated in **Table 12**.

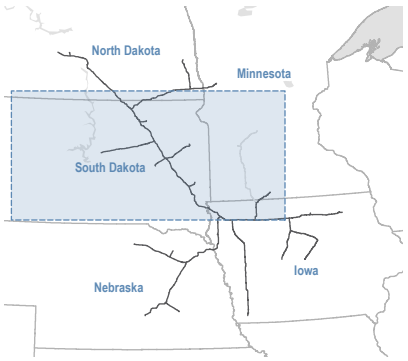
Table 12: Water Sources for Project Hydrostatic Tests			
WATER SOURCE	**COUNTY**	**LINE**	**SECTION/TOWNSHIP/RANGE**
Big Sioux River	Lincoln	SDM-104	Sec. 33 T. 99N R. 48W [1]
James River	Spink	SDM-105	Sec. 34 T. 120N R. 63W [1]
Round Lake	Lake	SDT-206	Sec. 04 T. 105N R. 51W [1]
James River	Beadle	SDT-207	Sec. 35 T. 112N R.61W [1]
James River	Spink	SDT-209	Sec. 25 T. 117N R. 64W [1]
Notes: [1] Sec = Section, T = Township; N = North; R = Range; W = West			

Applications will be filed with the SD DANR for permits to appropriate water within the State of South Dakota for all such withdrawals (see **Table 1**). Withdrawals will follow requirements of issued permits including restriction of withdrawal rates based on stream flow. Water will be recycled / transferred between pipeline test sections to reduce overall withdrawal volumes. Alternative water sources may be identified.

SOUTH DAKOTA RURAL WATER SYSTEM AREAS CROSSED BY THE PROJECT



VICINITY MAP



LEGEND

- Proposed Project Route
- Populated Place within 10 miles of the Project
- Pump Station
- County Boundary
- State Boundary
- City / Town
- Urban Area
- Highway
- River / Stream
- Waterbody
- Federal Land
- American Indian Reservation or Trust Land

Pipeline Naming Convention
[State Abbreviation][Line Designation] - [Line Number]
(e.g. SDT-207)
-State Abbreviation: Iowa (IA), Minnesota (MN), North Dakota (ND), South Dakota (SD)
-Line Designation: Lateral (L), Main (M), Trunk (T)
-Line Number: 3-digit series

PREPARED BY

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United States of America
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SUMMIT CARBON SOLUTIONS

REVISIONS

Date	Revised by	Checked by	
2022-02-07	GS	PD	0 - Issued for SDPUC Application
2022-10-03	PD	SB	1 - Re-Issued for SDPUC Application

MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Rural Water System Areas Crossed by the Project
South Dakota

Figure Number: Figure 4

Scale: 1 : 2,750,000
1 inch equals 43.4 miles

Projection: Transverse Mercator
NAD 1983 UTM Zone 14N

Sheet: 1
1 of 1

Drawing Number: 1003-01-007
Revision

EXHIBIT A-1

Path: I:\Projects\TAL-21015451-00 - Summit Carbon - MCE Project\0800 GEO\10_Mapping\01 Map Books\06 Regulatory\1001-06-007 South Dakota PUC Rural Water Systems Overview\1001-01-007 South Dakota PUC Rural Water Systems Overview New.aprx

Construction Impacts

It is anticipated that the Project will not impact municipal and rural water systems and supply. The Applicant will employ BMPs and abide by all required provisions for protecting and mitigating potential impacts to municipal and rural water supplies during construction, including spill prevention and response. The Applicant will negotiate crossing agreements with rural water authorities and municipalities as required.

Prior to initiating grading or construction activities, the Applicant will determine the exact location of rural water system pipelines by notifying the "One-Call" locate system and coordinating physical location of the existing water lines. Typically, existing utilities, including water lines, are crossed by installing the pipeline with a minimum of 12 inches of separation from the existing utility while the existing utility remains in operation, in accordance with regulations and in coordination with the water authority.

With regard to spill prevention, refueling and lubricating construction equipment will be restricted to upland areas at least 100 feet away from the edge of any streams, wetlands, ditches, and other waterbodies and at least 150 feet away from groundwater wells. Wheeled and tracked construction equipment will be moved to an upland area more than 100 feet away from streams, wetlands, ditches, and other waterbodies for refueling when necessary. Fuels and lubricants will be stored in designated areas and in appropriate service vehicles. Spill Prevention, Control, and Countermeasure (SPCC) procedures are described in the ECP and will be implemented in compliance with 40 CFR 112 (for oil spills) and the SD DANR Ground Water Quality Standards, Administrative Rules of South Dakota (ARSD) Chapter 74:54:01.

In a few cases, such as for water withdrawal pumps or directional drill equipment located within or near a waterbody or wetland, refueling will be completed within or near a waterbody or wetland. In these situations, the specific measures identified in Section 8.0 (Spill Prevention, Containment, and Response) of the ECP (**Appendix 3**) will be followed.

Operation Impacts

The Project will have minor impacts on water supply. Regarding spill prevention and response, if a CO_2 release were to occur, the Project would immediately implement its emergency operations and shut off the pipeline segment where the release occurs. However, if a CO_2 release were to occur it would expand into a gaseous phase and escape into the atmosphere, seeping out of the ground or into surface water if the release occurred under a waterbody. Temporary release could result in a temporary increase of CO_2 within a waterbody but will dissipate through mixing within the waterbody. CO_2 is a naturally occurring compound in the environment and will have no permanent impacts.

Minor surface disturbance activities within waterbodies from pipeline inspection and maintenance may occur infrequently and at widely spaced locations.

5.3 Terrestrial Ecosystems

Project footprint in South Dakota is located within two Level III ecoregions, the Northern Glaciated Plains Ecoregion, and the Northwestern Glaciated Plains Ecoregion, and seven Level IV ecoregions. General descriptions of these ecosystems and the proportion of the Project that will be within the ecosystems are provided below in **Table 13**.

Table 13: Ecoregions Crossed by the Project				
LEVEL III ECOREGION [1]	**LEVEL III ECORGION VEGETATION [2]**	**LEVEL IV ECOREGION [3]**	**PROJECT [1,3]**	
			MILES	**PERCENT**
Northwestern Glaciated Plains	Spear grass, blue grama grass (*Bouteloua gracilis*), and wheat grass were once dominant native grasses that covered many parts of the landscape. A variety of shrubs and herbs were also common as well as some sagebrush. On the driest sites yellow cactus and prickly pear (*Opuntia* spp) can be found. Scrubby quaking aspen (P*opulus tremuloides*), willow (*Salix* spp), cottonwood (*Populus deltoides*), and box elder (*Acer negundo*) occur to a limited extent on shaded slopes of valleys and river terraces. Local saline areas support alkali grass (*Puccinellia nuttallii*), wild barley, greasewood (*Sarcobatus vermiculatus*), red sampire (*Salicornia rubra*), and sea blite. There is a low density of streams and rivers across the area. High concentrations of temporary and seasonal wetlands create favorable conditions for waterfowl nesting and migration.	Missouri Coteau	70	15%
		Southern Missouri Coteau Slope	19	4%
		All	89	19%
Northern Glaciated Plains	Most of the region is now farmland but in its native state, the landscape was characterized by quaking aspen, oak groves, mixed tall shrubs, and intermittent fescue grasslands. Bur oak (*Quercus macrocara*) and grassland communities occupied drier sites. Many areas had transitional grassland containing tallgrass and shortgrass prairie, including big (*Andropogon gerardi*) and little bluestem (*Schizachyrium scoparium*), green needlegrass (*Nassella viridula*), blue grama, western wheatgrass (*Pascopyrum smithii*), and switchgrass (*Panicum virgatum*). Streams in the region are mostly intermittent, though some are perennial, and there are some larger rivers. The region is drained by the Missouri River system to the south and to the north by the South Saskatchewan River. In some areas, a high concentration of semi-permanent and seasonal wetlands can be found, locally referred to as Prairie Potholes.	Drift Plains	68	14%
		James River Lowland	158	33%
		Prairie Coteau	89	19%
		Big Sioux Basin	8	1%
		Glacial Lake Basins	64	14%
		All	388	81%

Notes:
[1] GIS data accessed online at https://www.epa.gov/eco-research/ecoregions-north-america.
[2] Descriptions from CEC 2011.
[3] Project centerline miles and percent of total Project centerline miles.

5.3.1 Vegetation Communities

Vegetation communities are described below. Additional information is provided in the Project threatened and endangered species habitat assessment report (**Appendix 10**) and wetlands delineation report (**Appendix 9**).

5.3.1.1 General Vegetation

The distribution of land cover types along the pipeline ROW is summarized below in **Table 14**. Most of the lands along the pipeline ROW are cultivated lands (71%), pasture / hay fields (13%), or grasslands (10%).

Table 14: Land Cover Types Traversed by the Project in South Dakota

COVER TYPE [1]	PROJECT CENTERLINE MILES	PROJECT CENTERLINE PERCENT	DESCRIPTION [1]
Open Water	1.0	0.2%	Areas of open water, generally with less than 25% cover of vegetation or soil.
Barren Land (Rock/Sand/Clay)	0.1	0.01%	Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Developed	10.3	2.2%	Developed lands include such land as residential, commercial, industrial, ROW corridors. Vegetation in previously disturbed areas is frequently little to none and is often composed of introduced weedy species. The previously disturbed areas crossed by the Project have been identified through land-use classification as ROW corridors, with a very small portion (<0.1 mile) identified as rural residence. ROW corridors include roads, utility corridors and railroads. These areas have often been replanted with a mixture of grass and forbs.
Cultivated Crops	336.5	70.5%	Areas used for the production of annual crops, which in the Project area are crops such as wheat, corn, and soybeans. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
Pasture/Hay	62.0	13%	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation. Dominant vegetation observed in hayfields within the Project area consisted of oat (*Avena sativa*), blue grama (*Bouteloua gracilis*), smooth brome (*Bromus inermis*), blue grama (*Bouteloua gracilis*), redroot (*Ceanothus americanus*), orchardgrass (*Dactylis glomerata*), creeping wildrye (*Elymus repens*),, fox-tail barley (*Hordeum jubatum*), alfalfa (*Medicago sativa*), reed canarygrass (*Phalaris arundinacea*), Kentucky bluegrass (*Poa pratensis*), tall false ryegrass (*Schedeonorus arundinaceus*), and common dandelion (*Taraxacum officinale*). (Perennial 2021a, 2022b)

Table 14: Land Cover Types Traversed by the Project in South Dakota			
	PROJECT CENTERLINE		
COVER TYPE [1]	MILES	PERCENT	DESCRIPTION [1]
Emergent Herbaceous Wetlands	20.3	4.3%	Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water. See descriptions of PEM wetland vegetation in **Section 5.4.** Further description is provided in the Project wetlands report (Perennial 2021a, Perennial 2022b) provided in **Appendix 9**.
Woody Wetlands	0.1	0.03%	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water. See descriptions of palustrine scrub shrub (PSS) and palustrine forested (PFO) wetland vegetation in **Section 5.4.** Additional information is provided in the Project wetlands report (Perennial 2021a) provided in **Appendix 9**.
Deciduous Forest	0.4	0.1%	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change. Forests within the Project area are characterized as hardwood forests. Dominant tree and shrub species in the Project area include boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), eastern red-cedar (*Juniperus virginiana*), European buckthorn (*Rhamnus cathartica*), American-aster (*Symphyotrichum lanceolatum*), American elm (*Ulmus americana*), and Siberian elm (*Ulmus pumila*). Further description is provided in the habitat assessment (Perennial 2021a, 2022b) provided in **Appendix 10**.
Scrub / Shrub	0.5	0.1%	Shrub/scrub- areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Grassland / Herbaceous	46.1	9.7%	Areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling but can be utilized for grazing.

Notes:
[1] Cover types of descriptions from National Land Cover Database 2019 (NLCD 2019) Legend online at: https://www.mrlc.gov/data/legends/national-land-cover-database-2019-nlcd2019-legend#:~:text=National%20Land%20Cover%20Database%202019%20%28NLCD2019%29%20Legend%20,%20%20%20%2024%20more%20rows%20.

Grasslands in the Project area (not classified as wetlands, agricultural lands, or hayfields) were categorized as prairie habitat or tame planted grasslands. The prairie habitat consists of open land with a diverse mix of grass species. These include tall grass, mixed grass, and short grass prairie types. Dominant vegetation

observed in prairie habitat within the Project survey area consisted of slender wildrye (*Elymus trachycaulus*), smooth oxeye (*Heliopsis helianthoides*), field sow-thistle (*Sonchus arvensis*), stiff goldenrod (*Solidago rigida*), big bluestem (*Andropogon gerardii*), Canadian thistle (*Cirsium arvense*), Kentucky bluegrass (*Poa pratensis*), Canadian goldenrod (*Solidago canadensis*), fox-tail barley (*Hordeum jubatum*), smooth brome (*Bromus inermis*), western-wheat grass (*Pascopyrum smithii*), velvetleaf (*Abutilon theophrasti*), yellow bristlegrass (*Setaria pumila*), buffalograss (*Bouteloua dactyloides*), white sagebrush (*Artemisia ludoviciana*), little false bluestem (*Schizachyrium scoparium*), porcupine grass (*Stipa spartea*), needle and thread (*Stipa comata*), western snowberry (*Symphoricarpos occidentalis*), careless weed (*Amaranthus palmeri*), prairie junegrass (*Koeleria nitida*), common dandelion (*Taraxacum officinale*), white heath aster (*Symphyotrichum ericoides*), curlycup gumweed (*Grindelia squarrosa*), intermediate wheatgrass (*Agropyron intermedium*), annual ragweed (*Ambrosia artemisiifolia*), yard knotweed (*Polygonum aviculare*), perennial ragweed (*Ambrosia psilostachya*), creeping wildrye (*Elymus repens*), alfalfa (*Medicago sativa*), and prairie sunflower (*Helianthus petiolaris*). Tame or planted grasslands consist of tame pastures of cultivated fields planted with introduced (non-native) grass and legume species or cultivars with the multiple purposes of providing livestock grazing and foraging. Dominant vegetation observed in tame/planted grasslands within the Project survey area consisted of smooth brome, Kentucky bluegrass, big bluestem, reed canarygrass (*Phalaris arundinacea*), yellow bristle grass, creeping wild rye, wavy-leaf thistle (*Cirsium undulatum*), broad-leaf cattail (*Typha latifolia*), buffalograss, perennial ryegrass (*Lolium perenne*), crested wheatgrass (*Agropyron cristatum*), needleleaf sedge (*Carex duriuscula*), blue grama (*Bouteloua gracilis*), common dandelion, slender wildrye, alfalfa, and perennial ragweed. (Perennial 2022b, **Appendix 10**)

5.3.1.2 Grassland and Wetland Easements

USFWS established grassland and wetland easement programs to conserve habitat for nesting waterfowl and grassland birds in the Prairie Pothole Region. The easements are voluntary agreements with the landowners to protect the habitats on their property. After selling the wetland easement, the landowner cannot drain, fill, levee or burn the wetlands. However, if the wetlands dry up naturally, they can be farmed, grazed, or hayed (USFWS 2020a). After selling the grassland easement, the landowner cannot mow, hay or harvest grass seed from the grassland until after July 15 of each year (USFWS 2020b). This provision is to allow grassland nesting species, such as ducks and pheasants time to fledge their young before any manipulation is done to the habitat. Grazing is permitted anytime. The landowners maintain ownership of their land and control whether to allow hunting or trapping.

During Project meetings, USFWS Ecological Services staff voiced a general concern regarding potential Project impacts to native grassland and grassland easements and further stated that mitigation will likely be required for surface crossings of USFWS easements. These easements are numerous and widespread across eastern South Dakota, especially in McPherson, Edmunds, Hyde, Beadle, and Clark Counties. GIS shape files were obtained from USFWS for all USFWS grassland and wetland easements in South Dakota. The Applicant has adjusted the route to avoid or minimize direct impacts to these resources. Construction of the Project will not result in any surface disturbance within the grassland easements. All wetland easements could not be avoided but impacts to wetlands within the easements will be minimized through the use of BMPs provided in the ECP (**Appendix 3**) as applicable. The Applicant is in communication with USFWS and will continue to work with the agency on this issue. HDD crossings of these easements are listed in **Table 15**.

Table 15: Horizontal Directional Drill Crossings of USFWS Grassland and Wetland Easements					
EASEMENT	**COUNTY**	**PIPELINE ID**	**MILEPOST**	**LENGTH (feet)**	**AREA[1] (acres)**
Grassland	Spink	SDL-320	75.22	675.50	0.8
Grassland	Hand	SDL-320	58.54	2,962.16	3.4
Grassland	McPherson	NDM-106	6.37	1,025.00	1.2
Grassland	McPherson	NDM-106	7.01	700.00	0.8
Grassland	McPherson	SDM-105	106.65	3,012.09	3.5
Wetlands	Edmunds	SDM-105	89.6	1,083.1	1.2
Grassland	Edmunds	SDT-210	11.11	4,513.41	5.2
Wetlands	Brown	SDT-210	6.44	1,111.15	1.3
Wetlands	Spink	SDL-320	78.44	2,810.44	3.2
Notes: [1] Acres are rounded.					

5.3.1.3 Noxious Weeds

The South Dakota administrative rule (S.D. Admin. R. 12:62:03:01.06) identifies and classifies 7 plant species as noxious weeds statewide. S.D. Admin. R. 12:62:03:01.06 also provides a list of 26 additional plant species from which county boards may select species to be classified as locally noxious weeds within their respective county. Plant species identified either as statewide noxious weeds or selected as locally noxious by counties traversed by the Project are listed in **Table 16**. Surveys for noxious weeds have not been conducted in the Project footprint. Documented occurrences of statewide noxious weeds in counties traversed by the Project are indicated in **Table 16**. Reported infestations in South Dakota in 2020 are summarized by county in **Table 17**.

Table 16: Noxious Weeds in South Dakota Counties Traversed by the Project									
	NOXIOUS WEEDS IN COUNTIES TRAVERSED BY THE PROJECT [1,2]								
NOXIOUS WEED	**MCPHERSON**	**EDMUNDS**	**BROWN**	**SPINK**	**BEADLE**	**KINGSBURY**	**MINER**	**LAKE**	**MCCOOK**
Absinth wormwood [1] *Euphorbia esula*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Bull thistle [2] *Cirsium vulgare*	--	--	C	--	C	--	C	C	C
Canada thistle [1] Cirsium arvense	SW	SW	SW	SW	SW	SW	SW	SW	SW
Common burdock [2] *Arctium minus*	--	--	--	--	--	--	--	C	--
Common mullein [2] *Verbascum Thapsus*	--	--	--	--	--	--	--	--	--

Table 16: Noxious Weeds in South Dakota Counties Traversed by the Project									
	NOXIOUS WEEDS IN COUNTIES TRAVERSED BY THE PROJECT [1,2]								
NOXIOUS WEED	**MCPHERSON**	**EDMUNDS**	**BROWN**	**SPINK**	**BEADLE**	**KINGSBURY**	**MINER**	**LAKE**	**MCCOOK**
Field bindweed [2] *Convolvulus arvensis*	--	--	---	--	--	--	--	C	--
Hoary cress [1] *Cardana draba*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Houndstongue [2] *Cynoglossum oficinale*	--	--	--	--	--	--	--	--	--
Leafy spurge [1] *Euphorbia esula*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Musk thistle [2] *Carduus nutans*	--	--	C	C	C	C	C	C	C
Palmer Amaranth [2] *Amaranthus palmeri*	--	X	--	--	--	--	--	--	--
Perennial sowthistle [1] *Sonchus arvensis*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Plumeless thistle [2] *Carduus acanthoides*	--	--	C	C	C	C	C	C	C
Poison hemlock [2] *Conium maculatum*	--	--	--	--	--	C	--		--
Purple loosestrife [1] *Lythrum salicaria*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Saltcedar [1] *Tamarix* spp.	SW	SW	SW	SW	SW	SW	SW	SW	SW
Scotch thistle [2] *Onopordum acanthium*	--	--	--	--	--	--	--	C	--
Spotted knapweed [2] *Centaurea maculosa*	--	--	--	--	--	--	--	C	--
Yellow toadflax [2] *Linaria vulgaris*	C	C	C	C	C	--	--	--	--
Absinth wormwood [1] *Euphorbia esula*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Bull thistle [2] *Cirsium vulgare*	--	C	--	--	C	--	C	C	C
Canada thistle [1] Cirsium arvense	SW	SW	SW	SW	SW	SW	SW	SW	SW
Common burdock [2] *Arctium minus*	--	--	--	--	--	--	--	--	--
Common mullein [2] *Verbascum Thapsus*	--	--	--	--	C	--	--	--	--
Field bindweed [2] *Convolvulus arvensis*	--	--	--	--	--	--	--	--	C

Table 16: Noxious Weeds in South Dakota Counties Traversed by the Project									
	NOXIOUS WEEDS IN COUNTIES TRAVERSED BY THE PROJECT [1,2]								
NOXIOUS WEED	**MCPHERSON**	**EDMUNDS**	**BROWN**	**SPINK**	**BEADLE**	**KINGSBURY**	**MINER**	**LAKE**	**MCCOOK**
Hoary cress [1] *Cardana draba*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Houndstongue [2] *Cynoglossum oficinale*	--	--	--	--	C	--	--	--	--
Leafy spurge [1] *Euphorbia esula*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Musk thistle [2] *Carduus nutans*	C	C	C	--	C	C	C	C	C
Palmer Amaranth [2] *Amaranthus palmeri*	--	--	--	--	C	--	--	--	--
Perennial sowthistle [2] *Sonchus arvensis*	--	--	--	--	--	--	--	--	--
Plumeless thistle [2] *Carduus acanthoides*	C	C	C		C	C	C	C	C
Poison hemlock [2] *Conium maculatum*	--	--	--	--	--	--	--	C	--
Purple loosestrife [1] *Lythrum salicaria*	SW	SW	SW	SW	SW	SW	SW	SW	SW
Saltcedar [1] *Tamarix* spp.	SW	SW	SW	SW	SW	SW	SW	SW	SW
Scotch thistle *Onopordum acanthium*	--	--	--	--	--	--	--	--	--
Spotted knapweed [2] *Centaurea maculosa*	--	C	C	--	--	--	--	--	C
Yellow toadflax [2] *Linaria vulgaris*	--	--	--	--	C	C	--	--	--

Notes:
[1] Statewide (SW) noxious weed species per S.D. Admin. R. 12:62:03:01.06 and online at https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/StateNoxious/default.aspx.
[2] Localized (C) noxious weed in noted county per South Dakota Locally Noxious Weed Pest List, available at https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/docs/noxiousweeds.pdf.

Table 17: Reported Infestations of Statewide Noxious Weeds in Counties Traversed by the Project					
	ACRES INFESTED WITH STATEWIDE NOXIOUS PLANT SPECIES IN 2020 [1]				
COUNTY	**ABSINTH WORMWOOD**	**LEAFY SPURGE**	**CANADA THISTLE**	**HOARY CRESS**	**PURPLE LOOSESTRIFE**
McPherson	>10,001	>10,001	20,001-40,000	None reported	None reported
Edmunds	5,001-10,000	5,001-10,000	20,001-40,000	None reported	<100

Table 17: Reported Infestations of Statewide Noxious Weeds in Counties Traversed by the Project

COUNTY	ACRES INFESTED WITH STATEWIDE NOXIOUS PLANT SPECIES IN 2020 [1]				
	ABSINTH WORMWOOD	LEAFY SPURGE	CANADA THISTLE	HOARY CRESS	PURPLE LOOSESTRIFE
Brown	5,001-10,000	>10,001	20,001-40,000	None reported	None reported
Spink	1,001-5,000	1,001-5,000	10,001-20,000	None reported	<100
Beadle	5,001-10,000	1,001-5,000	5,001-10,000	None reported	None reported
Kingsbury	5,001-10,000	1,001-5,000	1,001-5,000	None reported	None reported
Miner	501-1,00	101-500	5,001-10,000	None reported	None reported
Lake	None reported	5,001-10,000	5,001-10,000	None reported	None reported
McCook	501-1,000	>10,001	5,001-10,000	None reported	None reported
Minnehaha	101-500	1,001-5,000	<5,000	<100	<100
Turner	5,001-10,000	>10,001	10,001-20,000	501-1,000	<100
Lincoln	<100	1,001-5,000	5,001-10,000	<100	<100
Sully	1,001-5,000	1,001-5,000	<100	None reported	None reported
Hyde	1,001-5,000	<100	10,001-20,000	None reported	None reported
Hand	1,001-5,000	<100	1,001-5,000	<100	None reported
Codington	5,001-10,000	1,001-5,000	1,001-5,000	None reported	None reported
Hamlin	1,001-5,000	1,001-5,000	1,001-5,000	None reported	<100
Clark	5,001-10,000	5,001-10,000	20,001-40,000	None reported	None reported

Notes

[1] Infested acres from South Dakota Department of Agriculture and Natural Resources maps available at South Dakota Forestry - State Noxious Weed and Pest List (sd.gov).

5.3.1.4 Impacts to Vegetation

Construction Impacts

Construction of the Project will disturb a total of approximately 6,384 acres (**Table 18**) within South Dakota. Most of these lands are agricultural lands in crop production or used for pasture / hay production. What is not in agricultural production is barren, open water, or herbaceous vegetation, so impacts will be short term. Approximately 6 acres are classified as wooded, of which half is a temporary impact and half is a permanent impact. Trees will be removed and either provided to the landowner for their use or sale or hauled and disposed of in an appropriate manner. The permanent ROW will be kept free of trees to ensure integrity and ease of maintenance and aerial patrols.

Agricultural areas with crops present will be mowed or disced to ground level unless the landowner requests for the crops to be removed so there will be a relatively small, temporary loss of crops in many agricultural areas during construction. Agricultural areas that have terraces will be surveyed to determine pre-construction contours and ensure restoration will be successful when establishing original contours and drainage patterns.

Table 18: Project ROW Impacts by Land Cover Type in South Dakota

COVER TYPE [1]	CONSTRUCTION IMPACT [2]		OPERATIONS IMPACT [3]		TOTAL	
	ACRES[4]	PERCENT	ACRES[4]	PERCENT	ACRES[4]	PERCENT
Open Water	1.5	<1%	6.1	<1%	7.6	<1%
Barren Land (Rock/Sand/Clay)	0.8	<1%	0.4	<1%	1.2	<1%
Developed	85.7	2.5%	68.3	2.3%	154.0	2.4%
Cultivated Crops	2,512.5	72.4%	2,050.8	70.4%	4,563.3	71.5%
Pasture/Hay	467.1	13.5%	377.9	13%	845.0	13.2%
Emergent Herbaceous Wetlands	58.6	1.7%	123.5	4.2%	182.1	2.9%
Woody Wetlands	0.4	<1%	0.8	<1%	1.2	<1%
Deciduous Forest	3.6	<1%	2.2	<1%	5.8	<1%
Scrub / Shrub	4.2	<1%	3.1	<1%	7.3	<1%
Grassland / Herbaceous	337.2	9.7%	279.2	9.6%	616.4	9.7%
Total	**3,471.6**	--	**2,912.3**	--	**6,383.9**	--

Notes:
[1] Cover types from and as mapped by National Land Cover Database but revised with survey and desk top analysis.
[2] Construction impacts consist of Project footprint during construction but outside the permanent ROW and include the pipeline construction ROW and additional temporary workspace (ATWS).
[3] Operations impacts consist of Project footprint during operations.
[4] Acres are rounded.

Bushes and trees will be felled or sheared to prevent damage to adjacent trees and structures. Tree stump removal and grading activities will be limited to directly over the trench or where needed for a safe work area. HDD of major waterbodies and sensitive areas, the path clearing will be limited to what is necessary to access a water source and/or for Tru-tracker cable and no grading or stump removal will occur along HDD paths except where bridges will be installed.

The Applicant will implement procedures to prevent the spread of noxious weeds. The Contractor will clean the tracks, tires, and blades of equipment by water or compressed air to remove excess soil prior to moving the equipment out of weed or soil-borne pest infested areas. The Contractor may also utilize cleaning stations to remove vegetative and soil materials using water at a high pressure in lieu of compressed air. The duration between final grading and permanent seeding will be minimized to reduce the potential growth of nuisance species establishing. Certified weed-free hay or straw will be used for mulch and sediment barriers. Where required by weed control boards for specific species that require treatment ahead of construction, the topsoil will be stripped from the full width of the ROW where isolated weed populations exist and will be stored separately from other topsoil and subsoil. These locations will be identified and marked prior to construction activities by an EI. Alternatively, approved herbicides may be used to prevent the growth and spread of weeds. Only non-residual herbicides will be used.

Operation Impacts

Most of the ROW will be allowed to revert to pre-construction vegetative conditions. This includes all of the temporarily impacted lands totaling approximately 3,472 acres (**Table 18**) and much of the permanent ROW (2,912 acres). Exceptions in the permanent ROW include maintenance of an herbaceous corridor over the centerline through wooded areas and the permanent loss of vegetation at aboveground facilities, including pump stations, MLVs, launchers/receivers, and permanent access roads, which total approximately 26.3 acres.

Maintenance activities may result in minor alterations of vegetation including clearing the permanent pipeline ROW of vegetation (in areas outside wetlands, waterbodies, and agricultural land). The same mitigation measures employed during construction will be employed during vegetation clearing of the permanent pipeline ROW.

5.3.2 Wildlife

5.3.2.1 Biological Consultations

Coordination with USFWS has been initiated. The Project team has conducted preliminary meetings with federal agencies. Meetings were then arranged to introduce the Project and to discuss wildlife impacts, review species lists, and establish consultation paths for moving forward. USFWS Wetland Management Districts and Refuges were contacted to identify federally owned lands and/or easements crossed by the Project. Two pre-application meetings were held on 24 August 2021 and attended by Project representatives and USFWS Ecological Services staff in North Dakota and South Dakota. An additional meeting with the USFWS in South Dakota was held on September 9, 2021. Initial details of the Project were presented along with draft species lists for any required consultations. Consultations in September revolved around grassland and wetland easement and the data provided by the USFWS. A meeting with the SD GFP was held in January 2022 to discuss listed species and surveys requirements. Recommendations and concerns offered by agency staff during those meetings are summarized below in **Table 19**.

Table 19: Recommendations and Concerns Voiced by USFWS during Project Pre-application Meetings

TOPIC	USFWS RECOMMENDATION / CONCERN [1]
Listed Species [2]	USFWS is most concerned with the Dakota skipper in North Dakota
	Prairie bush- clover should not be on the species list
	Powershiek skipperling should not be on the species list
	Dakota skipper has a limited survey window and few qualified surveyors
Mitigation	Few northern long-eared bat roost trees in State but avoid tree felling in June and July
	Keep migratory birds in mind when scheduling construction
	Concerned regarding impacts to grasslands
	Mitigation will likely be required for surface crossings of USFWS easements
	USFWS recommends siting yards in agricultural areas
	Recommended avoiding USFWS fee-owned lands or boring underneath

Notes:
[1] Voiced by USFWS Ecological Services during meetings held with Project representatives on 8/24/20.

Table 19: Recommendations and Concerns Voiced by USFWS during Project Pre-application Meetings	
TOPIC	**USFWS RECOMMENDATION / CONCERN [1]**
[2] Draft species list presented by Project included Dakota skipper, Powershiek skipperling, prairie bush-clover, Western prairie fringed orchid, pallid sturgeon, northern long-eared bat, whooping crane, and piping plover.	

5.3.2.2 Wildlife Habitat

Wildlife habitat assessments were conducted in August-November within the Project environmental surveys area corridor where access was granted. The primary intent of these habitat assessments was to determine the presence of habitat suitable for listed species. The Applicant plans to conduct species specific wildlife surveys in Project footprint next spring after assessing the results of the habitat and conducting additional consultations with USFWS and SDGFP.

5.3.2.3 Big and Small Game Species

Big Game

Big game animals are species of relatively large mammals or birds that are commonly hunted and for which hunting seasons are routinely established in South Dakota. Big game found in South Dakota counties with Project footprint include white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*) and wild turkey (*Meleagris gallopavo*) as indicated in **Table 20.** These species are discussed further below.

Table 20: Distribution and Occurrence of Big Game Species in Project Counties				
COUNTY	**WHITE-TAILED DEER[1]**	**MULE DEER[1]**	**PRONGHORN[1]**	**WILD TURKEY[1]**
Beadle	primary range	rare	occurrence is rare	few to locally fair
Brown	primary range	rare	occurrence is rare	few to locally fair
Clark	primary range	rare	occurrence is rare	few to locally fair
Codington	primary range	rare	occurrence is rare	few to locally fair
Edmunds	primary range	rare to primary range	occurrence is rare	few to locally fair
Hamlin	primary range	rare	occurrence is rare	few to locally fair
Hand	primary range	rare to primary range	occurrence is rare	few to locally fair
Hyde	primary range	primary range	occurrence is rare	few to locally fair
Kingsbury	primary range	rare	occurrence is rare	few to locally fair
Lake	primary range	rare	occurrence is rare	few to locally fair
Lincoln	primary range	rare	occurrence is rare	few to locally fair [2]
McCook	primary range	rare	occurrence is rare	few to locally fair
McPherson	primary range	rare to primary range	occurrence is rare	few to locally fair
Miner	primary range	rare	occurrence is rare	few to locally fair
Minnehaha	primary range	rare	occurrence is rare	few to locally fair
Spink	primary range	rare	occurrence is rare	few to locally fair
Sully	primary range	primary range	occurrence is rare	few to locally fair
Turner	primary range	rare	occurrence is rare	few to locally fair

Table 20: Distribution and Occurrence of Big Game Species in Project Counties				
COUNTY	**WHITE-TAILED DEER[1]**	**MULE DEER[1]**	**PRONGHORN[1]**	**WILD TURKEY[1]**
Notes: [1] Occurrence data from SDGFP (2014) Wildlife Action Plan Explorer website at: https://apps.sd.gov/gf43wap/Species.aspx#tab2. [2] Lands adjacent to the Big Sioux River in Lincoln County are classified as primary range.				

Deer

Deer are the most important big game animals in terms of statewide hunting effort and harvests. Two species occur in South Dakota. The white-tailed deer is found in suitable habitat across all of South Dakota with all of the Project counties classified as being within its primary range. The whitetail is highly adaptable and can be found in urban areas, deciduous and coniferous forests, plains, prairies, agricultural areas, and drier areas. The other South Dakota deer species, the mule deer, is found wherever there is suitable habitat in western South Dakota (west of Missouri Breaks) where it prefers hills or open country. Mule deer occurrences are considered to be rare in most Project counties, but Edmunds, Sully, Hyde, and Hand Counties are considered to be in primary mule deer range. Only about 3 percent of the deer in SDGFP's East River firearm management unit, which encompasses all of South Dakota east of the Missouri River, are mule deer, the remainder being whitetails (SDGFP 2017a).

Hunting seasons are established annually across the State. The Project counties are in SDGFP's East River firearm management unit, which typically has the main (firearms) deer hunting season November 20 – December 5, with wider seasons for archery and muzzleloaders (generally September-December).

Pronghorn

The pronghorn antelope is found in suitable habitat across western South Dakota where it prefers short grass and mixed-grass prairies with rolling hills that provide good visibility. It is found in much more limited numbers in eastern South Dakota, and its occurrence is rated as rare in all counties traversed by the Project (SDGFP 2019a). The pronghorn is not protected under state or federal endangered species laws and hunting seasons are established annually for this species within Management Units. Currently, Sully County (Management Unit 59A) and Hyde and Hand Counties (both in Management Unit 38A) are the only Project counties open to pronghorn hunting (SDGFP 2021a). SDGFP (2021b, 2021c) reported relatively low 2019 spring pronghorn densities of 0.01-0.5 animals per square mile (State range 0.01-7.0) and low 2020 harvests of 1-3 pronghorns per 100 square miles (State range 01 to >30) in Sully County (Unit 59A) and 0-1 per hundred square miles in Hyde and Hand Counties (Unit 38A). There are currently no pronghorn hunting seasons in the other Project counties.

Wild Turkey

Wild turkeys were extirpated from the State by 1920 but have been brought back through a series of reintroductions from 1950 to 2008 and they are now found in the Black Hills, and riparian drainages with suitable woodland habitat, and in established woodland areas across the state (SDGFP 2021d). In South Dakota, the species prefers hardwood and mixed conifer-hardwood forests with scattered open areas (SDGFP 2021d). Hunting seasons are established annually for the wild turkey in South Dakota with prairie portions of the State having two seasons, a spring season in April-May and a fall season in November-January (SDGFP 2021e). Some Project counties have little if any good habitat, and therefore few if any turkeys, and no turkey hunting (**Table 21**). Although most, if not all, suitable wild turkey habitat in the

State is now inhabited by wild turkeys, SDGFP's management goals for most areas still include increases in the turkey populations (SDGFP 2021d).

Table 21: Turkey Management Areas and Hunting Success in Project Counties

MANAGEMENT UNIT [1]	PROJECT COUNTY [2]	2020 HUNTING SEASON [3] LICENSES SOLD	HUNTER SUCCESS (%)	HARVEST BY SEASON (BIRDS/100MI^2) SPRING	FALL	MANAGEMENT GOAL [4,5]
01A	Minnehaha	80	80	2-7	--	increase
22A	Codington [6]	80	80	2-7	--	increase
32A	Clark/Hamlin	10	10	0-2	--	increase
40A	Beadle/Hand	10	10	0-2	--	increase
44A	Lincoln	99	99	2-7	--	increase
--	McPherson, Edmunds, Brown, Spink, Sully, Hyde, Kingsbury, Miner, Lake, McCook	--	--	--	--	--

Notes:
[1] Hunting license not valid outside regulatory Management Unit (SDGFP 2021e).
[2] County within the Management Unit with Project footprint.
[3] Data from SDGFP 2021f; dashes (–) indicate no fall turkey hunting season in these counties, no harvest record.
[4] Data from SDGFP 2021d; dashes (–) indicate no season in the county.
[5] Management goal set by SDGFP (2021d) as increase, maintain, or decrease turkey population.
[6] Management Unit also includes Day County, which has no Project footprint.

Small Game

Small game are those species of birds and mammals other than big game, which are legally hunted in South Dakota during established hunting seasons. Mammalian small game species include cottontail rabbits (*Sylvilagus* spp) and tree squirrels (*Sciurus* spp). Avian small game species include American crow (*Corvus brachyrhynchus*), common snipe (*Gallinago gallinago*), mourning dove (*Zenaida macroura*, and the upland gamebirds northern bobwhite quail (*Colinus virginanus*), gray partridge (*Perdix perdix*), chukar partridge (*Alectoris chukar*), ringneck pheasant (*Phasianus colchicus*), ruffed grouse (*Bonasa umbellus*), sharp-tailed grouse (*Tympanuchus phasianellus*), greater prairie-chicken (*Tympanuchus cupido*), greater sage grouse (*Centrocercus urophasianus*). Sandhill crane (*Antigone canadensis*), tundra swan (*Cygnus columbianus*), and ducks may also be considered small games. All of these species are, or may be, hunted in the Project counties except the greater sage grouse and the ruffed grouse, which are both found only in far western South Dakota.

Prairie grouse (sharp-tailed grouse and the greater prairie chicken) are important game birds in the State. In 2020, a Projected 10,487 resident and 6,389 nonresident grouse hunters harvested a total of 67,261 grouse (SDGFP 2021g). Habitat prioritization areas have been established by SDGFP for prairie grouse. Prairie grouse abundance and Project proximity to prairie grouse priority habitat are provided in **Table 22**. The lekking and nesting season is generally March 1 – July 30, although lekking may start as early as late February and mean nesting initiation has been reported as April 22 (SDGFP 2017). SDGFP used prairie

grouse occupancy and habitat characteristics to model habitat and identify priority habitats for conservation (Runnia and Solem 2018). The distribution of these priority habitats in relation to Project footprint is indicated in **Table 22**.

Table 22: Abundance, Priority Habitats, and Harvest of Prairie Grouse in Project Counties

PROJECT COUNTY	SHARP-TAILED GROUSE			GREATER PRAIRIE CHICKEN			PRAIRIE GROUSE HARVEST (BIRDS/100 SQ MI)[3]
	ABUNDANCE [1]	PRIORITY HABITAT IN [2]		ABUNDANCE [1]	PRIORITY HABITAT IN [2]		
		COUNTY	FOOTPRINT		COUNTY	FOOTPRINT	
Beadle	present, <10 Leks	Yes	Yes	present, <10 Leks	Yes	--	1-30
Brown	present, no known leks	yes	yes	present, <10 leks	--	--	1-30
Clark	present, <10 leks	yes	yes	present, <10 leks	--	--	1-30
Codington	present, <10 leks	yes	--	present, no known leks	--	--	1-30
Edmunds	present, <10 leks	yes	yes	present, no known leks	--	--	1-30
Hamlin	maybe present	yes	--	possibly present	--	--	1-30
Hand	present,>10 leks	yes	yes	present,>10 leks	yes	--	30-60
Hyde	present,>10 leks	yes	yes	present,>10 leks	yes	yes	1-30
Kingsbury	present, no known leks	yes	--	possibly present	--	--	outside primary range
Lake	maybe present	yes	yes	possibly present	--	--	outside primary range
Lincoln	probably absent	--	--	probably absent	--	--	outside primary range
McCook	maybe present	yes	--	probably absent	--	--	outside primary range
McPherson	present,>10 leks	yes	yes	present, <10 leks	--	--	120+
Miner	present, no known leks	yes	--	possibly present	--	--	outside primary range
Minnehaha	maybe present	yes	--	probably absent	--	--	outside primary range
Spink	present, no known leks	yes	yes	present, <10 leks	yes	--	1-30
Sully	present,>10 leks	yes	yes	present, <10 leks	yes	yes	60-120
Turner	maybe present	--	--	possibly present	--	--	outside primary range

Notes
[1] SDGFP (2017) assesses abundance and distribution based on the number of known leks.
[2] Priority habitat within the Project County and within Project footprint per SDGFP Environmental Review Tool accessed on 12/7/21 athttps://ert.gfp.sd.gov/content/map.

Table 22: Abundance, Priority Habitats, and Harvest of Prairie Grouse in Project Counties

PROJECT COUNTY	SHARP-TAILED GROUSE			GREATER PRAIRIE CHICKEN			PRAIRIE GROUSE HARVEST (BIRDS/100 SQ MI)[3]
	ABUNDANCE [1]	PRIORITY HABITAT IN [2] COUNTY	PRIORITY HABITAT IN [2] FOOTPRINT	ABUNDANCE [1]	PRIORITY HABITAT IN [2] COUNTY	PRIORITY HABITAT IN [2] FOOTPRINT	

[3] Average number of prairie grouse (sharp-tailed grouse and greater prairie chicken) harvested per 100 square miles per SDGFP (2017).

The ringneck pheasant is another very important small game species with over one million birds harvested in most years. Central and eastern South Dakota are within the primary range of the ringneck. During the 2020 hunting season >35-59 pheasants per square mile were harvested in Brown, Beadle, Miner, and McCook Counties, >15-35 in Edmunds, Sully, Spink, Clark, Codington, Hamlin, Kingsbury, Lake, and Minnehaha Counties, and >5-15 in McPherson, Hyde, Hand, Turner, and Lincoln Counties (SDGFP 2021h).

Central and eastern South Dakota are within the Prairie Pothole Region. Prairie potholes account for just 10 percent of North America's waterfowl breeding habitat, but the region produces nearly half the continent's ducks. USFWS has used funds from the sale of Federal Duck Stamps to conserve some of the most threatened and productive migratory bird habitats as WPAs which may be fee-title lands or easements and are part of the National Wildlife Refuge System. As opposed to National Wildlife Refuges, WPAs lands are dispersed across several counties and townships. There are currently over 160,000 acres of such WPAs in South Dakota. All WPAs could not be avoided by routing. As now planned, Project pipelines will cross WPAs at 12 locations (**Table 23**) with construction impacts totaling approximately 20 acres, reduced to 8 acres of an operational ROW that will have no lasting impacts to emergent or scrub-shrub habitats (wetland or upland). The Applicant will work with the USFWS and landowner to cross them and restore them to meet the easement terms

Table 23: Project Waterfowl Production Area Crossings

PIPELINE ROUTE ID	MILEPOST	CROSSING LENGTH (MILES)	WATERFOWL PRODUCTION AREA	TYPE
NDM-106	6.29[1]	0.02	McPherson County Waterfowl Production Area	Conservation Easement
NDM-106	7.01[1]	0.01	McPherson County Waterfowl Production Area	Conservation Easement
NDM-106	15.34	0.50	McPherson County Waterfowl Production Area	Conservation Easement
NDM-106	16.27	0.02	McPherson County Waterfowl Production Area	Conservation Easement
SDM-105	102.84	0.02	McPherson County Waterfowl Production Area	Conservation Easement
SDM-105	106.61[1]	0.29	McPherson County Waterfowl Production Area	Conservation Easement
SDL-320	40.00[1]	0.56	Hand County Waterfowl Production Area	Conservation Easement
SDL-320	44.76	0.05	Hand County Waterfowl Production Area	Conservation Easement
SDL-320	58.27[1]	0.50	Hand County Waterfowl Production Area	Conservation Easement
SDL-320	65.61[1]	0.09	Hand County Waterfowl Production Area	Conservation Easement
SDL-320	66.13[1]	0.50	Hand County Waterfowl Production Area	Conservation Easement
SDL-320	75.18[1]	0.05	Spink County Waterfowl Production Area	Conservation Easement

Notes

[1]Represents Waterfowl Production Areas that will be crossed using the HDD method.

5.3.2.4 Nongame Species

A number of bird species found in the Project area are designated by USFWS as Birds of Conservation Concern (BCCs). Per mandates in the Fish and Wildlife Conservation Act, USFWS identifies species, subspecies, and populations (taxa) of all migratory nongame birds that without additional conservation action are likely to become candidates for listing under the ESA. These species (BCCs) represent USFWS's highest conservation priorities based on an assessment of factors, including population abundance and trends, threats on breeding and nonbreeding grounds and size of breeding and nonbreeding ranges. The Project within South Dakota lies in Bird Conservation Region (BCR) 11 – Prairie Potholes. BCCs with probable presence in the Project area are listed in **Table 24**.

Table 24: Probable Presence of Birds of Conservation Concern in the Project Area

BIRD OF CONSERVATION CONCERN [1,2]	BREEDING PERIOD [2]	PROBABLE PRESENCE [3]
Clark's Grebe [1,2] *Aechmophorus clarkii*	Breeds Jun 1 to Aug 31	Jun-Aug
Black-billed Cuckoo [1,2] *Coccyzus erythropthalmus*	Breeds May 15 to Oct 10	May-Oct
Eastern Whip-poor-will [1,2] *Antrostomus vociferus*	Breeds May 1 to Aug 20	May-Sep
American Golden-plover [1,2] *Pluvialis dominica*	Breeds elsewhere	Mar-May, Sep-Oct
Long-billed Curlew [1,2] *Numenius americanus*	Breeds Apr 1 to Jul 31	Apr-Aug
Hudsonian Godwit [1,2] *Limosa haemastica*	Breeds elsewhere	Apr-May
Marbled Godwit [1,2] *Limosa fedoa*	Breeds May 1 to Jul 31	Apr-Jul
Ruddy Turnstone [1,2] *Arenaria interpres morinella*	Breeds elsewhere	May-Jun, Aug-Sep
Short-billed Dowitcher [1,2] *Limnodromus griseus*	Breeds elsewhere	May
Lesser Yellowlegs [1,2] *Tringa flavipes*	Breeds elsewhere	Mar-Oct
Willet [1,2] *Tringa semipalmata*	Breeds Apr 20 to Aug 5	Apr-Sep
Franklin's Gull [1,2] *Leucophaeus pipixcan*	Breeds May 1 to Jul 31	Mar-Nov
Black Tern [1,2] *Chlidonias niger*	Breeds May 15 to Aug 20	May-Aug
Red-headed Woodpecker [1,2] *Melanerpes erythrocephalus*	Breeds May 10 to Sep 10	Mar-Sep
Sprague's Pipit [1,2] *Anthus spraguei*	Breeds May 10 to Aug 31	May-Aug
Chestnut-collared Longspur [1,2] *Calcarius ornatus*	Breeds May 1 to Aug 10	Mar-Aug
Le Conte's Sparrow [1,2] *Ammodramus leconteii*	Breeds Jun 1 to Aug 15	May-Oct
Baird's Sparrow [1,2] *Ammodramus bairdii*	Breeds May 20 to Aug 15	May-Aug
Bobolink [1,2] *Dolichonyx oryzivorus*	Breeds May 20 to Jul 31	May-Sep
Golden-winged Warbler [1,2] *Vermivora chrysoptera*	Breeds May 1 to Jul 20	May-Jul

Notes:
[1] Birds with BCC status in Bird Conservation Region (BCR) 11 from USFWS (2021c).
[2] Breeding period pf BCCs with probable presence in the Project area per IPaC (2021).
[3] Period BCC may be found in the Project area per IPaC 2021; note that presence may be only part of the beginning or end month.

SDGFP has identified 101 animal species as species of greatest conservation need (SGCN) in their South Dakota Wildlife Action Plan (SDGFP 2014), including 30 bird species, 12 mammal species, 12 reptile or amphibian species, 12 terrestrial insect species, 9 freshwater mussel species, 4 gastropod species, 21 fish species, and 4 aquatic insect species.

The Project also contains footprint in areas identified by the Audubon Society as Important Bird Areas (IBAs). Approximately 1.7 miles of SDL-320 traverses the northwest corner of the Wolsey Crane Stopover

Area, and IBA. This area was designated by Audubon as an IBA due to its importance as a staging area for sandhill and whooping Cranes. The habitat is a mixture of wet meadows, marshes, creeks, grasslands, and corn fields. During spring migration, and to a lesser extent, in the fall, the cranes feed on waste grain in the cornfields, as well as forage in wet meadows and pastures. Approximately 60,000 sandhill cranes used these lands during migration in 2012 and 100,000 in 2013.

5.3.2.5 Potential Impacts to Wildlife

Construction Impacts

Construction of the Project will include the clearing of approximately 6,384 acres of land (**Table 18**), all with some value to wildlife. However, a large percentage of the impacted lands will be croplands. Clearing in pasture / hay lands and grassland / herbaceous areas could result in the destruction of bird nests, both game birds (wild turkey, ringneck pheasant, prairie grouse) and nongame birds. Noise and human disturbance associated with construction could displace these species from a broader area for a short time period. No especially sensitive habitats for non-game birds, game birds (such as leks), or other small game species have been identified along the route; however, surveys have not yet been conducted along the route. Project footprint traverses some prairie grouse priority habitat indicating a potential for leks to be located in proximity.

Impacts to big game species will include the temporary loss of potential forage (native vegetation and croplands) and will result in temporary habitat fragmentation within the surface disturbance areas during construction. However, these temporary impacts to vegetation will represent a small percentage (far less than 1 percent) of the overall available habitat within the Project region. No especially sensitive habitats for big game have been identified along the route. Spoil piles and open trenches could block movements or trap wildlife. To allow wildlife movements, gaps will be left in the spoil piles that align with breaks in the strung pipe. Bridges may also be constructed to allow the passage of wildlife. Trenching procedures will be followed minimize the length of time the trench is left open. Indirect impacts will result from increased noise levels and human presence during surface disturbance activities. Because the big game species mentioned above have adapted to human activities and land uses, displacement from construction areas are likely to be short-term.

Construction during hunting seasons will likely result in some space use conflicts with hunters, with hunters being restricted from construction areas and perhaps avoiding larger areas surrounding the work sites. Most hunting in the area is for white-tailed deer, wild turkey, prairie grouse, and ringneck pheasant. These impacts will be short-term lasting only as long as construction requires, or the season remains open. These impacts are considered small because of the area of impact in comparison to the acreage open for hunting, and the small numbers of hunters that likely use the area (**Tables 21,22,23)**. This could reduce harvest in the area by very small amounts; however, construction of temporary access roads for Project construction could result in increased hunter access with a consequential increase hunting pressure on game species.

Operation Impacts

Operations are expected to have little impact on wildlife. All of the construction ROW and most of the permanent ROW will be allowed to revert to pre-construction vegetative conditions. This includes all of the temporarily impacted lands totaling approximately 3,472 acres (**Table 18**) and much of the permanent ROW (2,912acres). Disturbances associated with maintenance activities will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion

through regular inspections. Maintenance activities will have only short-term impacts on wildlife and no impact on wildlife populations.

5.3.3 Threatened and Endangered Species

The Project crosses portions of 18 South Dakota counties. Nine species (**Table 25**) federally listed as either threatened or endangered under the Endangered Species Act (ESA) occur or are thought to possibly occur in these counties (IPaC 2021; USFWS 2021a; Perennial 2021b; 2022a). Two candidate species were identified to possibly occur in the Project Facility area. The only critical habitat designated under the ESA within these counties is piping plover critical habitat (Unit 1) located along the Missouri River in Sully County (IPaC 2021) more than 20 miles from Project footprint. On December 17, 2020, the USFWS found upon review of petitions that listing of the monarch butterfly (*Danaus plexippus plexippus*) is warranted but precluded by higher priority actions and is therefore a candidate species found state-wide in certain habitats in South Dakota. A habitat assessment was conducted for the Project Facilities to determine the potential presence of suitable habitat within the Project Facility area. A report (Perennial 2022a) detailing the methods and results of the habitat assessment is provided in **Appendix 10.** The results of the assessment are utilized in preparation of the following sections.

Three of these federally listed species are also listed by the State of South Dakota as threatened or endangered as indicated in **Table 25**. These are Piping plover, Pallid sturgeon, and Whooping crane.

In addition to these federally listed species, there are eight other species that are State listed (but not federally listed) and known to occur in Project Facility counties (**Table 26**; SDGFP 2021j,k,l).

Table 25: Other State Listed Species in the Project Area

SPECIES [1]	STATUS [2]	KEY HABITATS [3]	PROJECT COUNTIES [4,5]
Swift Fox *Vulpes velox*	ST	Prefers heavily grazed shortgrass or mixed-grass prairies with open, gently rolling topography for high visibility of surrounding area and is usually associated with prairie dog or ground squirrel colonies. They use dens throughout the year and may dig their own dens or occupy abandoned badger dens or prairie dog burrows. Suitable habitat may be present within the Project area, especially in Sully and Hyde Counties (Perennial 2021b)	Sully, Hyde
Bald eagle [6] *Haliaeetus leucocephalus*	BGEPA [6]	Usually found near water such as rivers, lakes, reservoirs, and coastal areas. Large cottonwood trees are typically used for nesting and roosting. This species requires a large area of clear surface water for feeding. Bald eagles are widespread nesters that nest along many rivers and large wetlands in South Dakota. Wintering birds congregate near Missouri River dams and surrounding forests and also winter in the Black Hills. Eagles can be seen in migration along rivers and large wetlands. Eagles begin nesting in March or April. They typically nest high in trees and often	All

Table 25: Other State Listed Species in the Project Area			
SPECIES [1]	**STATUS [2]**	**KEY HABITATS [3]**	**PROJECT COUNTIES [4,5]**
		reuse nests from previous years. A typical clutch has 2 eggs which are incubated for 45 days. Both parents care for chicks, which stay in the nest for 10-11 weeks. Suitable habitat for the bald eagle may be present at various locations within the Project area, especially near large rivers and streams such as the Big Sioux River and the Vermillion River. Although bald eagles were observed during the survey, eagle nests were not observed in the Project area (Perennial 2021b)	
Lined snake *Tropidoclnion lineatum*	SE	Prefers open, grassy prairies with rich soils and sparsely wooded areas. Often found on hillsides near rocky areas. Lined snakes are active at night and typically shelter beneath rocks and logs during the day. This species overwinters underground in animal burrows. Suitable habitat for the lined snake may be present in the Project area (Perennial 2021b; 2022a).	Lincoln, Minnehaha
False map turtle *Graptemys pseudogeographica*	ST	Large rivers, backwaters, lakes, and flooded floodplains. Turtles need basking sites and aquatic vegetation. Females dig nests in sandy areas near water, laying up to 3 clutches per breeding season. She lays 12-16 eggs in June and July, and eggs hatch 2 months later. Turtles overwinter in mud or in muskrat dens within wetlands.	Sully, Hyde
Banded killifish *Fundulus daphaneus*	SE	Habitat is lentic or lotic; it has been detected in quiet, shallow lakes, and in ponds with abundant aquatic vegetation and sandy-gravel substrates but also in streams with muddy bottoms without aquatic vegetation. Reported from a few lakes in west South Dakota. East South Dakota is on the range periphery. Since 2000, reported banded killifish have been limited to the inlet of Bitter Lake, Day County and Little Eureka Lake, McPherson County (Perennial 2021b).	McPherson, Edmunds, Brown
Blacknose shiner *Notropis heterolepis*	SE	Prefers cool, highly vegetated streams, small rivers, and lakes with sandy substrates. Spawns May to June over sandy substrates. Southern South Dakota, tributaries to the James and Keya Paha River basins. South Dakota is on the western periphery of the range for this species	Brown, Codington
Northern redbelly dace *Chrosomus eus*	ST	Prefers cool, bogs, ponds, beaver ponds, lakes, and small clear streams. Spawns in clear low to moderate current over sand or gravel substrates during the spring. South central South Dakota-tributaries to the Little White and Keya Paha River basins. South Dakota is on the southern periphery	Codington, Miner, Turner, Lincoln, Hamlin, Kingsbury, McCook, Minnehaha

Table 25: Other State Listed Species in the Project Area			
SPECIES [1]	**STATUS [2]**	**KEY HABITATS [3]**	**PROJECT COUNTIES [4,5]**
		of the range for this species. Suitable habitat for the northern redbelly dace may present in the Project area in the tributaries of the Missouri and Big Sioux rivers (Perennial 2021b).	
Interior Least Tern *Sternula antillarum athalassos*	SE	Interior least terns are typically found along large rivers. The nesting areas are barren, treeless beaches of sand, gravel, or shells; dry mudflats and salt flats; and sand and gravel pits along rivers. Interior least terns arrive in South Dakota in early May and leave at the end of the summer. In South Dakota, interior least terns nest along the Missouri and Cheyenne rivers, with the majority nesting below Gavins Point Dam.	Sully

Notes:
[1] State listed species in South Dakota, which are not also federally listed, and which are found in South Dakota counties the Project traverses (SDGFP 2021 j,k,l).
[2] Status: ST = State threatened, SE = State endangered, BGEPA = Bald and Golden Eagle Protection Act
[3] Key habitats and distribution from SDGFP Wildlife of South Dakota website https://apps.sd.gov/gf43wap/Species.aspx#tab2.
[4] Counties with Project footprint only.
[5] Occurrence / distribution from SDGFP (2021j) mapping website Wildlife of South Dakota accessed on 13 December 2021 at https://apps.sd.gov/gf43wap/Species.aspx#tab2; includes more counties than Environmental Review Tool (SDGFP 2021l) at https://ert.gfp.sd.gov/content/map.
[6] The bald eagle is not currently federally listed or state-listed in South Dakota but is included here due to its protection under the BGEPA.

The Project footprint was reviewed on the SDGFP South Dakota Environmental Review Tool interactive websites with township level Natural Heritage data (SDGFP 2021l). The numbers of documented occurrences of sensitive species within townships that have Project footprint are provided in **Table 26**.

Table 26: Occurrence of Sensitive Species Near Project Footprint based on SDGFP Natural Heritage Data												
		NUMBER OF OCCURRENCES WITHIN TOWNSHIPS WITH PROJECT FOOTPRINT BY PIPELINE ID										
SPECIES	**STATUS**	**SDM 104**	**SDM 105**	**SDM 106**	**SDT 206**	**SDT 207**	**SDT 208**	**SDT 209**	**SDT 210**	**SDL 320**	**NDT 211**	**Total**
Western Prairie Fringed Orchid	FE	-	-	-	-	-	-	-	-	-	-	-
Dakota Skipper	FT	-	2	-	1	-	2	-	-	-	1	6
Poweshiek Skipperling	FE	-	-	-	-	-	-	-	-	-	-	-
Topeka Shiner	FE	1	2	-	-	3	2	-	-	-	-	8
Pallid Sturgeon	FE/SE	-	-	-	-	-	-	-	-	-	-	-
Whooping Crane	FE/SE	3	1	1	-	-	-	1	-	8	-	14

Table 26: Occurrence of Sensitive Species Near Project Footprint based on SDGFP Natural Heritage Data

SPECIES	STATUS	NUMBER OF OCCURRENCES WITHIN TOWNSHIPS WITH PROJECT FOOTPRINT BY PIPELINE ID										
		SDM 104	SDM 105	SDM 106	SDT 206	SDT 207	SDT 208	SDT 209	SDT 210	SDL 320	NDT 211	Total
Piping Plover	FT/ST	-	-	-	-	-	-	-	-	-	-	-
Rufus Red Knot	FT	-	-	-	-	-	-	-	-	-	-	-
Northern Long-eared Bat	FT	-	-	-	-	-	-	-	-	-	-	-
Northern Redbelly Dace	ST	1										1
Blacknose Shiner	SE	-	-	-	-	-	-	-	-	-	-	-
Banded Killifish	SE	-	-	-	-	-	-	-	-	-	-	-
False Map Turtle	ST	-	-	-	-	-	-	-	-	-	-	-
Lined Snake	SE	3	-	-	-	-	-	-	-	-	-	3
Bald Eagle	BGEPA	3	3		1	1	1	1	-	-	1	11
Swift Fox	ST	-	-	-	-	-	-	-	-	1	-	1

Notes:
[1] If the species occurs in the county, its occurrence is inserted as either "known" or "possible" as indicated in USFWS (2021a) South Dakota Listed Species by County List (updated February 12, 2021) available at https://www.fws.gov/mountain-prairie/es/southDakota/species.php.
[2] Status is listing status: FT = federally endangered, FT = federally threatened, ST = state threatened, SE = state endangered, BGEPA = Bald and Golden Eagle Protection Act.
[3] Project counties are those South Dakota counties with Project footprint.

5.3.3.1 Sensitive Plant Species

Sensitive plant species discussed here are plant species that are federally listed as threatened or endangered species (**Table 25**). The State does not designate plants as state-listed species.

Western Prairie Fringed Orchid

The western prairie fringed orchid is a flowering plant that can grow to a height of 3 feet but is typically 18 to 30 inches tall. Historically, it was distributed throughout much of the western central lowlands and eastern Great Plains physiographic provinces of the central U.S., and Interior Plains in extreme south-central Canada. Conversion of native grasslands to cropland, as well as overgrazing, herbicides, and exotic plant invasion have led to significant declines. Invasive plants such as leafy spurge and reed canary grass (*Phalaris aruninacea*) may displace the orchid through competition (USFWS 2021b). The plant is reliant on sphinx moths for pollination and seed production so any threat to these insects, such as the use of insecticides, is also a threat to the orchid (Schneider et al. 2018). The plant was federally listed as threatened in 1989 (54 FR 39857); to date, no critical habitat has been designated for the species.

Currently, there are no known populations of this species in South Dakota (USFWS 2021a,b). Status surveys have been completed in South Dakota and have confirmed this, but it is possible that plants have been overlooked. References to possible range of the western prairie fringed orchid being located in Lake,

Lincoln, McCook, Miner, Minnehaha, and Turner counties, are based on the existence of habitat in those counties. The species is most often found in unplowed, calcareous prairies and sedge meadows (USFWS 1996) and may occur along ditches and roadsides (USFWS 2017). In tallgrass prairies, it is typically associated with big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and Indiangrass (*Sorghastrum nutans*). In wetter sites, it is commonly associated with tufted hairgrass (*Deschampsia caespitosa*) and switchgrass (*Panicum virgatum*), and in sedge meadows is associated with *Carex* spp. and spikerushes (*Eleocharis* spp.) (USFWS 1996).

5.3.3.2 Sensitive Wildlife Species

Sensitive wildlife species discussed here are terrestrial and amphibious species of wildlife that are either federally listed as threatened or endangered species (**Table 25**) or listed by the State in South Dakota as threatened or endangered, but which are not also federally listed (**Table 26**). Information for state-listed species is provided above in **Table 26**. Additional information on federally listed species is provided below.

Dakota Skipper

The Dakota skipper is a small butterfly. Historically, the species occurred throughout the vast grasslands of the north-central United States and south-central Canada, extending from Illinois to Saskatchewan, but its range has been much reduced due to the loss of native prairie grasslands. It is found in two types of native prairies, each containing a high diversity of wildflowers and grasses. One is a low, wet prairie dominated by bluestem grasses, wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*) and smooth camas (*Zygadenus elegans*). The other is an upland prairie often found on ridges and hillsides and dominated by bluestem grasses, and needlegrasses dominate these prairies; purple coneflower (*Echinacea angustifolia*) is typical of high-quality sites (USFWS 2014a; 2018b). There is no critical habitat in South Dakota counties crossed by the Project. Dakota skippers are believed to presently use 44 sites in 10 South Dakota counties, including Project counties McPherson, Hamlin, and Codington Counties (Cochrane and Delphey 2002). South Dakota Natural Heritage Program data (SDGFP 2021l) data indicate no historical or extant Dakota skipper sites within townships with Project footprint. Suitable habitat for the Dakota skipper may be present in the Project area (Perennial 2021b; 2022a).

Poweshiek Skipperling

Poweshiek skipperlings are small butterflies most often found in remnants of native prairie in Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin and in fens in Michigan (USFWS 2013). However, this skipperling may have been extirpated from the Dakotas, Minnesota, and Iowa – an area that previously contained the vast majority of the surviving populations. It is now known only from Wisconsin, Michigan, and Manitoba. During surveys in 2014, the species could be found only at a few sites in a single Michigan county, in very limited numbers at one site in Wisconsin, and in Canada at the single Manitoba site. Suitable habitat for the Poweshiek skipperling may be present in the Project area (Perennial 2021b). Although some data indicates the skipperling could possibly be found in Clark, Codington, and Hamlin Counties, the USFWS indicated that effects on the species from the Project are unlikely and consultation is not required.

Whooping Crane

The whooping crane was listed under the ESA as endangered on March 11, 1967 (32 FR 4001). It is also state-listed as endangered in South Dakota. Critical habitat has been federally designated for whooping cranes (43 FR 20938-942; CWS and USFWS 2005) but none is located in South Dakota or Project Facility Counties. The wild population of 504 birds, nests Wood Buffalo Park in Canada and winter on the Texas coast. During spring and fall migration, the Aransas-Wood Buffalo National Park population moves

through the central Great Plains including portions of South Dakota. Birds from this population depart from their wintering grounds in Texas from late March through May 1. Fall migration typically begins in mid-September with most birds arriving on wintering grounds between late October and mid-November (CWS and USFWS 2005). Whooping cranes use a variety of habitats during migration (Howe 1987; Lingle 1987; Lingle et al. 1991; Johns et al. 1997) but are most closely associated with river bottoms, marshes, potholes, prairie grasslands, and croplands (CWS and USFWS 2005). Whooping cranes generally use seasonally or semi permanently flooded palustrine wetlands, broad river channels, and shallow portions of reservoirs for roosting and various cropland and emergent wetlands for feeding (Austin and Richert 2001; Johns et al. 1997). Suitable stopover habitat for the whooping crane may be present in the Project area (Perennial 2021b).

Piping Plover

The piping plover is a migratory shorebird. Historically, the piping plover bred across three geographic regions: (1) U.S. and Canadian Northern Great Plains from Alberta to Manitoba south to Nebraska; (2) Great Lakes beaches; and (3) Atlantic coastal beaches from Newfoundland to North Carolina. Wintering areas are less well known, although wintering birds have been most often seen along the Gulf of Mexico, southern U.S. Atlantic coastal beaches from North Carolina to Florida, eastern Mexico, and scattered Caribbean Islands (Haig 1986; USFWS 1988). The piping plover's current breeding range is similar except that breeding populations in the Great Lakes have almost disappeared (Haig and Plissner 1993). In Nebraska, the current range follows the Platte River, Loupe River, lower Elkhorn River, Niobrara River, and portions of the Missouri River.

The piping plover was listed as endangered and threatened December 11, 1985 (50 FR 50726) (USFWS 1985). The Great Lakes population of piping plover is federally listed as endangered, while the remaining Atlantic and Northern Great Plains populations are listed as threatened. Migrating and wintering populations of piping plover were also classified as threatened. Populations of piping plover within South Dakota are considered to belong to the threatened Northern Great Plains population.

Critical habitat has also been federally designated under the ESA for the piping plover, including areas along much of the Missouri River in both South Dakota and Nebraska. The final rule designating critical habitat for the Northern Great Plains breeding population of the piping plover (67 FR 57638) within and along river segments bounding Nebraska has been vacated by the Service. Primary constituent elements of critical habitat include: (1) prairie alkali lakes and wetlands; (2) shallow, seasonally to permanently flooded, mixosaline to hypersaline wetlands with sandy to gravelly, sparsely vegetated beaches, salt-encrusted mud flats, and/or gravelly salt flats; (3) springs and fens along edges of alkali lakes and wetlands; (4) adjacent uplands 200 feet above the high water mark of alkali lakes or wetlands; (5) rivers with sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river; and (6) reservoirs with sparsely vegetated shoreline beaches, peninsulas, and islands composed of sand, gravel, or shale (67 FR 57638). Suitable habitat for the piping plover may be present at various locations within the Project area, especially near large rivers such as the Big Sioux River (Perennial 2021b).

Rufus Red Knot

The rufa red knot is a migratory shorebird, which nests on breeding grounds in the Canadian arctic and then migrates southward, primarily along the coastline, and especially the eastern coastline, to its wintering grounds. Rufa red knots migrate to wintering areas as far south as Tierra del Fuego, South America; however, many birds' winters along the coast of the southeastern U.S., Gulf of Mexico, and northern Brazil (USFWS 2013). It is a casual or irregular occurrence within the non-coastal portion of the

Central Flyway (Central Flyway Council 2013); however, there are very few records of this species in South Dakota. The rufa red knot was federally listed as a threatened species on December 11, 2014. No critical habitat has been designated. Suitable habitat for the red knot may be present at various locations within the Project area (Perennial 2021b)

Northern Long-eared Bat

The range of the northern long-eared bat extends across much of eastern and north central United States from Maine to eastern Montana and adjacent Canada and south as far as parts of Louisiana and Alabama. Historical and current ranges encompass all of South Dakota, except for a few southwestern counties. Historically, the bat has been patchily distributed throughout its range but has been decidedly most common in the northeastern U.S. and Canada and less common in the southern and western parts of the range. The primary threat to the northern long-eared bat is the white-nose syndrome, an infectious disease responsible for unprecedented mortality in some hibernating insectivorous bats of the northeastern United States. The disease is believed to have resulted in population declines of 99 percent in affected areas of the historic range.

The northern long-eared bat is federally listed under the ESA as a threatened species. An ESA Section 4(d) rule in the Federal Register on January 14, 2016, which specifically defines take prohibitions to protect maternity colonies and hibernacula for Projects within the white-nose syndrome zone (50 CFR Part 17). No critical habitat has been established. Suitable summer roosting habitat may be present within the Project area (Perennial 2021b).

5.3.3.3 Sensitive Aquatic Species

Sensitive aquatic species are fish amphibians, and aquatic reptiles such as turtles that are either federally listed as threatened or endangered species or listed by the State in South Dakota as threatened or endangered, but which are not also federally listed. Information for state-listed species is provided above in **Table 25**. Additional information on federally listed species is provided below.

Topeka Shiner

USFWS listed the Topeka shiner as endangered in January 1999. Prior to that, the limited available survey data suggested the fish occupied 10 percent or less of its historic range (USFWS 1999). However, recent studies documented the occurrence of Topeka shiners in 80 percent of the known historically occupied streams in South Dakota and a number of streams where they were not previously reported, suggesting the fish is more abundant in South Dakota than other states within its range (Shearer 2003). Topeka shiners generally occupy small, prairie streams with groundwater inputs (springs), high water quality, and or gravel substrates (Pflieger 1997). In South Dakota, the Topeka shiner is presently found in 72 tributaries of the James (27), Vermillion (15), and Big Sioux (39) rivers in South Dakota (USFWS 2018a) including five streams crossed by the Project centerline. The Project includes 18 crossings of streams, all within these watersheds; Topeka shiners have been reported in the streams involved with four of these crossings (**Table 27**). USFWS designated critical habitat for the Topeka shiner in 2004; however, none was designated within South Dakota.

Table 27: Project Crossings of Streams with Reported Topeka Shiner Sightings				
NAMED STREAM [1]	**PIPELINE ROUTE ID**	**COUNTY**	**STREAM TYPE**	**YEAR OBSERVED [2]**
Spring Creek	NDM-106	McPherson	Ephemeral	--
Matter Creek	SDL-320	Hand	Ephemeral	--
East Fork Vermillion River	SDM-104	Lake	Ephemeral	1992 [2], 2006 [3]
Redstone Creek	SDM-104	Kingsbury	Perennial	1989 [2], 2010 [3]
West Branch Skunk Creek	SDM-104	Minnehaha	Ephemeral	--
Dry Run	SDM-105	Spink	Perennial	--
James River	SDM-105	Spink	Perennial	--
Shue Creek	SDM-105	Beadle	Perennial	1999 [2], 2017 [3]
Snake Creek	SDM-105	Brown	Perennial	--
Timber Creek	SDM-105	Spink	Ephemeral	--
James River	SDT-207	Beadle	Perennial	--
Shue Creek	SDT-207	Beadle	Perennial	1999 [2], 2017 [3]
Big Sioux River	SDT-208	Codington	Ephemeral	1970 [2]
Big Sioux River	SDT-208	Codington	Perennial	1970 [2]
Redstone Creek	SDT-208	Clark	Ephemeral	1989 [2]
Dry Run	SDT-209	Spink	Perennial	--
James River	SDT-209	Spink	Perennial	--
Snake Creek	SDT-210	Brown	Ephemeral	--

Notes:
[1] All crossings of named streams.
[2] Most recent year the Topeka Shiner was reported as found in the stream per Shearer 2003
[3] Most recent year the Topeka Shiner was reported as found in the stream per USFWS 2018a.

Pallid Sturgeon

The pallid sturgeon is a large fish that can weigh up to 80 pounds and reach lengths of 6 feet. Historically their range encompassed most of the Mississippi, Missouri, Yellowstone, and Atchafalaya Rivers but their range and population have been reduced by damming and channelization of rivers. Commercial fishing and environmental contaminants may have contributed to the decline. The pallid sturgeon was listed as endangered (55 Federal Register 36641) on September 6, 1990. Pallid sturgeons are adapted to living close to the bottom of large rivers with high turbidity and a natural hydrograph. Their preferred habitat has a diversity of depths and velocities formed by braided channels, sand bars, islands, sand flats, and gravel bars.

By 1967, the first year when all six dams on the mainstem Missouri River were operating as a system, large portions of the Missouri River had changed from a riverine to a lacustrine (lake) environment (National Research Council 2002). Remnant pallid sturgeon exists in the reservoirs but there has been no evidence of any reproduction in the reservoirs since dam completion (Gilbraith et al. 1988). USFWS (2021a) identifies Hyde, Lincoln, and Sully Counties as the only Project counties where the pallid sturgeon is of concern. Its current range in South Dakota is shown as restricted to the Missouri River from North Dakota south to and within Lake Sharpe and between the Fort Randall and Gavins Point Dams, and to the lower

Big Sioux River in Lincoln County (Pallid Sturgeon Recovery Program 2021, USFWS 2014b). The Project does not cross the Missouri River and as currently proposed crosses no named streams within Hyde and Sully Counties. The Project will cross the Big Sioux River at three locations including one in Lincoln County where it will be crossed using horizontal directional drill (HDD) technology. Suitable habitat for the pallid sturgeon may be present in the Project area within the Big Sioux River. However, the recorded range in the Big Sioux River for this species does not extend up to the Project area (Perennial 2021b).

5.3.3.4 Potential Impacts to Threatened and Endangered Species

An assessment of the potential of Project construction or operation affecting the identified threatened and endangered species identified above is provided in the threatened and endangered species habitat assessment report (Perennial 2022a) attached in **Appendix 10**.

5.4 Aquatic Ecosystems

5.4.1 Wetlands

Wetlands and riparian areas were identified along the Project by completing field surveys and reviewing aerial photographs for areas where access was not granted. Wetlands and waters of the U.S. along the route were delineated in accordance with the direction provided by the USACE – Omaha District. A report detailing methods and findings of wetland delineations conducted for the Project is attached in **Appendix 9**.

Wetlands within the Project area were classified into three categories: palustrine emergent (PEM) wetlands, palustrine scrub-shrub (PSS) wetlands, and palustrine forested (PFO) wetlands (Cowardin et al. 1979). Wetlands within the Project area in South Dakota are limited to approximately 20.3 miles of PEM wetlands and less than 0.13 mile of PFO wetlands. Less than a tenth of an acre of PSS wetlands will be impacted.

Palustrine emergent (PEM) wetlands generally are dominated by fowl blue grass (*Poa palustris*) and fox tail (*Hordeum jubatum*) in areas that typically contain water for several weeks after spring snowmelt. Shallow-marsh vegetation such as spikerush (*Eleocharis palustris*) and wheat sedge (*Carex antherodes)* dominate areas where water typically persists for a few months each spring, and deep-marsh vegetation like cattails (*Typha latifolia*), and hardstem bulrush (*Scirpus acutus*) occupies areas where water persists throughout the year (USDA NRCS 2008; USGS 2006).

Palustrine scrub-shrub (PSS) wetlands are dominated by woody shrubs and trees less than 20 feet tall (Cowardin et al. 1979). Dominant woody vegetation in PSS in the Project survey area consists of white willow (*Salix alba*), narrowleaf willow (*S. Interior*), and common lilac (*Syringa vulgaris*).

Palustrine forested (PFO) wetlands are dominated by woody vegetation that is at least 20 feet tall (Cowardin et al. 1979). The dominant woody vegetation in PFO in the Project survey area consists of eastern cottonwood (*Populus deltoides*), crack willow (*S. fragilis*), white willow, peachleaf willow (*S. amygdaloides*), green ash (*Fraxinus pennsylvanica*), and common buckthorn (*Rhamnus cathartica*). The report (Perennial 2021a) provided in **Appendix 9** provides complete lists of dominant species in the wetlands as well as descriptions of soils and hydrology.

Construction Impacts

To mitigate the potential for these impacts, the Project will implement specific procedures as outlined in the ECP (**Appendix 3**) and summarized in this report. Impacts on wetland vegetation will be greatest during and immediately following construction. The Project will restore soil grade and replace topsoil to

allow wetlands affected by construction activities to naturally revegetate. Wetlands impacts are indicated in **Table 28**.

Table 28: Wetlands Impacted by the Project

WETLAND TYPE [1]	PROJECT IMPACTS BY FACILITY TYPE [2]			
	PIPELINE		ACCESS ROADS	
	CONSTRUCTION ROW (ACRES)	OPERATION ROW (ACRES)	CONSTRUCTION (ACRES)	OPERATION (ACRES)
PEM	181.6	0.0	0.6	0.013
PSS	<0.1	0.0	0.0	0.0
PFO	1.2	0.8	0.0	0.0
Total	**182.8** [2]	**0.8**	**0.6** [3]	0.013

Notes:
[1] PEM = palustrine emergent, PSS = palustrine scrub-shrub, PFO = palustrine forested.
[2] Area within Project footprint; there are no direct wetland impacts associated with Project facilities not listed here. Project HDD crossings are not included as impacts, the ground disturbance at these locations will be avoided.
[3] Construction impacts include both construction footprint and operation footprint.
[4] Acres are rounded up.

Smaller streams and ephemeral or intermittent drainages will likely be open cut and wetlands located in these areas will be crossed by trenching. However, the installation of aboveground facilities will not occur in wetlands. Permanent access roads will result in the loss of approximately 0.013 acres of PEM wetlands. Herbaceous vegetation in PEM wetlands is expected to re-establish to preconstruction levels within 1 to 5 years following the completion of reclamation, resulting in a short-term loss of vegetation and available habitat for some wildlife species. The construction ROW will result in the permanent conversion of approximately 0.8 acres of PFO wetlands to PEM wetlands in the permanent ROW. PFO wetlands within the temporary construction workspace would not return to preconstruction conditions for an extended length of time, typically 10 years or more to reach mature habitat.

The ECP (**Appendix 3**) contains mitigative procedures to be followed in wetlands. All work shall be conducted in accordance with applicable permits. The Applicant will work directly with USACE for any Section 404 permit applications as applicable.

Operation Impacts

Over the operational life of the pipeline, vegetation will be allowed to re-establish in emergent and scrub-shrub wetlands with the exception of 0.013 acres of PEM wetlands as a result of a permanent access road (**Table 28**). Over the operational life of the pipeline, vegetation will be allowed to re-establish in emergent and scrub-shrub wetlands with the exception of 0.013 acres of PEM wetlands as a result of a permanent access road (**Table 28**). Woody vegetation in PFO wetlands will be removed during construction (approximately 1-acre) and will regrow within the temporary workspace over many years. Construction will result in the permanent conversion of approximately 0.8 acres of PFO to PEM wetlands in the permanent ROW, which would result in loss of the incremental portion of functional value associated with loss of tree cover, but these wetlands would retain other wetland values such as water retention, water

filtration, and aquatic habitat. As part of its Section 404 application to the USACE, the Applicant will abide by all required mitigation measures regarding vegetation conversion impacts on PFO wetlands.

All wetland areas within conservation lands or easements will be restored to a level consistent with any additional criteria established by the relevant managing agency.

Although planning and routing efforts have reduced the overall number of wetlands crossed by the Project, wetlands are present along and adjacent to the Project pipeline route. The impact of CO_2 released into a wetland environment will depend not only upon the quantity of CO_2 released, but also on the physical conditions of the wetland at the time of the release.

Carbon dioxide released from the pipeline within a wetland could reach the soil surface. If the water table reaches the surface, the release will manifest as dissipating carbon to its natural state. The general lack of surface flow within a wetland will restrict carbon movement. Where surface water is present within a wetland, the spill will dissipate into the surface water or vaporize into the air. The depth of soil impacts likely will be minimal, due to shallow (or emergent) groundwater conditions. Groundwater impacts within the wetland are likely to be minimal and confined to the near surface, enhancing the potential for biodegradation. If any impacts were to occur from a release within an isolated wetland. As described in Section 5.4, pH will increase in an isolated wetland due to the carbon incorporation of the fresh water. However, this release will be diluted and dissipate once the leak is stopped and repaired, and the CO_2 is diluted from surface/groundwater movement.

The chance of a release occurring at any specific wetland along the pipeline is very low. Based on survey data and aerial interpretation, wetlands comprise approximately 20.3 miles of the Project in South Dakota. Based on PHMSA data on pipeline leaks or spills (natural gas pipelines), the risk of a CO_2 release in a wetland is very small. An accidental release from the pipeline will have little to no impact on the natural habitat. If a release occurs, the Project will initiate its emergency response procedures to shut the mainline valves and restore the ROW where the release occurred. Restoration of any vegetative damage from a release will follow the timelines discussed above and would be localized and small scale to the immediate area around the release.

5.4.2 Fisheries

Aquatic Habitats and Communities

Construction of the Project will involve 19 crossings of named waterbodies, including 5 ephemeral stream crossings, 1 intermittent stream crossing, 12 perennial stream crossings, and 1 lake crossing (**Table 29**). Of these, the segments of the Big Sioux River, James River, and Redstone Creek crossed by the Project have been designated by the State with the beneficial use of "warmwater semipermanent fish life propagation water." The Snake Creek stream segment crossed by the Project has been designated the beneficial use value of warmwater marginal fish life propagation (SDDENR 2020, S.D. Admin. R. 74:51:01). SD DANR (S.D. Admin. R. 74:51:01:29) classifies a stream as high-quality fishery water if it has been assigned the beneficial use of coldwater permanent fish life propagation, coldwater marginal fish life propagation, or warmwater permanent fish life propagation. None of the streams crossed by the Project have been designated with these beneficial uses thus all are considered to be low quality fishery waters.

Except for the East Fork of the Vermillion River, the James River, and the Big Sioux River, these crossed streams are low order streams or tributaries of relatively small size. Woody riparian habitats are found at only one of the stream crossings, the crossing of the Big Sioux River in Lincoln County. Some of the other stream crossings have adjacent riparian areas consisting of palustrine emergent wetland (**Table 29**).

SDGFP (2019b) conducted electrofishing at two sites (i.e., Highway 12 and Hitchcock) on the James River within the NEFMA in September 2017. Species collected included: bigmouth buffalo (*Ictiobus cyprinellus*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), emerald shiner (*Notropis atherinoides*), fathead minnow (*Pimephales promelas*), flathead catfish (*Pylodictis olivaris*), freshwater drum (*Aplodinotus grunniens*), gizzard shad (*Dorosoma cepedianum*), grass carp (*Ctenopharyngodon 83della*), orangespotted sunfish (*Lepomis humilus*), red shiner (*Cyprinella lutrensis*), river carpsucker (*Carpiodes carpio*), shorthead redhorse (*Moxostoma macrolepidotum*), shortnose gar (*Lepisosteus platostomus*) and walleye (*Sander vitreus*). Silver carp (*Hypopthalmichthys molitrix*) were observed jumping but were not captured.

Surveys of the Big Sioux River revealed many of the same species. A survey of 13 sites along the length of the Big Sioux in South Dakota yielded 48 species (Dieterman and Berry 1998). Cyprinids (minnows) represented 56 percent of the catch with the sand shiner (*Notropis ludibundis*), red shiner, and fathead minnow being numerically dominant. Ictalurids made up 22 percent of the catch and were dominated by black bullheads (*Ameiurus melas*) and channel catfish (*Ictalurus punctatus*). Catostomids (suckers) represented 14 percent of the catch, with the white sucker (*Catostomus commersoni*) being the most common, and the predominant percids (perch) were the johnny darter (*Etheostoma nigrum*) and walleye being most common.

Table 29: Named Waterbodies Crossed by the Project

FEATURE NAME	COUNTY	LINE / MILEPOST	CROSSING METHOD [1]	CROSSING LENGTH [2] (FEET)	IMPACT [3] (ACRES)	ASSOCIATED WETLANDS [4]	STREAM TYPE
Spring Creek	McPherson	NDM-106 / 21.0	WOC	9	0.01	PEM	ephemeral
Medicine Knoll Creek	Sully	SDL-320 / 17.7	WOC	26	0.03	--	perennial
Matter Creek	Hand	SDL-320 / 50.7	WOC	11	0.02	--	ephemeral
Bryant Creek	Hand	SDL-320 / 63.8	WOC	21	0.02	PEM	intermittent
E. Fork Vermillion R.	Lake	SDM-104 / 96.5	WOC	89	0.03	--	perennial
Redstone Creek	Clark	SDT-208 / 43.8	WOC	1	0.001	PEM	ephemeral
	Kingsbury	SDM-104 / 127.9	WOC	56	0.03	PEM	perennial
W. Branch Skunk Cr.	Minnehaha	SDM-104 / 75.7	WOC	3	0.003	--	ephemeral
Dry Run	Spink	SDM-105 / 40.1	WOC	106	0.12	--	perennial
	Spink	SDT-209 / 9.6	WOC	64	0.07	PEM	perennial
James River	Spink	SDT-209 / 1.0	HDD	117	--	PEM	perennial

Table 29: Named Waterbodies Crossed by the Project

FEATURE NAME	COUNTY	LINE / MILEPOST	CROSSING METHOD [1]	CROSSING LENGTH [2] (FEET)	IMPACT [3] (ACRES)	ASSOCIATED WETLANDS [4]	STREAM TYPE
	Spink	SDM-105 / 51.6	HDD	149	--	PEM	perennial
	Beadle	SDT-207 / 11.0	HDD	258	--	PEM	perennial
Shue Creek	Beadle	SDT-207 / 17.8	WOC	71	0.08	--	perennial
Snake Creek	Brown	SDM-105 / 73.7	WOC	22	0.03	PEM	perennial
	Brown	SDT-210 / 9.4	WOC	12	0.02	PEM	ephemeral
Timber Creek	Spink	SDM-105 / 30.7	WOC	100	0.01	PEM	perennial
Big Sioux River	Lincoln	SDM-104 / 26.7	HDD	93	--	--	perennial
Round Lake	Lake	SDT-206 / 3.4	HDD	187	--	PEM	lake

Notes:

[1] Crossing method is either HDD (horizontal directional drill) or WOC (wet open cut) as identified in Section 2.2.
[2] Crossing length is centerline and bank to bank.
[3] Impact within stream; there may be additional impact to adjacent associated wetlands.
[4] Associated wetlands are adjacent riparian wetlands but are not included in the impact acreage: PEM = palustrine emergent.

Project construction will involve 173 crossings of other aquatic habitats including very small ephemeral unnamed streams, named streams with no defined channel, roadside and field ditches, prairie potholes, and two lakes. Brant Lake is a 1,037-acre glacial lake located at MP 3.4 on SDT-206. The northwestern corner of the lake, which is isolated by a road, will be crossed by the pipeline using HDD technology. A fish survey using gill nets in 2016 found the most abundant fish to be as follows in descending order: black bullhead, yellow perch, smallmouth bass, walleye, white bass, white sucker, common carp, channel catfish, black crappie, bluegill, bigmouth buffalo, and northern pike. Sago pondweed is a common aquatic plant in the lake (SDGFP 2016). Round Lake is hydrologically connected to Brant Lake and will be crossed by SDT-206 with the same HDD.

Recreational and Commercial Fisheries

Little active management of stream fisheries currently occurs by SDGFP Northeast Fisheries Management Area (NEFMA), which includes McPherson, Edmunds, Spink, Codington, and Hamlin counties (SDGFP 2019b). Because of climate and hydrology, stream fisheries within the NEFMA are often temporal only occurring in the spring when flows are high, and the streams become populated with sport fish moving from lakes with connections to the stream. SDGFP (2019b) reports that regarding stream fishing in the NEFMA, the James River is commonly fished, and limited angling occurs on the Big Sioux River (within the NEFMA). SDGFP has not stocked fish in these two rivers in more than 25 years (**Table 30**). Walleye, northern pike, channel catfish and bullheads are commonly targeted by anglers fishing the James River and the Big Sioux River. Past stocking of some of the smaller streams such as Pearl Creek, Shue Creek, Timber Creek, and Snake Creek, indicates they provide some recreational fishing opportunities. The

species of fish that were stocked in these streams (**Table 30**) also provides an indication of the species that are fished for. In SDGFP's Southeast Fisheries Management Area (SEFMA) the Big Sioux, James and East Vermillion River are considered major rivers providing significant recreational fisheries that are self-sustained by fish movement and natural reproduction.

Table 30: Fish Stocked in Named Waterbodies Crossed by the Project

STREAM	COUNTY	FISH STOCKED [1]	MOST RECENT STOCK YEAR [2]
Redstone Creek	Sanborn	Walleye	1985
W. Branch Skunk Cr.	Minnehaha	Black bullhead, black crappie, yellow perch	1935
James River	Beadle	Black crappie, channel catfish, smallmouth bass, largemouth bass, bluegill, walleye, sauger, muskellunge, northern pike, yellow perch	1995
Shue Creek	Beadle	Black bullhead	1935
Snake Creek	Brown	Black bullhead	1935
Timber Creek	Spink	Black bullhead, largemouth bass, northern pike, yellow perch	1970
Big Sioux River	Minnehaha	Black bullhead, Black crappie, white crappie, channel catfish, smallmouth bass, largemouth bass, bluegill, walleye, northern pike, yellow perch	1996
Round Lake	Lake	Northern pike	1969
Brant Lake	Lake	Walleye, yellow perch, black crappie, bluegill, channel catfish, smallmouth bass, largemouth bass, spottail shiner, fathead minnow	2021

Notes:
[1] Fish species stocked by SDGFP in named streams crossed by the Project per SDGFP stocking reports at: https://apps.sd.gov/GF56FisheriesReports/?_ga=2.236776577.1808269613.1640486355-1162596512.1638215578.
[2] The most recent year that stocking was conducted by SDGFP I that waterbody.

Brant Lake is actively managed for walleye and yellow perch (*Perca flavescens*), but black crappie (*Pomoxis nigromaculatus*) bluegill (*Lepomis macrochirus*), smallmouth bass (*Micropterus dolomieu*), northern pike (*Esox lucious*), and white bass (*Morone chrysops*) frequently provide additional fishing opportunity. Although three fish kills have been documented since 1999, they had no significant impact on game fish populations. Yellow perch and walleye, among other species, are often stocked in the lake (as recently as 2021) to maintain population abundance and fishing opportunity (SDGFP 2016). Round Lake provides fishing opportunities as well.

Aquatic Invasives

SDGFP (2021) reports infestations with aquatic invasive species in seven waterbodies within South Dakota counties with Project footprint (**Table 31**). The species include three plants – curly pondweed (*Potamogeton crispus*), Eurasian milfoil (*Myriophyllum picatum*), and flowering rush (*Butomus umbellatus*), and four species of fish – silver carp (*Hypopthalmichthys molitrix*), bighead carp (*Hypopthalmichthys nobilis*), grass carp (*Ctenopharyngodon Idella*), and the Eurasian rudd (*Scardinius*

erythrophthalmus). Three of the waterbodies are lakes and are not within Project footprint. The two streams, James River and the East Fork Vermillion River will be crossed by Project pipelines.

Table 31: Surface Waterbodies in Project Counties that are Infested by Aquatic Invasive Organisms

		PLANTS [1]			FISH [1]			
WATERBODY	COUNTY	CURLY PONDWEED	EURASIAN MILFOIL	FLOWERING RUSH	SILVER CARP	BIGHEAD CARP	GRASS CARP	EURASIAN RUDD
Mina Lake	Edmunds	--	--	--	--	--	--	X
James River	Brown	--	--	--	X	X	X	--
	Spink	--	--	--	X	X	X	--
	Beadle	--	--	--	X	X	X	--
Lake Byron	Beadle	--	--	--	X	X	--	--
East Fork Vermillion River	Kingsbury	--	--	--	X	X	--	--
	Miner	--	--	--	X	X	--	--
	Lake	--	--	--	X	X	--	--
	McCook	--	--	--	X	X	--	--
	Turner	--	--	--	X	X	--	--
Lake Oahe	Sully	X	X	--	--	--	-	--
Lake Sharpe	Hyde	--	--	--	--	--	--	X
Lake Louise	Hand	--	--	X	--	--	--	--

Notes:
[1] Data from SDGFP (2021) Environmental Review Tool website at: https://sdgfp.maps.arcgis.com/apps/Solutions/s2.html?appid=db23fc955ee84695b864bf91c140ad37&ex=-11567036,5327838,-10709107,5661715,102100; and South Dakota Aquatic Invasive species website at: https://sdgfp.maps.arcgis.com/apps/Solutions/s2.html?appid=db23fc955ee84695b864bf91c140ad37&ex=-11567036,5327838,-10709107,5661715,102100.

5.4.2.1 Potential Impacts to Fisheries

Construction Impacts

Construction of the Project will have only minor and temporary impacts on aquatic habitat and fisheries. The primary impact will be the re-suspension of sediments in the water column which will temporarily reduce water quality and could result in the destruction of sessile benthic organisms during excavation or mortalities to benthic organisms due to re-deposition of the suspended sediments most of which are silty clay. Fish eggs and larvae could be negatively affected in a similar manner. Motile adult fish will be displaced from the work area as they will move away from areas of increased turbidity. Displacement could briefly interfere with spawning or feeding and reduce fishing opportunities or success. However, these impacts will be temporary as the crossings are small and will be conducted rapidly - in a matter of a couple of days. Impacts such as increased suspended sediments will dissipate within hours of completion of the crossing. One-third (6) of the 18 crossings will occur in stream segments with ephemeral or intermediate flow regimes, which indicates significant spawning does not take place at that location.

Fisheries in all the waterbodies to be crossed are considered to be warmwater fisheries and warmwater fish species are generally more resistant to the impacts of increased sediments than those of coldwater fisheries (e.g., salmonids). From a recreational fishery standpoint, the most important waterbodies

crossed by the Project are the James River, the Big Sioux River, and Brant Lake; however, the segments of Redstone Creek and Snake Creek crossed by the Project have also been designated as having the beneficial use of warmwater semipermanent or marginal fish life propagation waters and the other perennial streams provide some fisheries values.

The James River, Big Sioux River (Lincoln County crossing), Round Lake, and Brant Lake will all be crossed using HDD technologies and therefore require no in-water work and result in no disturbance of the waterbody banks or channels, and no suspension of sediments. The Big Sioux River crossing is the only one with adjacent forested riparian areas. Workspace for the HDD will be located outside the riparian habitat, but woody vegetation may need to be cut within a 15-foot-wide area along the HDD path to access water and the true-tracker. While HDD crossings generally avoid impacts to the waterbodies and their banks, they sometimes result in an inadvertent release of drilling fluids from the borehole through the soils (termed a frac-out) to the floor of the waterbody and then to the water column. To mitigate such impacts, only non-toxic drilling fluids and additives will be utilized, and the Contractor will be required to develop a contingency plan prior to conducting any HDDs to address any such frac-outs. The contingency plan will include instructions for monitoring (for drilling fluid loss) during the directional drill and mitigation in the event that there is a release of drilling fluids.

If non-HDD methods are used, a number of mitigation measures will be applied to minimize impacts and restore stream banks. Any necessary work areas near the waterbody will be minimized and limited in size. Markers will be placed at the banks of waterbodies until post-construction seeding is completed to ensure the riparian cover is maintained. Hazardous materials such as fuels, lubricating oils, or chemicals will not be stored within 100 feet of the waterbody. Waterbody banks will be restored to the preconstruction contour. Topsoil will be replaced on top of the subsoil. Waterbody banks will be stabilized by installing permanent erosion control devices and revegetation during final clean up.

The introduction and/or spread of invasive or exotic species during construction is also a concern. To reduce the potential for such an event, pre-construction surveys for invasive or noxious species will be conducted in habitats including infested waters if the source will be used for water during construction. Areas identified to avoid will have signs posted by the Applicant, so they are easily recognized by Project personnel and managed. The Contractor will clean the tracks, tires, and blades of equipment with water or compressed air to remove excess soil prior to moving the equipment out of weed or soil-borne pest infested areas. The Contractor may also utilize cleaning stations to remove vegetative and soil materials using water at a high pressure in lieu of compressed air.

Operational Impacts

Operations will have little if any impact on aquatic streams, lakes, and fisheries once the work areas are restored. Post-construction mowing and clearing of riparian areas will be limited to occur between April 15 and August 1. The use of pesticides and herbicides will be prohibited within 100 feet of a waterbody unless approved by the appropriate land management and state agency. Vegetation between HDD entry and exit posts will not have routine clearing or mowing.

The potential for accidental release of CO_2 into the aquatic environment from a pipeline rupture is very low based on the frequency of pipeline ruptures in general and the fact that open water habitats represent only 0.2 percent of the pipeline routes, but such a release, were it to occur, could have some impacts on the aquatic communities. The magnitude of the impacts of a release will be contingent upon the volume of the release and the size and flow of the waterbody (dilution), but in general will be expected to be low. The release of CO_2 will cause the concentration of dissolved CO_2 in the water column to increase with consequent decreases in pH. Fish appear to be less sensitive to the physiological impacts of acidification

than invertebrates with carbonate shells, and adult fish less sensitive than eggs and juvenile fish. Motile adult fish will also likely move away from the release (Suzuki 2020) but CO_2 concentrations near the source could increase to toxic levels and result in morbidity or mortality on fish that do not move away and on sessile invertebrates. Most impacts will be short-term ameliorating soon after the release is stopped, but re-colonization by invertebrates could take a year or longer.

5.5 Land Use and Local Land Controls

5.5.1 Existing Land Use

Public data available at the time of this Application included the land cover classifications from the NLCD as referenced in Section 5.3. The land use analysis also incorporated the desktop and field survey of wetlands and waterbodies. The land use map book is provided in **Appendix 6C**. Miles of each land cover type crossed by the Project are provided in Section 5.3, **Table 14**: Land Cover Types Traversed by the Project in South Dakota. The land use categories for this Project utilized available land cover types as provided above, as well as the desktop and field analysis completed for the Project. The land affected during construction (CONS.) and operations (OPER.) are provided in **Table 32** below. Noise sensitive lands are addressed in Section 6.5.3 and are considered to be rural residences and farmsteads, and other occupied buildings.

5.5.2 Displacement

There will be no homes removed or displaced as a result of the Project.

5.5.3 Compatibility with Existing Land Use

The Project will be compatible with the predominant agricultural land use impacted by the Project (85% of the footprint). The construction ROW on agricultural lands (cultivated crops and pasture/hay) accounts for over 5,378 acres (84% of the total) and will be buried to a depth of approximately four feet as to not interfere with normal agricultural operations.

Construction of the pipeline will also impact some developed and barren land (approximately 146 acres), forest and scrub/shrub (approximately 13 acres), grassland (approximately 611 acres), some waterbodies (approximately 8 acres) and wetlands (approximately 183 acres).

Aboveground facilities, including pump stations, MLVs, and launcher-receivers will permanently impact agricultural land (approximately 15 acres), developed and barren land (approximately 1.2 acres), and grassland (approximately 0.2 acres).

Access roads required for construction will impact agricultural land (approximately 16 acres), developed and barren land (approximately 8 acres), and grassland (approximately 5 acres). Access roads may impact some wetlands and waterbodies (approximately 0.6 acres and 0.03 acres, respectively), and forest and scrub/shrub (approximately 0.05 acres). There will be approximately 2.95 miles of permanent access roads that will be built to access MLVs and pump stations and will connect to existing roads.

Table 32: Existing Land Use for the Project (Acres)

LAND USE	PIPELINES		PUMP STATIONS		MLVS		LAUNCHER-RECEIVERS		ACCESS ROADS		ATWS		TOTAL	
	CONS.	OPER.	CONS.	OPER.	CONS.	OPER.	CONS.	OPER.	CONS.	OPER.	CONS.	OPER.	CONS.	OPER.
Developed, Open Space	111.6	53.0	1.0	1.0	0.2	0.2	0.3	0.3	1.8	0.9	15.6	0	130.5	55.4
Developed, Low Intensity	10.0	5.8	0	0	0.02	0.02	0	0	1.9	1.2	1.1	0	13.0	7.0
Developed, Medium Intensity	5.5	3.4	0	0	0	0	0	0	3.1	1.8	0.5	0	9.1	5.2
Developed High Intensity	0.5	0.1	0	0	0	0	0	0	0.8	0.7	0.1	0	1.4	0.8
Barren Land	1.0	0.4	0	0	0	0	0	0	0.04	0.03	0.2	0	1.2	0.4
Deciduous Forest	5.6	2.2	0	0	0	0	0	0	0.03	0.03	0.1	0	5.7	2.2
Shrub/Scrub	6.6	3.0	0	0	0	0	0	0	0.02	0	0.5	0	7.1	3
Grassland	558.0	278.5	0	0	0.2	0.2	0	0	4.9	0.5	53.4	0	616.5	279.2
Pasture/Hay	745.4	374.7	1.2	1.2	0.2	0.2	1.0	1.0	3.6	0.8	93.7	0	845.1	377.9
Cultivated Crops	4259.0	2034.6	9.8	9.8	0.9	0.9	1.5	1.5	12.0	4.0	280.1	0	4563.3	2050.8
Waterbodies[4]	7.5	6.1	0	0	0	0	0	0	0.03	0.02	0	0	7.5	6.1
Wetlands[4]	181.9	124.3	0	0	0	0	0	0	0.6	0.01	1.0	0	183.5	124.3
TOTAL	5892.6	2886.1	12	12	1.5	1.5	2.8	2.8	28.8	10.0	446.3	0.0	6384.0	2912.4

Notes:

[1]Acreage required for construction includes both construction and operations. Pump stations, MLVs and launcher-receivers have the same footprint for construction and operations.

[2]Acres are rounded.

[3]Totals are rounded to the nearest tenth.

[4]Wetlands and Waterbodies totals are represented in Section 5.4.

5.5.4 Local Land Use Controls

The Applicant will comply with local regulations to review proposed Project measures within their respective counties and municipalities before construction. Project pipelines will cross multiple counties (**Table 32**). Project aboveground facilities, including pump stations, launcher-receivers, and MLVs will be located in Beadle, Brown, Codington, Edmunds, Kingsbury, Lake, McPherson, Minnehaha, Spink, and Sully counties.

The Applicant reviewed zoning and comprehensive plans for counties where pipelines and aboveground facilities have been proposed. Local regulations require a review of proposed Projects within their respective counties. For example, the Lincoln County subdivision ordinance requires the review of any proposed utilities prior to excavation, construction, and improvements (Lincoln County 2005) and the Beadle County Comprehensive Plan identifies objectives to design around wetlands and to limit development in areas with poor soils and high-water tables (Beadle 2016).

The Brown County Zoning Ordinance, Title 4 and McPherson County Zoning Ordinance No. 10-2 require a conditional use permit for utility substations (i.e., pump stations) in all zones except commercial, highway commercial, and light industrial districts:

- Public Utility Substations: facilities for the distribution of telephone, radio, communications, water, gas, and electricity…shall be permitted as a conditional use in the various zoning districts subject to conditions, which will assure their harmony, especially aesthetically with the nature of the respective district (Brown County ND, McPherson County 2011).

The Applicant will coordinate directly with county and municipal offices and comply with all applicable ordinances. **Table 33** is a list of anticipated local reviews and permits that will be required for the Project based on the Project facilities in each county.

Table 33: Local Land Use Control Permits Anticipated for the Project

COUNTY	PIPELINES	PUMP STATION	MLV	LAUNCHER-RECEIVER	ACCESS ROADS	PERMITS
Beadle	✓	✓	✓	✓	✓	Pipeline Construction Review; Zoning Review; Building Permit
Brown	✓	✓	✓		✓	Pipeline Construction Review; Zoning Review; Building Permit
Clark	✓				✓	Pipeline Construction Review
Codington	✓				✓	Pipeline Construction Review; Zoning Review; Building Permit
Edmunds	✓			✓	✓	Pipeline Construction Review; Zoning Review; Building Permit

Table 33: Local Land Use Control Permits Anticipated for the Project

COUNTY	PIPELINES	PUMP STATION	MLV	LAUNCHER-RECEIVER	ACCESS ROADS	PERMITS
Hamlin	✓				✓	Pipeline Construction Review
Hand	✓				✓	Pipeline Construction Review
Hyde	✓				✓	Pipeline Construction Review
Kingsbury	✓				✓	Pipeline Construction Review; Building Permit; Zoning Application
Lake	✓		✓	✓	✓	Pipeline Construction Review; Zoning Review; Building Permit
Lincoln	✓		✓		✓	Pipeline Construction Review
McCook	✓				✓	Pipeline Construction Review
McPherson	✓	✓	✓		✓	Pipeline Construction Review; Building Permit; Zoning Application
Miner	✓		✓		✓	Pipeline Construction Review
Minnehaha	✓	✓			✓	Pipeline Construction Review; Building Permit; Zoning Application
Spink	✓		✓	✓	✓	Pipeline Construction Review; Zoning Review; Building Permit
Sully	✓				✓	Pipeline Construction Review; Zoning Review/Application; Building Permit
Turner	✓					Pipeline Construction Review

Construction Impacts

Impacts to some wetlands, waterbodies, and grasslands will be avoided with the use of HDDs. During construction, contractors will adhere to the measures outlined in the ECP (**Appendix 3**), which includes procedures to minimize wetland impacts.

Impacts to land use during construction will be primarily from clearing vegetation, topsoil segregation, grading, and backfilling. To reduce impacts to land use, the pipeline ROW has been collocated to the extent possible (see Section 4.1). Most of the ROW will revert to pre-construction vegetative conditions.

The impacts of construction will be greatest during and immediately following construction. Generally, once the pipeline is in place, wetland vegetation and other vegetation communities will transition back to a community with a function similar prior to construction.

Where the pipeline will be constructed via clearing for the pipeline ROW, long, linear lines in the landscape will be visible immediately after construction. However, because a relatively small acreage of land use will be converted to another land use, it is anticipated that impacts will be minor and ameliorated over time as vegetation is re-established or agricultural use continues.

For agricultural users, the Applicant will work with landowners to identify drain tile prior to construction. In most locations, the pipeline will be placed below agricultural drain tiles. Drain tiles damaged by construction will be repaired. Areas that have been cleared of vegetation are expected to recover in one to three growing seasons after construction is completed, sooner if in row crop production.

The Applicant will apply measures in the ECP (**Appendix 3**) to promote recovery of areas by removing and then restoring topsoil and reseeding disturbed areas with approved seed mixtures or returning to the landowner for crop planting.

Other temporary impacts include restricting access across the ROW during construction, such as restricting livestock access, hunting, grazing, or similar activities. Once construction is completed and the ROW has been restored, grazing and livestock movement over the permanent ROW will resume. Landowners will be compensated for the temporary loss of land use. Grazing is expected to return to normal after vegetation is re-established. The Applicant will work with landowners to identify drain tile prior to construction. In most locations, the pipeline will be placed below agricultural drain tiles. Drain tiles damaged by construction will be repaired.

Applicable local regulatory agencies will be contacted prior to any excavation, construction, and improvements activities to ensure the Project complies with local ordinances. The Applicant will apply for conditional use permits where applicable prior to construction. The Project will be responsible for repairing damage to roads and restoring them to preconstruction or better condition. The Applicant will negotiate road haul agreements with counties impacted by construction use of their roads. This will culminate in the requirement for construction bonds to cover the potential impacts to public roads.

Operation Impacts

The pipeline will be buried with a minimum of four feet of cover that will not interfere with normal agricultural operations. Long-term or permanent impacts for the pipeline ROW are not expected as the majority of areas will revert to previous uses. Permanent impacts from associated infrastructure and aboveground facilities will be minor because the permanent conversion of land use from pump station, MLVs, launcher-receivers, and permanent access roads account for a total of only 26.3 acres.

Maintenance activities are not anticipated to be significant because disturbances will be isolated, short-term, and infrequent and include clearing the permanent pipeline ROW of vegetation and identifying corrosion through regular inspections. The primary long-term impact is the prohibition of permanent structures (e.g., homes, barns) within the permanent ROW and new, permanent facilities.

The Project will comply with applicable local land use zoning ordinances, building rules, and regulations for above-ground Project facilities.

5.6 Water Quality and Uses

South Dakota classifies surface water under the following state-designated system of 11 beneficial uses for environmental and water quality assessment:

- Domestic Water Supply,
- Coldwater Permanent Fish Life Propagation,

- Coldwater Marginal Fish Life Propagation,
- Warmwater Permanent Fish Life Propagation,
- Warmwater Semipermanent Fish Life Propagation,
- Warmwater Marginal Fish Life Propagation,
- Immersion Recreation,
- Limited Contact Recreation,
- Fish and Wildlife Propagation, Recreation, Stock Watering,
- Irrigation, and
- Commerce and Industry.

The SD DANR assesses waterbodies to determine if water quality parameters meet those required for each beneficial use and designates the waterbody as impaired under Section 303(d) of the Clean Water Act if it does not meet these criteria (SD DANR 2020a). The proposed Project crosses one impaired waterbody (Big Sioux River) at three different locations in South Dakota (**Table 34**). The Big Sioux River is impaired for warmwater semipermanent fish life and limited contact recreation at the Codington County crossings due to dissolved oxygen (DO) and *Escherichia coli* (E coli) levels respectively, and impaired for warmwater semipermanent fish life and immersion recreation at the Lincoln County crossing due to total suspended solids (TSS) levels and E. coli respectively (**Table 34**). Additional information on named waterbodies that are crossed by the Project and have specifically assigned beneficial uses is provided in **Table 34**. A complete list of Project waterbody crossings and their designated uses is provided in **Appendix 8**.

Table 34: Impairment Status of Streams with Assigned Beneficial Uses that are Crossed by the Project

WATERBODY [1]	COUNTY	PIPELINE	MP	CROSSING METHOD [2]	BENEFICIAL USES [3]	IMPAIRMENT STATUS [4]	IMPAIRED USE [5] (cause)
Redstone Creek	Kingsbury	SDM-104	127.9	WOC	6,8,9,10	--	--
James River SD-JA-R-JAMES_06	Spink	SDT-209	1.0	HDD	5,8,9,10	1 all uses met	--
James River SD-JA-R-JAMES_06	Spink	SDM-105	51.6	HDD	5,8,9,10	1 all uses met	--
James River SD-JA-R-JAMES_07	Beadle	SDT-207	11.0	HDD	**1**,5,8,9,10	1 all uses met	--
Snake Creek	Brown	SDM-105	73.7	WOC	6,8,9,10	--	--
	Brown	SDT-210	9.38	WOC	6,8,9,10	--	--
Timber Creek	Spink	SDM-105	30.7	WOC	6,8,9,10	--	--
Big Sioux River SD-BS-R-BIG_SIOUX_02	Codington	SDT-208	1.0	HDD	5,8,9,10	5 impaired without TMDL	5 (DO) 8 (E. coli)
Big Sioux River SD-BS-R-BIG_SIOUX_02	Codington	SDT-208	0.5	HDD	5,8,9,10	5 impaired without TMDL	5 (DO) 8 (E. coli)
Big Sioux River SD-BS-R-BIG_SIOUX_14	Lincoln	SDM-104	26.7	HDD	5,7,8,9,10	5 impaired without TMDL	5 (TSS) 7 (E. coli)
Round Lake	Lake	SDT-206	3.5	HDD	6,7,8,9	--	--

Table 34: Impairment Status of Streams with Assigned Beneficial Uses that are Crossed by the Project

WATERBODY [1]	COUNTY	PIPELINE	MP	CROSSING METHOD [2]	BENEFICIAL USES [3]	IMPAIRMENT STATUS [4]	IMPAIRED USE [5] (cause)
Brant Lake SD-BS-L-BRANT_01	Lake	SDT-206	3.7	HDD	4,7,8,9	1 all uses met	--

Notes:
[1] Table includes only named waterbodies crossed by the Project for which specific beneficial uses have been assigned; see Appendix 8 for other waterbodies.
[2] Crossing methods are WOC (west open cut) and HDD (horizontal directional drill).
[3] Beneficial uses are those assigned by South Dakota Department of Agriculture and Natural Resources as indicated in the ADNR Surface Water Quality website at: https://sdgis.sd.gov/portal/apps/MapSeries/index.html?appid=f3e56d2e55a34c65b7d78b07ef1e677e
The codes are: (1) domestic water supply; (4) warmwater permanent fish life propagation; (5) warmwater semipermanent fish life propagation; (6) warmwater marginal fish life propagation; (7) immersion recreation; (8) Limited-contact recreation; (9) fish and wildlife propagation, recreation, and stock watering; (10) Irrigation; and (11) commerce and industry. TMDL is Total Maximum Daily Load.
[4] Impaired status per SD DANR's Surface Water Quality website; -- means there is no data, or an assessment has not been made.
[5] See footnote (3) for beneficial use codes; DO = dissolved oxygen, E. coli = the bacterium *Escherichia coli*.

Based on the Project's proposed construction activities, permits or certifications may be required to adhere to Sections 401 and 402 of the CWA. Section 401 gives state the authority to grant, deny, or waive certification of proposed federal licenses or permits that may discharge into waters of the United States (WOTUS). The SD DANR is authorized with the issuance of these certifications after reviewing federal permits and ensuring they will not impact water quality or violate SD water quality standards.

Section 402 of the CWA prohibits the discharge of any pollutant from any point source to navigable waters unless authorized by a permit. SD DANR is authorized with enforcing Section 402 of the CWA through the State's National Pollutant Discharge Elimination System (NPDES). The proposed Project will likely require the below general permits:

- **SDG070000 General Surface Water Discharge Permit for Temporary Discharge Activities** (Authorizes hydrostatic test discharges from pipelines) - This permit authorizes hydrostatic testing test wastewaters discharges to be land applied or discharged into surface waters.
- **SDR100000 Construction Storm Water/Dewatering General Permit** – This permit is required and shall apply to storm water or non-storm water discharges and trench dewatering discharges associated with construction activity that causes land disturbance of equal to or greater than one acre and less than one acre.

Construction Impacts

Construction impacts to water quality will be minimized and mitigated through BMPs including stream crossing methods, erosion control devices, sediment controls, and discharge monitoring and inspection. Further discussion of mitigation and restoration is discussed in the Environmental Construction Plan.

The general discharge permits for hydrostatic test water discharges will impose pollutant limits on those discharges that will be protective of the designated uses of the receiving waterbodies. In one-time construction and hydrostatic test water use will not result in appreciable short- or long-term impacts to water quality.

The Project only crosses one impaired waterbody, the Big Sioux River. Stream crossings of these impaired stream segments will be constructed using HDD construction techniques, eliminating any further impacts to water quality (SD DANR, 2020a).

Operation Impacts

Maintenance activities will not result in significant impacts to water quality or its uses since disturbances will be isolated, short-term, and infrequent.

5.7 Air Quality

The Clean Air Act (42 USC 7401 et seq. as amended in 1977 and 1990) is the principal federal statute governing air pollution. The Clean Air Act empowered the USEPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. These pollutants are called "criteria" air pollutants and include carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, lead, particulate matter equal to or less than 10 microns in diameter, and fine particulate matter equal to or less than 2.5 microns in diameter. The NAAQS include primary standards designed to protect human health and secondary standards to protect public welfare, including visibility and damage to crops and vegetation.

Regions of the country that do not meet the NAAQS are designated as "nonattainment" areas. Certain rural parts of the country do not have extensive air quality monitoring networks; these areas are considered "unclassifiable" and are presumed to be in attainment with the NAAQS. All areas in South Dakota currently meet the NAAQS (SD DANR, 2020b). Because the proposed Project will occur in "attainment" areas for all criterial pollutants, Clean Air Act conformity requirements are not applicable and thus there are no emissions thresholds that pertain to the construction phase of this Project.

5.7.1 Air Quality Impacts

Air quality impacts for the Project include potential air emissions during both construction and operation of the pipeline facilities. The Applicant will comply with all federal and state air quality regulations that are applicable to the proposed facilities along the pipeline and will take necessary steps to ensure that they do not cause an exceedance of any air quality standard. Potential sources of emissions along the proposed pipeline route can be classified as one of three types: stationery, mobile, or fugitive. These types of sources will be different during construction and operation as discussed in the sections below.

Construction Impacts

Potential emissions during construction include both mobile source and fugitive emissions. Mobile sources of emissions are the tailpipe emissions from employee commuter vehicles and construction equipment to be used during construction of the pipeline, pump station, and other ancillary facilities. Air quality within the state of South Dakota is regulated by the SD DANR Air Quality Program. There are no prescribed state-wide requirements for controlling mobile emissions such as those that may be released during construction of the Project.

Fugitive sources of emissions include particulate emissions from paved and unpaved roadways and the particulate emissions from soil disturbance during construction activities. Fugitive particulate emissions from roadways consist of heavier particles and tend to settle out of the atmosphere by gravity within a few hundred yards. Therefore, these fugitive particulate emissions will be limited to the immediate vicinity of the Project; impacts to the surrounding region will be negligible. The quantity of fugitive dust emissions from soil-disturbance activities will depend on the moisture content and texture of the soils that will be disturbed, the type of construction equipment utilized, and the frequency and duration of precipitation

events. The majority of pipeline construction activities will pass by a specific location within a 30-day period; therefore, fugitive dust emissions during construction will be restricted to the brief active construction period along each segment of the Project pipeline route, with construction impacts diminishing once construction activities end and after disturbed areas are reclaimed. There are no prescribed state-wide requirements for controlling fugitive emissions such as those that may be released during construction of the Project. The Applicant will limit dust impacts in residential and commercial areas adjacent to pipeline construction by utilizing dust minimization techniques, such as minimizing exposed soil areas, reducing vehicle driving speeds, and watering or using soil amendments along the exposed soils of the ROW as needed.

Overall, construction of the Project will result in short-term, minor, localized increased tailpipe and fugitive dust emissions. Emissions will be concentrated at the construction sites and will steadily decrease with distance.

Operation Impacts

Potential emissions during operations include stationary source emissions at the pipeline pump stations. Since the proposed pump stations will be electrically driven, the pumps will not be a potential source of stationary emissions. While the pump station will include a back-up power supply for critical communications and control equipment, the stations will not have an emergency generator engine or other combustion source. Therefore, the pump stations will not require an air permit and will not result in air quality impacts. When fully developed, the Project will have an infrastructure network capable of capturing and permanently storing more than 18 MMTPA of CO_2, which is equivalent to taking over 3.9 million cars off the road per year.

5.8 Solid Wastes

Construction of the Project will generate non-hazardous pipeline construction wastes including human waste, trash, pipe banding and spacers, waste form coating products, welding rods, timber skids, cleared vegetation, stumps, rock and all other miscellaneous construction debris. All waste, which contains (or at any time contained) oil, grease, solvents, or other petroleum products will be segregated for handling and disposal as hazardous wastes.

Construction Impacts

Human sanitary waste will be handled and disposed of exclusively by means of portable self-contained toilets during all construction operations. Waste from these units shall be collected by licensed contractor for disposal at only licensed and approved facilities.

All trash will be removed from the construction ROW on a daily basis unless otherwise approved or directed by the Project. All drill cuttings and drilling mud will be disposed of at an approved location. Disposal options may include spreading over the construction ROW in an upland location approved, hauling to an approved licensed landfill, or other site approved by the Project. All extraneous vegetative, rock, and other natural debris will be removed from the construction ROW by the completion of clean-up. All trash and waste will be removed from contractor yards, pipe yards and staging areas when work is completed at each location. All waste materials will be disposed of at licensed waste disposal facilities.

Operation Impacts

No solid waste operational impacts are anticipated.

6 Community Impact

6.1 Economic Impacts

The South Dakota portion of the pipeline will be 477.31 miles long and is expected to result in $795 million of capital expenditures over the construction period. Of that amount, an estimated $440 million is resulting labor income.

Once the Project has been built, an estimated $37 million operations and maintenance spend is expected to add approximately 233 permanent direct, indirect, and induced jobs with an associated $18 million in labor income to the South Dakota economy. The increased economic activity that results during construction of the pipeline will generate an estimated $74 million in taxes, of which $41 million is state and local taxes.

During the first full year of operation the pipeline will generate an estimated $12 million in new property taxes for local governments.

6.1.1 Labor Market

Total labor force in South Dakota is 483,561 with 473,526 employed and 10,035 unemployed at a rate of 2.1 percent (2.10%). The average unemployment rate (**Table 35**) for counties crossed by the Applicant is 1.97%, down from 2.74% the previous year based on data from July 2022.

Table 35: South Dakota County Labor Force Crossed by the Project

COUNTY	LABOR FORCE	EMPLOYMENT	UNEMPLOYMENT	RATE
Beadle County	9,375	9,207	168	1.80%
Brown County	20,116	19,663	453	2.30%
Clark County	2,023	1,982	41	2.00%
Codington County	16,205	15,909	296	1.80%
Edmunds County	2,004	1,972	32	1.60%
Hamlin County	3,646	3,583	63	1.70%
Hand County	1,803	1,771	32	1.80%
Hyde County	682	664	18	2.60%
Kingsbury County	2,960	2,907	53	1.80%
Lake County	6,647	6,481	166	2.50%
Lincoln County	38,353	37,754	599	1.60%
McCook County	3,185	3,136	49	1.50%
McPherson County	999	967	32	3.20%
Miner County	1,231	1,209	22	1.80%
Minnehaha County	119,036	116,995	2,041	1.70%
Spink County	3,100	3,033	67	2.20%
Sully County	836	822	14	1.70%
Turner County	4,875	4,788	87	1.80%

Source:
Labor Market Information Center, South Dakota Department of Labor and Regulation, in cooperation with the U.S. Bureau of Labor Statistics, available at: https://dlr.sd.gov/lmic/lbtables/countylf.aspx. Accessed August 2022.

6.1.2 Employment Estimate

The Project is expected to employ approximately 2,321 average annual temporary jobs during construction. With the relatively short construction schedule and the low unemployment rates in the Project counties (**Table 34**), it is likely that in addition to local labor, additional labor will be sourced from other areas of the state and outsourced from neighboring states.

The estimated number of direct jobs required to operate the system in South Dakota is approximately 12 employees. Annual estimated operations direct employment expenditures are anticipated to be the same for each of the first 10 years of commercial operation, approximately $3 million per year.

6.1.3 Agriculture

As the Applicant's 7 South Dakota ethanol partners earn more for producing low-carbon renewable fuel, it strengthens the economic prosperity and long-term viability of ethanol, and as a result, benefits South Dakota's family farms, and ultimately the entire state. A stable ethanol industry provides South Dakota's farmers with a reliable market for their corn and underpins the value of South Dakota farmland.

The Project will require approximately 5,378 acres of agricultural lands (pasture/hay and cultivated crops) for construction of the pipeline ROW, 16 acres of and access roads, and approximately 15 acres for aboveground facilities. Of the approximately 5,400 acres of agricultural land required for construction, only 19 acres of agricultural land will be permanently converted to developed land for pump stations, MLVs, launcher/receivers and permanent access roads.

Long-term impacts on agricultural production from the permanent pipeline ROW are not expected since the pipeline will be buried and will allow for agricultural practices to resume after construction.

Project disturbance of agricultural lands will generally be short-term, during construction, and mitigated by the following measures:

- Vegetation will be preserved and protected from damage that results from construction operations through the use of BMPs as applicable.
- To minimize the spread of noxious weeds, construction crews will clean all equipment and vehicles (power or high pressure) of all mud, dirt, and plant parts before entering and leaving the construction area. The Applicant will be responsible for control of noxious weeds in the area proposed for construction. Suppliers will ensure that gravel and fill imported to the site come from weed-free sources.
- When the trench is backfilled, the subsoil will be placed first, followed by topsoil. Tillable agriculture land will be deeply tilled following construction to alleviate compaction.
- BMPs according to the ECP (**Appendix 3**) will be implemented.
- Fencing, drain tiles, irrigation systems, or other agricultural-related facilities disturbed during construction will be restored to their pre-construction condition upon completion of construction activities.
- The Applicant will prohibit feeding or harassment of livestock or wildlife, firearms, and pets on the construction ROW. Food and food wastes will be stored and secured.

Once construction has been completed, normal grazing and livestock movement over the permanent ROW along the pipeline route may resume.

6.1.4 Commercial and Industrial Sectors

Economic benefits to nearby businesses in counties crossed by the Project will likely be increased through the sales of food, goods, services, and lodging that will be generated by the temporary non-local workforce. The increase in consumer demand could impact local economies. Some construction materials and supplies will likely be purchased from local businesses. Local purchases could include consumables, fuel, and equipment rental. Long-term employment is anticipated during operations.

The Project is anticipated to have economic benefits to various commercial sectors in the State during construction and operations of the Project.

6.1.5 Land Values

The Project pipelines and facilities will be constructed primarily within rural, generally agricultural areas. Landowners will be compensated for the conveyance of Project temporary construction and permanent ROW, MLV and other easements for Project aboveground facilities. Pump station locations will be acquired and operated by the Applicant.

Certain existing land uses will be converted to long-term utility use for the duration of pipeline operations. This conversion represents a long-term future impact on development of private land because dwellings cannot be placed on the permanent pipeline ROW for the duration of the easement.

It is anticipated that property values associated with the Project pipeline and associated features (MLVs, launcher/receivers, permanent access roads) will be minimally affected. Property values associated with pump stations may increase because of Project improvements. As the Applicant's 7 South Dakota ethanol partners earn more for producing low-carbon renewable fuel, it strengthens the economic prosperity and long-term viability of ethanol, and as a result, benefits South Dakota's family farms, and ultimately the entire state. A stable ethanol industry provides South Dakota's farmers with a reliable market for their corn and underpins the value of South Dakota farmland.

6.1.6 Taxes

It is anticipated the Project will have a temporary positive impact on state sales and use tax during Project construction from the purchases of materials, equipment, supplies, and services by temporary construction employees of the Project. City sales tax will also be applicable on purchases made or deliveries received within a city that has a city sales tax. The city tax is in addition to the state sales tax and is typically 1-2%.

The state imposes a 1.5% tourism tax on lodging, amusement, entertainment, and other tourism related businesses. It is anticipated the Project will generate additional tourism revenues in locations utilized by the non-local construction work force.

Contractors providing Project construction work or operational repairs are required to have a South Dakota contractor's tax license. The excise tax imposed on the gross receipts for construction Projects is 2%.

It is anticipated the Project will have a positive impact on property taxes during operations. Property taxes for pipeline Projects are calculated the same as they are for other commercial properties but are assessed by the South Dakota Department of Revenue (SDDOR). The Project will annually submit a report to the SDDOR that states the location of property by county, township, and school district. The SDDOR will certify the taxable value to the counties where the Project property is located.

The increased economic activity (direct, indirect, and induced) that results during construction of the pipeline will generate an estimated $74 million in taxes, of which $41 million is state and local taxes.

During the first full year of operation (2025) the pipeline will generate an estimated $12 million in new property taxes for local governments.

All tax revenue from Project properties will go to the appropriate county, township, school district and other taxing districts, generating revenue for local governments.

6.2 Infrastructure Impacts

6.2.1 Housing

It is expected that most non-local workers will use temporary housing, such as hotels/motels, recreational vehicle parks, and campgrounds. Most of the temporary workers will likely seek housing in the more populated, service-oriented towns located within a reasonable commuting distance to the Project construction sites. Based on a review of identified available hotels/motels, recreational vehicle parks and campgrounds it appears adequate temporary housing will be available for Project construction crews.

6.2.2 Energy

Temporary short-term use of electrical power during the Project construction phase will be through existing supply and is expected to be minimal to support construction.

Operational electrical service requirements for the Project, including the pump stations in McPherson, Minnehaha, Brown, and Beadle counties, will use existing service lines with the construction of new service and or transmission lines as required. The operational needs of the Project are not anticipated to require an increase in existing power generation capacity. Any extensions to existing utility infrastructure would be constructed, owned, and operated by the local utilities. Load at pump station will range from 2,000 to 3,000kW.

6.2.3 Sewer and Water

An increase of water and sewage utilization is anticipated due to the influx of construction workers using temporary housing, such as hotels/motels, recreational vehicle parks, and campgrounds. However, it is anticipated that the existing water and sewer capacity of local community water and sewer utilities will be sufficient for the influx of temporary construction workers.

Portable water and sanitary facilities will be used at designated areas along the construction ROW. Portable facilities will be maintained by a service provider. Pump stations will not require permanent water or sanitary facilities.

6.2.4 Solid Waste Management

Increased utilization of solid waste management facilities will occur as a result of Project construction, the influx of temporary construction workers utilizing local lodging and services, and solid wastes from Project construction. Solid waste will be managed according to applicable federal, state, and local regulations. Local waste disposal transporters and landfills will be utilized where appropriate to dispose of construction waste.

All waste, which contains (or at any time contained) oil, grease, solvents, or other petroleum products will be segregated for handling and disposal as hazardous wastes. Hazardous wastes, which are anticipated to be limited to very small volumes, will be transported to permitted hazardous waste disposal facilities by licensed transporters.

6.2.5 Transportation

Transportation routes to be utilized during construction will be established prior to construction as necessary to support state and local permitting. The Department of Public Safety Commerce and Regulation, Division of Highway Patrol has jurisdiction over the federal and state highway system in South Dakota and is responsible for issuing transportation-related permits to accommodate construction vehicles and traffic.

The Project will initiate contacts with local permitting authorities for the purpose of establishing timelines for the construction of roads.

During Project construction, traffic on highways and secondary roads will be increased due to the construction activities and the influx of construction workers. Several types of light, medium, and heavy-duty construction vehicles, as well as private vehicles used by construction personnel, will travel to and from the Project area.

Hauling of line pipe and most construction equipment will be within state road and bridge weight limits. There will be isolated hauling of equipment that will require special permits for weight and/or width. There may be an increased temporary demand for permits for vehicle load and width limits. The primary impact will be deterioration of gravel or stone surfaced roads requiring grading and/or replenishment of the surface materials. The Project will be responsible for repairing damage to roads and restoring them to preconstruction or better condition. The Applicant will negotiate road haul agreements with counties impacted by construction use of their roads. This may culminate in the requirement for construction bonds to cover the potential impacts to public roads.

There will be minimal to no impacts on transportation during operations. CO_2 transportation by tanker truck and rail tankers is technically feasible but are better suited to the movement of small quantities. A typical tanker truck has a 2.27- to 10.9-metric ton capacity (TOMCO2 Systems, n.d.). Using the maximum anticipated transport capacity for the Project of 18 MMTPA this would equate to 7,929,515 to 1,651,376 tanker truck loads. A typical CO_2 rail car has 84.3-metric ton capacity. Using the maximum estimated transport capacity for the Project of 18 MMTPA this would equate to 213,523 rail tankers per year.

These surface transport systems are not practical nor cost-effective and would not be feasible for the large-scale capture and storage of CO_2 required to meet the Project's purpose and need.

6.3 Community Services

6.3.1 Healthcare Services and Facilities

Remote medical units will be deployed in the field during construction and local healthcare facilities will provide healthcare services to Project construction workers during construction only if required. It is anticipated that impacts to local facilities will be minor and that local healthcare facilities will be able to manage minor increases to healthcare needs during construction. The Project health and safety procedures and policies will also limit the utilization of local healthcare facilities during the temporary influx of non-local construction workers.

During operation, the Project will have a limited number of local permanent employees; there will be no impact on healthcare services and facilities.

6.3.2 Schools

Construction workers for this type of Project typically will not travel with their families or enroll their children temporarily in local schools. As there is a limited potential for new students, local schools should be capable of providing adequate opportunities and accommodations for any new students.

Due to the limited number of employees required for operations, no material impact on schools are anticipated from operation of the Project except the positive benefit of additional tax revenue sent to each county that can be used for the schools if so chosen by the county.

6.3.3 Recreation

Recreational opportunities in proximity to the Project include swimming, boating, hunting, camping, fishing, bird watching and photography. The area lakes and rivers provide yearly recreational opportunities to residents and visitors with access for boating and fishing. The most heavily used areas will most likely occur where public access exists. Hunting is a popular activity throughout the state due to its public accessibility and quality management of its diverse game species. Walk-in access areas are found throughout the State of South Dakota, allowing public access on private lands.

Some Project construction workers may use recreational areas during Project construction when they are not working, but it is not anticipated that these workers will have greater than minor impacts to any recreational areas near the Project area.

Construction of the Project may temporarily limit access to certain areas used for recreation, hunting, fishing, and boating.

No impacts associated with the operation of the Project are anticipated.

6.3.4 Public Safety Services

Law enforcement agencies and fire protection services in the communities adjacent to the pipeline may be affected during Project construction. The Applicant will coordinate with local law enforcement agencies and the South Dakota Highway Patrol on public safety issues and measures to accommodate the temporary influx of Project construction personnel and additional public safety risk.

The Project construction contractors will work with local and county emergency management to develop procedures for response to emergencies, natural hazards, hazardous materials incidents, manmade problems, and potential incidents concerning Project construction. The contractor will provide site maps, haul routes, Project schedules, contact numbers, training, and other requested Project information to local and county emergency management.

The Project construction contractor will maintain a current list of local emergency response providers and methods of contact/communication in all construction and operations vehicles. Designated construction and operations personnel will be trained in first aid.

During construction, response times to highway- or construction-related accidents may be lengthy given communication, dispatch, and travel time considerations. In these areas, it may be necessary to provide on-site first responder services; however, the Project will work with the local law enforcement, fire departments, and emergency medical services to determine the best course of action and coordinate for effective emergency response. Traffic impacts are discussed in Section 6.2.5.

During operations, the Project operator will coordinate with local and county emergency management to protect the public and the property related to the Project during natural, manmade or other incidents.

The Applicant will prepare an operation manual for routine facility operations and an emergency response plan for abnormal operations per PHMSA regulations.

6.4 Cultural and Historical Resources

Address the nature (description) and significance of cultural resources within the Project's Area of Potential Effect (APE—which in this case is the environmental survey area), including any "historic properties" (districts, buildings, structures, sites, and/or objects) listed on or eligible for listing on the National Register of Historic Places (NRHP) or any traditional cultural properties.

6.4.1 Results of Record Search

Perennial conducted a Level I literature review through the South Dakota Archaeological Research Center's Archaeological Resources Management System (ARMS) online database on August 27, 2021, prior to the start of fieldwork. On March 8, 2022, Gray & Pape accessed the ARMS database to again review background records for additional areas added to the Project.

The background reviews provided information on previously recorded cultural resources and previous surveys in the vicinity of the Project area in South Dakota. The literature review revealed that 174 cultural resources had been previously recorded within a 1.0-mi (1.6 km) radius of the Project environmental survey area. These resources consist of 93 prehistoric sites, 71 historic sites, 7 multicomponent resources and 3 resources that are unassigned. Of the 174 previously identified archaeological resources, 92 of the sites have not been evaluated, 63 are determined to be not eligible, and 19 are considered eligible for inclusion to the NRHP.

Additionally, the background review determined that a total of 342 previous archaeological studies have been conducted within a 1.0-mi (1.6-km) radius of the environmental survey area. These Projects consisted primarily of compliance-driven work for roadway and bridge improvements, utility installations, and large pipeline corridors. The current Project is adjacent to, and crosses, the Northern Border Pipeline Project, the fieldwork for which was conducted between 1979 and 1981. This work resulted in the identification of 107 archaeological sites, several of which were investigated for the current Project. Surveys for the Dakota Access Pipeline Project (DAPL) were conducted between 2014 and 2015, which also crosses portions of the current Project. Eighty cultural resources were recorded during DAPL surveys, and several of these archaeological sites were investigated during inventory of the current Project.

6.4.2 Summary of Field Surveys

The Level III cultural resources investigation was conducted in compliance with provisions of the National Historic Preservation Act of 1966 (as amended), South Dakota Codified Law 1-191-11.1 (11.1), the South Dakota Historic Preservation Office's South Dakota Guidelines for Compliance with the National Historic Preservation Act, South Dakota Codified Law 1-19A-11.1 as well as a scope of work approved by the South Dakota State Historic Preservation Office (SDSHPO) dated September 27, 2021 **(Appendix 11).**

The first round of Level III survey investigations began on September 28, 2021, and continued until November 29, 2021, when weather conditions inhibited surveys. The results of this survey effort were documented in the South Dakota main report for the Project (Trader 2021). The second round of cultural resources surveys were conducted between November 30, 2021, and July 2, 2022, the results of which are documented in the South Dakota Addendum report (Trader 2022). The cultural resources surveys will continue as access becomes available and will be completed for the entirety of the Project footprint, including all Project workspaces and access roads. The cultural surveys for the Project covered a 300-ft-

wide corridor for all route corridors, a 50-ft (15.0 meter) wide corridor for access roads, and the total footprint of any aboveground facilities (i.e., pump stations, launcher-receivers, and MLVs).

As of July 2, 2022, archaeological inventories have been conducted for approximately 360.90 miles (12,929 acres) of the 300-ft wide centerline route through South Dakota. Surveys resulted in the documentation of 89 archaeological sites. These include 76 newly recorded archaeological sites, and 13 previously recorded archaeological sites. Of the prehistoric sites identified, 50 are stone circle sites, 11 are Precontact artifact scatters, one is a village site, one is a possible eagle trap, and one is a mound site. Historical period cultural resources consist of 25 archaeological sites. EuroAmerican site types include 10 farmsteads associated with artifact scatters, nine railroads, two artifact scatters with no foundation remnants, two school sites, one stone-fence remnant, and one historic dump. Additionally, two newly recorded prehistoric isolated finds were also documented.

Of the 89 sites documented, 60 are recommended as eligible for inclusion to the NRHP and two remain unevaluated. These sites have all been avoided or will be avoided once minor route variances have been implemented. Twenty-seven sites are recommended as not eligible, and no further work is required. Table 36 lists the resources identified during inventory of the Project.

Table 36: Cultural Resources Recorded in the Environmental Survey Corridor

Site Number	Site Type	NRHP Recommendation	Management Recommendation	SHPO Concurrence
39CK2072	Railroad	Eligible	Avoided via Bore	Yes
39MP0103	Stone Circle	Eligible	Avoided via reroute	Yes
39MP0105	Stone Circle	Eligible	Avoided via reroute	Yes
39MP0106	Stone Circle and cairn	Eligible	Avoided via reroute	Yes
39MP0107	Cairn	Eligible	Avoided via reroute	Yes
39MP0108	Stone Circle	Eligible	Avoided via reroute	Yes
39HD0128	Farmstead	Eligible	Avoidance by reroute pending	Yes
39HD0129	Stone Circle	Eligible	Avoided via HDD	Yes
39BE0189	Stone Circle	Eligible	Avoided via reroute	Yes
39KB2072	Railroad	Eligible	Avoided via bore	Yes
39LN2007	Railroad	Eligible	Avoided via bore	Yes
39MP0015 (combined with 39MP0016)	Stone circle and cairn	Eligible	Avoidance by reroute pending	Yes
39MP0019	Stone circle	Eligible	Avoided via reroute	Yes
39MP0021	Stone circle	Eligible	Avoided via reroute	Yes
39MP0022	Stone circle	Eligible	Avoided via reroute	Yes

Table 36: Cultural Resources Recorded in the Environmental Survey Corridor				
Site Number	Site Type	NRHP Recommendation	Management Recommendation	SHPO Concurrence
39SP0011	Village site	Eligible	Avoided via reroute	Yes
39MP0110	Stone circle and cairn	Eligible	Avoided via HDD	Yes
39MP0111	Stone circle	Eligible	Avoided via reroute	Yes
39BN0144	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39CK2007	Railroad	Eligible	Avoided via bore	Pending
39CK2013	Railroad	Eligible	Avoided via bore	Pending
39ED2007	Railroad	Eligible	Avoided via bore	Pending
39HE0027	Cairn	Eligible	Avoided via reroute	Pending
39HD0134	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39HD0135	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39HD0136	Stone circle	Eligible	Avoided via reroute	Pending
39HE0097	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39HE0099	Stone circle	Eligible	Avoided via reroute	Pending
39LK0090	Cairn	Eligible	Avoided via reroute	Pending
39LK2013	Railroad	Eligible	Avoided via bore	Pending
39KB0056	Stone Alignment	Eligible	Avoided via reroute	Pending
39KB2013	Railroad	Eligible	Avoided via bore	Pending
39MP0112	Cairn	Eligible	Avoided via reroute	Pending

Table 36: Cultural Resources Recorded in the Environmental Survey Corridor				
Site Number	Site Type	NRHP Recommendation	Management Recommendation	SHPO Concurrence
39MP0113	Cairn	Eligible	Avoided via reroute	Pending
39MP0114	Stone circle	Eligible	Avoided via reroute	Pending
39MP0115	Stone circle, cairn and effigy	Eligible	Avoided via reroute	Pending
39MP0116	Stone circle, cairn and effigy	Eligible	Avoided via reroute	Pending
39MP0117	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39MP0118	Stone circle	Eligible	Avoidance by reroute pending	Pending
39MP0119	Stone circle and cairn	Eligible	Avoided via HDD	Pending
39MP0120	Stone circle	Eligible	Avoided via reroute	Pending
39MP0121	Stone circle	Eligible	Avoided via reroute	Pending
39MP0122	Stone circle	Eligible	Avoided via reroute	Pending
39MP0123	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39MP0124	Cairn	Eligible	Avoided via reroute	Pending
39MP0125	Stone circle	Eligible	Avoided via reroute	Pending
39MP0126	Stone circle	Eligible	Avoided via reroute	Pending
39MP0127	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39MP0128	Stone circle	Eligible	Avoided via reroute	Pending
39MP0129	Stone circle and cairn	Eligible	Avoided via reroute	Pending

Table 36: Cultural Resources Recorded in the Environmental Survey Corridor				
Site Number	Site Type	NRHP Recommendation	Management Recommendation	SHPO Concurrence
39MP0130	Stone circle	Eligible	Avoided via reroute	Pending
39MP0131	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39MP0132	Stone circle and cairn	Eligible	Avoided via reroute	Pending
39MP0133	Cairn	Eligible	Avoided via reroute	Pending
39MP0134	Stone circle	Eligible	Avoided via reroute	Pending
39MH2014	Railroad	Eligible	Avoided via bore	Pending
39SL0491	Cairn	Eligible	Avoided via reroute	Pending
39SL0492	Cairn	Eligible	Avoided via reroute	Pending
39SL0493	Stone Effigy	Eligible	Avoided via reroute	Pending
39HE0096	Cairn	Eligible	Avoided via reroute	Pending
39CK0212	Stone fence remnant	Not Eligible	No further work	Pending
39CK0214	Farmstead	Not Eligible	No further work	Pending
39CK0021	Historic artifact scatter	Not Eligible	No further work	Pending
39HD0017	School foundation	Not Eligible	No further work	Pending
39KB0057	Farmstead	Not Eligible	No further work	Pending
39HE0095	Farmstead	Not Eligible	No further work	Pending
39KB0054	Farmstead	Not Eligible	No further work	Pending
39MN0036	Farmstead	Not Eligible	No further work	Pending
39LN0043	Mound	Unevaluated	Avoided via reroute	Pending
39LN0068	School site	Not Eligible	No further work	Pending
39MH0192	Prehistoric artifact scatter	Not Eligible	No further work	Pending

Table 36: Cultural Resources Recorded in the Environmental Survey Corridor				
Site Number	Site Type	NRHP Recommendation	Management Recommendation	SHPO Concurrence
39CD0058	Prehistoric artifact scatter	Not Eligible	No further work	Pending
39CD0162	Prehistoric artifact scatter	Not Eligible	No further work	Pending
39LK0058	Farmstead	Not Eligible	No further work	Pending
39BE0188	Historic depression	Not Eligible	No further work	Yes
39ED0066	Historic artifact scatter	Not Eligible	No further work	Yes
39KB0053	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39LK0088	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39LK0089	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39MP0104	Historic artifact scatter	Not Eligible	No further work	Yes
39MP0109	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39SP0284	Prehistoric artifact scatter	Unevaluated	Avoided via reroute	Yes
39SP0285	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39SP0287	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39MP0005	Prehistoric artifact scatter	Not Eligible	No further work	Yes
39MP0006	Historic artifact scatter	Not Eligible	No further work	Yes
39MN0028	Farmstead	Not Eligible	No further work	Yes
39SP0286	Prehistoric isolated find	Not Eligible	No further work	Yes
39MH0192	Prehistoric Isolated find	Not Eligible	No further work	Pending

The Level III field survey methods included standard pedestrian survey of the entire Project environmental survey areas, and shovel testing across areas where surface visibility was less than 10 percent. Previously

recorded and newly documented cultural resources were assessed and evaluated utilizing eligibility criteria to determine NRHP status. The Project will complete the remaining surveys on outstanding parcels later in 2022 or 2023 and the results of these investigations will be provided in addendum reports.

Sixty-two Native American tribes were contacted and offered the opportunity to participate in field surveys to provide local/Tribal input and knowledge to the fieldwork. Seven tribes agreed to participate in the archaeological field studies; in the state of South Dakota that included the Rosebud Sioux; Northern Cheyenne; Mandan, Hidatsa, and Arikara Nation - Three Affiliated Tribes; and Sisseton Wahpeton Oyate of the Lake Traverse Reservation. A Traditional Cultural Property (TCP) study was also offered in the Spring and Summer of 2022 to Native American tribes who wished to participate. While no tribes agreed to partake in a TCP study, the Applicant financed a week-long cultural resources training course for the Mille Lacs Ojibwe tribe in Minnesota in May 2022. Government to Government consultation initiated by the USACE will also allow for additional tribal involvement in the Project.

Construction Impacts

The Project will attempt to avoid eligible archaeological sites and historic structures, and to date all eligible sites have been avoided via reroutes or construction methodology (e.g., HDD) or have reroutes pending. If future eligible sites cannot be avoided through design or construction efforts the Project will conduct formal evaluations in consultation with the SDSHPO and seek resolution through mitigation for those sites that meet the eligibility criteria for listing on the NRHP.

The APE for direct effects includes the pipeline mainline, trunk line and lateral lines as well as the total footprint for aboveground facilities (e.g., pump stations, MLVs, launcher-receivers), access roads, temporary workspace areas.

The APE for indirect effects will apply to any new aboveground facilities to be constructed for the Project and will include areas from which any permanent aboveground facilities have the potential to visually diminish or alter the setting of an NRHP-listed or -eligible property. The APE for indirect effects will consist of a review radius ranging between 0.5 mi (0.8 km) and 1.0 mi (1.6 km) for any permanent facilities. Only historic properties within visible range of the proposed permanent aboveground facilities will be evaluated.

The Project will prepare Level III technical reports for the cultural resource studies and submit them to the SD SHPO for their review and comment. To protect these sensitive resources, the Applicant will not submit information about the location of cultural resources with this application, unless specifically requested by either SDSHPO or the Commission and agreed upon by both.

Only the title page and abstract of cultural resources technical reports will be submitted as documentation of the surveys and evaluations for this application and any other public filings. SDSHPO review and comment letters for technical reports will be submitted as supplemental filings to this application.

Operation Impacts

The Project has conducted pre-construction cultural surveys to identify cultural resources and assess their significance to the NRHP. Areas identified as culturally or historically important were avoided to the extent practical by rerouting the pipeline corridor, reducing ROW workspace, horizontal directional drill (HDD) or other means.

If an unanticipated cultural resource is discovered during construction, the procedures identified in the Unanticipated Discovery Plan (UDP) (**Appendix 12**) will be implemented. See also ECP Section 2.12.

6.4.3 Unanticipated Discovery Plan

The Project has prepared an UDP (**Appendix 12**) that will be implemented should an unanticipated cultural discovery (I.e., archeological find or human remains) occur during the construction phase of the Project. Training will be provided to all construction personnel on unanticipated discovery procedures and notification protocols. In the event an unanticipated discovery is encountered, the Contractor will immediately halt all construction activities within a 100-foot radius, notify the Environmental Inspector, and implement the notification procedures listed in the UDP.

6.5 Other Impacts

Provide any additional information necessary to describe potential impacts not identified by SDC 49-41B.

6.5.1 Population and Demographics

Project construction is expected to take 12-18 months for installation of the pipeline and full restoration of the right-of-way. The influx of construction workers will be temporary and will not impact populations or demographics for the long term. The limited number of permanent employees associated with Project operations will not negatively affect local populations or demographics.

6.5.2 Public Safety Regulations

The Project will meet or exceed state and federal safety requirements and, at a minimum, will be designed in accordance with 49 CFR Part 195 – Transportation of Hazardous Liquids by Pipeline. Facilities will be constructed and operated according to applicable regulations.

Prior to construction, One-call notifications will be made to identify potential buried hazards within the proposed construction ROW. Pipeline contractors may also conduct a sweep to confirm the location of foreign pipelines prior to excavation.

Occupational Safety and Health Administration (OSHA) standards will be followed for safe excavation and trenching. The Applicant will ensure compliance with the requirements of OSHA's Excavation Standard, 29 CFR 1926, Subpart P to protect workers during trench excavation.

The Applicant will develop an Emergency Response Plan based on PHMSA 49 CFR Part 195 regulations. The Project construction contractor will maintain a current MSA with and ensure an up-to-date contact list of local emergency response providers and methods of contact/communication in all construction and operations vehicles. Designated construction and operations personnel will be trained in first aid (see Section 6.3.4).

The Project will have an Emergency Response Plan and an Operation Manual for use during operations.

6.5.3 Noise Impacts

In South Dakota, the Project will occur primarily in over 90 percent rural agricultural areas, including cultivated crop land, hay/pastureland, and grassland. These areas typically have ambient noise levels that are generally quite low. It is estimated that day-night average levels currently are approximately 40 to 45 decibels on the A-weighted scale (dBA).

Ambient (background) noise levels occur from roadway traffic, farm machinery on a seasonal basis, pets, and various other household noises. The Project will produce ambient noise levels comparable to ambient levels and sources (e.g., agriculture equipment) during construction for populated places within 1,000 feet of the Project and localized during operations for populated places and residences within 500 feet.

Populated places within 1,000 feet of the Project include:

- Hazel
- Huron
- Mina CDP
- Riverside Colony CDP
- Vienna
- Watertown

Construction Impacts

During construction, residences within 1,000 feet of the ROW may experience short-term noise from construction equipment for a period of one week to 30 days. Construction activities will be primarily limited to daylight hours. Noise impacts from construction activities will be minimized as identified in the ECP (**Appendix 3**).

Operations Impacts

All pumps and major equipment at pump stations will be installed within a shelter to minimize noise generated from operations. During operation of the Project, there is the potential that noise associated with the operation of pump stations may increase ambient noise levels for residences and other noise sensitive areas within 1,000 feet.

Visual Impacts

An analysis of the Project corridor did not identify any designated scenic outlooks or viewing areas on or along the route. The Project pipeline route and pump station locations were selected with the intent to avoid any visual resources to the extent possible.

Construction Impacts

Visual resource impacts associated with construction of the Project include the presence of construction equipment, removal of existing vegetation, exposure of bare soils, earthwork, and grading scars. Impacts from construction activities will be temporary with no significant long-term impacts due to implementation of minimization and mitigation measures outlined in the ECP (see **Appendix 3**).

Operations Impacts

The Project's four pump stations are located on private land in rural agricultural settings near roads and will be fenced. The pump stations will have a small footprint ranging between 3 to 9.5 acres. There are no structures within 1,000 feet of the four proposed pump stations and visual impacts will be limited to those who directly pass near them temporarily.

6.6 Amelioration of Potential Adverse Community Impacts

The Project is anticipated to have positive short- and long-term economic impacts on local economies. Local businesses—such as restaurants, grocery stores, hotels, postal services, equipment suppliers, packaging services, vehicle and equipment repair and maintenance shops, and gas stations—will see an increase in business from construction workers. Short-term construction personnel may be hired locally or from adjacent communities for both skilled and unskilled labor positions. Additionally, housing may be needed for non-local construction laborers.

During Project construction and operation, the Applicant will coordinate with state and local emergency management services to develop procedures for response to emergencies, natural hazards, hazardous

materials incidents, and potential incidents. The Project will register all Project facilities and pipeline structures with the rural identification / addressing (fire number) system and 911 systems.

The Applicant will work with state highway departments and local authorities to establish road use agreements that will be in place prior to construction to ensure the safe and efficient use of public roads and to minimize and mitigate adverse impacts. Roads used by the Project during construction will be repaired and restored to preconstruction or better condition. In locations where new access roads are necessary, they will be designed and constructed to the appropriate standard necessary to accommodate their intended function (e.g., traffic volume and weight of vehicles) and minimize erosion.

The Project is not anticipated to result in permanent impacts on transportation resources in the state of South Dakota. Temporary indirect effects may include increased traffic volume along local, state, and federal roadways. Impacts from potential construction associated with temporary workers are expected to be minor and limited in duration. Operation impacts are anticipated to be minor, as a relatively low number of workers and equipment will be accessing any one location within the Project area at any time during operations.

Project construction noise impacts will be minimized, as feasible, using procedures identified in the Environmental Construction Plan. During Project operation if landowner noise concerns are identified the Project will investigate and assess the appropriate noise minimization/mitigation response.

7 Other Information

7.1 Monitoring of Impacts

The Applicant is committed to protecting the environment and complying with all applicable laws, regulations, and standards. The Applicant will ensure environmental compliance during and after construction through environmental training, environmental inspections, and post-construction monitoring. In addition, operations, and maintenance programs per the Applicant IMP will be performed. During operations, the Applicant will utilize a supervisory control and data acquisition (SCADA) system that provides for continuous, remote monitoring and control of pipeline operations. Additionally, visual surveillance will be conducted in accordance with 49 CFR Part 195.412.

The Applicant is proposing to implement training and monitoring on this Project to help ensure compliance with environmental, safety, landowner, and company requirements as follows.

7.1.1 Environmental Training

Experienced, well-trained personnel are essential for the successful construction and operation of the Project.

To communicate the Project requirements to personnel, the Applicant will require environmental training of all Project personnel prior to construction. In addition, the Applicant and its contractors will undergo prevention, response, and general safety training. The training program will be designed to improve awareness of environmental and safety requirements, pollution control laws and procedures for proper operation and maintenance of equipment.

The Applicant will require that the contractors ensure that all persons (contractors' and subcontractors' personnel) engaged in work associated with the pipeline's construction are informed of the construction issues and concerns, and that they attend and receive training regarding these requirements as well as all laws, rules, and regulations applicable to the work. Environmental training and certification will be required for all personnel including the Applicant personnel visiting or working on the job site.

Different levels of training will be required for different groups of contractor personnel. Contractor supervisors, managers, field foremen, and other contractor personnel designated by the Applicant will attend a full-day, comprehensive environmental training session. All contractor personnel will attend a 1- to 2-hour group training session before the beginning of construction and during construction as new personnel are assigned or as environmental issues and incidents warrant. All visitors and any other personnel without specific work assignments will be required to attend a brief safety and environmental awareness orientation.

Training will be acknowledged on a training form and the records of proof-of-training will be maintained for the duration of the Project.

To provide on-site documentation of compliance, the Applicant will utilize a team of inspectors overseeing environmental safety and quality. The Applicant will require training of all inspectors to Project's construction specifications. A review of the landowner and permit requirements with the applicable inspectors will also be required.

7.1.2 Environmental Inspection

The Applicant is committed to environmental compliance. The Applicant's environmental inspectors will be responsible for overseeing the contractors' compliance with environmental requirements, Project specifications, permits, and landowner requirements during construction activities. The environmental inspector's primary responsibility will be to observe construction-related activities and monitor compliance with, and provide interpretation of, the environmental requirements specific to the Project. The environmental inspector will be qualified to perform the environmental compliance evaluations and interpretations required to comply with environmental permits. . If environmental damage or risk to the safety of the workers or the public is imminent, the environmental inspector will have the authority to stop a non-compliance activity until the concern can be resolved.

On-site environmental compliance by the Applicant's contractors will be documented.

7.1.3 Post-construction Monitoring and Maintenance Programs

The Applicant will conduct post-construction monitoring of the Project area to minimize the potential for long-term adverse impacts to the environment. Operations and maintenance programs such as vegetation management, pipeline maintenance, integrity surveys, hydrostatic testing, or other programs may have an impact on the final reclamation of the ROW. To ensure that the integrity of the facility and land surface reclamation of the ROW is maintained after completion of construction and that regulatory requirements are adhered to during operations, the following measures will be implemented unless otherwise directed by the Applicant in response to site-specific conditions or circumstances:

- Post-construction monitoring inspections will be conducted of disturbed non-cropland areas after the first growing season to determine the success of revegetation. Areas that have not been successfully re-established will be revegetated by the Applicant or through compensation to the landowner to reseed the area. If, after the first growing season, revegetation is successful, no additional monitoring will be conducted.
- In non-agricultural areas, revegetation will be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar in density and cover adjacent undisturbed lands. In agricultural areas, revegetation will be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.

- The Applicant will maintain communication with the landowners and or tenants throughout the operating life of the pipeline to allow expedient communication of issues and problems as they occur. The Applicant will provide the landowners with corporate contact information for these purposes. The Applicant will work with landowners to prevent excessive erosion on lands disturbed by construction. Reasonable methods will be implemented to control erosion. This may not be implemented if the property across which the pipeline is constructed is bare cropland, which the landowner intends to leave bare until the next crop is planted.
- In wetland areas, all timber riprap, timber mats, and prefabricated equipment mats will be removed upon completion of construction. The contractor will replace topsoil, as applicable, and spread as closely to its original contours in the wetland as possible with no crown over the trench. Any excess spoil will be removed from the wetland. The contractor will stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and re-vegetation, as applicable, during final clean up. For each standard wetland crossed, the contractor will install a permanent slope breaker and trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. The contractor will locate the trench breaker immediately upslope of the slope breaker.
- Herbicides and pesticides will not be used in or within 100 feet of a wetland except as allowed by the appropriate land management agency or state agency.

The success of wetland re-vegetation will be monitored after construction until wetland revegetation is successful except in circumstances where property is purchased for aboveground facilities. Wetland re-vegetation will be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If re-vegetation is not successful at the end of 3 years, a remedial re-vegetation plan will be developed in consultation with a professional wetland ecologist to actively re-vegetate the wetland. Re-vegetation efforts will continue until wetland re-vegetation is successful.

7.2 Testimony and Exhibits

The Applicant is submitting the prepared direct testimony of the witnesses listed below in support of its application. Additional testimony will be submitted in accordance with the procedural schedule to be established by the SD PUC. The Applicant reserves the right to designate additional witnesses, as necessary. **Table 37** provides the portions of the document that each witness is responsible for.

Table 37: Project Witnesses

Application Section	Application Subsections	Witness
1.0 Introduction	All Sections Section 1.8	Mr. James Powell Dr. Jon Schmidt
2.0 Project Description	All Sections Section 2.2 Section 2.1.1 Section 2.3.2 (abnormal operations/ERP) Section 2.2 and 2.3	Mr. James Powell/Erik Schovanec Mr. Lynn Meredith Dr. Jon Schmidt Mr. Rod Dillon Mr. Brigham McCowan
3.0 Demand for Facility	All Sections	Mr. James Powell

Table 37: Project Witnesses		
Application Section	**Application Subsections**	**Witness**
4.0 Alternatives	All Sections	Dr. Jon Schmidt Mr. Erik Schovanec Mr. James Powell
5.0 Environmental Information and Impact on Physical Environment	All Sections	Dr. Jon Schmidt Mr. Erik Schovanec
6.0 Community Impact	All Sections All Sections Section 6.1	Mr. James Powell Dr. Jon Schmidt Mr. Andrew Phillips
7.0 Other Information	7.1 Monitoring of Impacts	Dr. Jon Schmidt Mr. Erik Schovanec
Appendices	1, 2 and 4 3, 9, 10, and 12 3, 5-12	Mr. Lynn Meredith Mr. Erik Schovanec Dr. Jon Schmidt

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