ENVIRONMENTAL ASSESSMENT WORKSHEET

This Environmental Assessment Worksheet ("EAW") form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addressed collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an Environmental Impact Statement (EIS).

1. **Project title:** Sandpiper Pipeline Project ("SPP")

2. **Proposer:** North Dakota Pipeline Company LLC ("NDPC")

Contact person: James Watts	Contact person: Jonathan Minton
Title: Senior Legal Counsel	Title: Project Supervisor, Regulatory Pipeline Development
Address: 4628 Mike Colalillo Drive	Address: 1100 Louisiana, Ste. 3300
City, State, ZIP: Duluth, Minnesota 55807	City, State, ZIP: Houston, TX 77002
Phone: 218-464-5600	Phone: 713-821-2000
Email: James.Watts@enbridge.com	Email: Jonathan.Minton@enbridge.com

3. **RGU:** Minnesota Public Utilities Commission (MPUC)

Contact person: Scott Ek	Contact person: Jamie MacAlister
Title: MPUC Energy Facilities Planner	Title: Environmental Review Manager
Address: 121 E 7th Place East, Suite 350	Address: 85 7th Place East, Suite 500
City, State, ZIP: St. Paul, MN 55101	City, State, ZIP: St. Paul MN, 55101
Phone: 651-201-2255	Phone: 651-539-1775
Fax: N/A	Fax: 651-539-0109
Email: Scott.Ek@state.mn.us	Email: Pipeline.Comments@state.mn.us

4. **Reason for EAW Preparation: (check one)**

Required:	Discretionary:
X EIS Scoping	☐ Citizen petition
☐ Mandatory EAW	☐ RGU discretion - Minn. R. 4410.2000, subp. 3(B)
	☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):

4410.4400 Subp. 24 - Pipelines

5. Project Location: See Section 6.

County: Polk, Red Lake, Clearwater, Hubbard, Wadena, Cass, Crow Wing, Aitkin, and Carlton counties.

City/Township: See detailed route maps in Appendix A.

PLS Location (¼, ¼, Section, Township, Range): See detailed route maps in Appendix A.

Watershed (81 major watershed scale): See section 11a.i.

GPS Coordinates: N/A

Tax Parcel Number: See tax parcel list in Appendix B. Information is provided for parcels within the 750-foot-wide requested route width centered on the SPP centerline.

At a minimum attach each of the following to the EAW:

- **County map showing the general location of the project;**
- **U.S. Geological Survey ("USGS") 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and**
- **Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan.**

Figure 5-1 presents an overview map depicting the counties crossed by SPP in Minnesota. Appendix A presents three sets of detailed route maps that show:

- The proposed SPP centerline;
- The SPP construction workspace;
- The 750-foot-wide requested route width centered on the SPP centerline and widened route widths in specific areas;
- Clearbrook West Terminal and Pine River Facility footprints;
- Locations of mainline valves and cathodic protection systems;
- Temporary and permanent access roads;
- The SPP environmental survey area[1];
- The locations and boundaries of state environmental resources accessed from the Minnesota Geospatial Commons website (MNGeo 2016); tribal lands accessed from the Minnesota Department of Transportation ("MNDOT") (MNDOT 2016); and federal lands accessed from the U.S. Geological Survey ("USGS") (USGS 2014). Parcel ownership for SPP was determined using information primarily from NDPC's landowner tracking database; and
- The proposed Enbridge Energy, Limited Partnership ("Enbridge") Line 3 Replacement Project ("L3R") centerline, where co-located.

The three sets of detailed route maps are, more specifically:

- Topographic Maps: This map set presents SPP components overlain on a USGS 7.5-minute, 1:24,000 scale topographic basemap as required by the EAW filing criteria. The map set depicts the items listed above as well as the boundaries of publicly available environmental resources crossed by and in the vicinity of SPP.

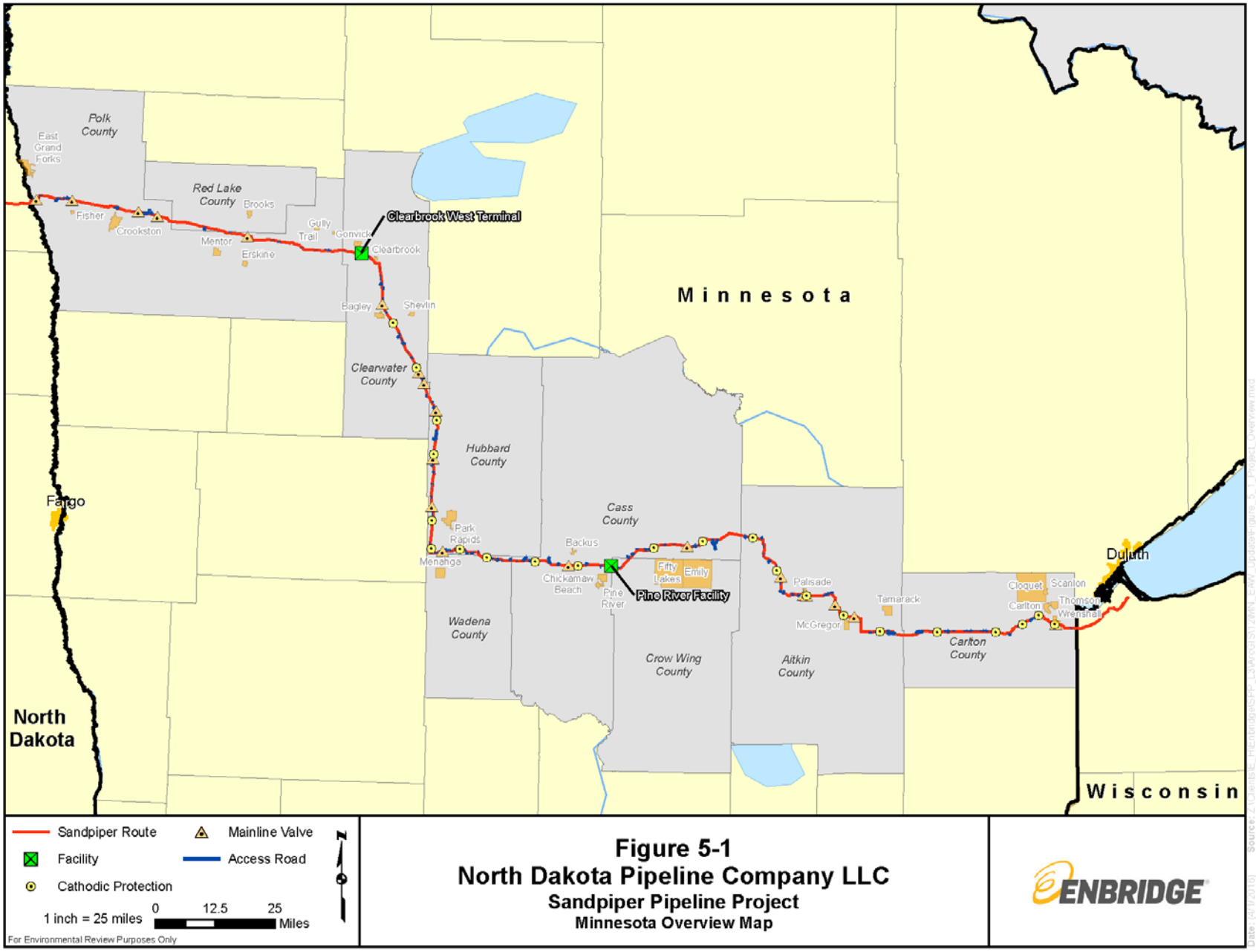
[1] Environmental survey area: The environmental survey area describes the area where environmental surveys, such as wetland and waterbody delineations, archaeological investigations, and threatened and endangered species inventories, were conducted for SPP. The environmental survey area is generally inclusive of and larger than the proposed construction footprint, although not all types of environmental surveys are required in all areas.

- Aerial Survey Maps: This map set presents SPP components overlain on a 1:12,000 scale aerial view. The map set depicts the items listed above as well as survey results and sensitive noise receptors[2].

- Aerial Soils Maps: This map set presents SPP components overlain on a 1:12,000 scale aerial view. The map set depicts the items listed above as well as publicly available soil survey information.

Figures 5-2 and 5-3 present pre-construction conditions of the land to be used for construction of the Clearbrook West Terminal and the Pine River facility, respectively. Figures 5-4 and 5-5 present post-construction site plans for the Clearbrook West Terminal and the Pine River Facility, respectively.

[2] Categories for sensitive noise receptors include: 1) private (residences and garage/barns); 2) public (schools, churches, cemeteries, and hospitals); 3) commercial/industrial (businesses and industries); and 4) other.


Polk County
East Grand Forks
Red Lake County
Brooks
Fisher
Crookston
Mentor
Erskine
Gully
Trail
Gonvick
Clearbrook West Terminal
Clearbrook
Bagley
Shevlin
Minnesota
Clearwater County
Hubbard County
Fargo
Park Rapids
Menahga
Cass County
Backus
Chickamaw Beach
Pine River
Pine River Facility
Fifty Lakes
Emily
Palisade
Tamarack
McGregor
Cloquet
Scanlon
Carlton
Thomson
Wrenshall
Duluth
Wadena County
Crow Wing County
Aitkin County
Carlton County
North Dakota
Wisconsin
Sandpiper Route
Facility
Cathodic Protection
Mainline Valve
Access Road
1 inch = 25 miles
0
12.5
25
Miles
For Environmental Review Purposes Only
Figure 5-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
Minnesota Overview Map
ENBRIDGE

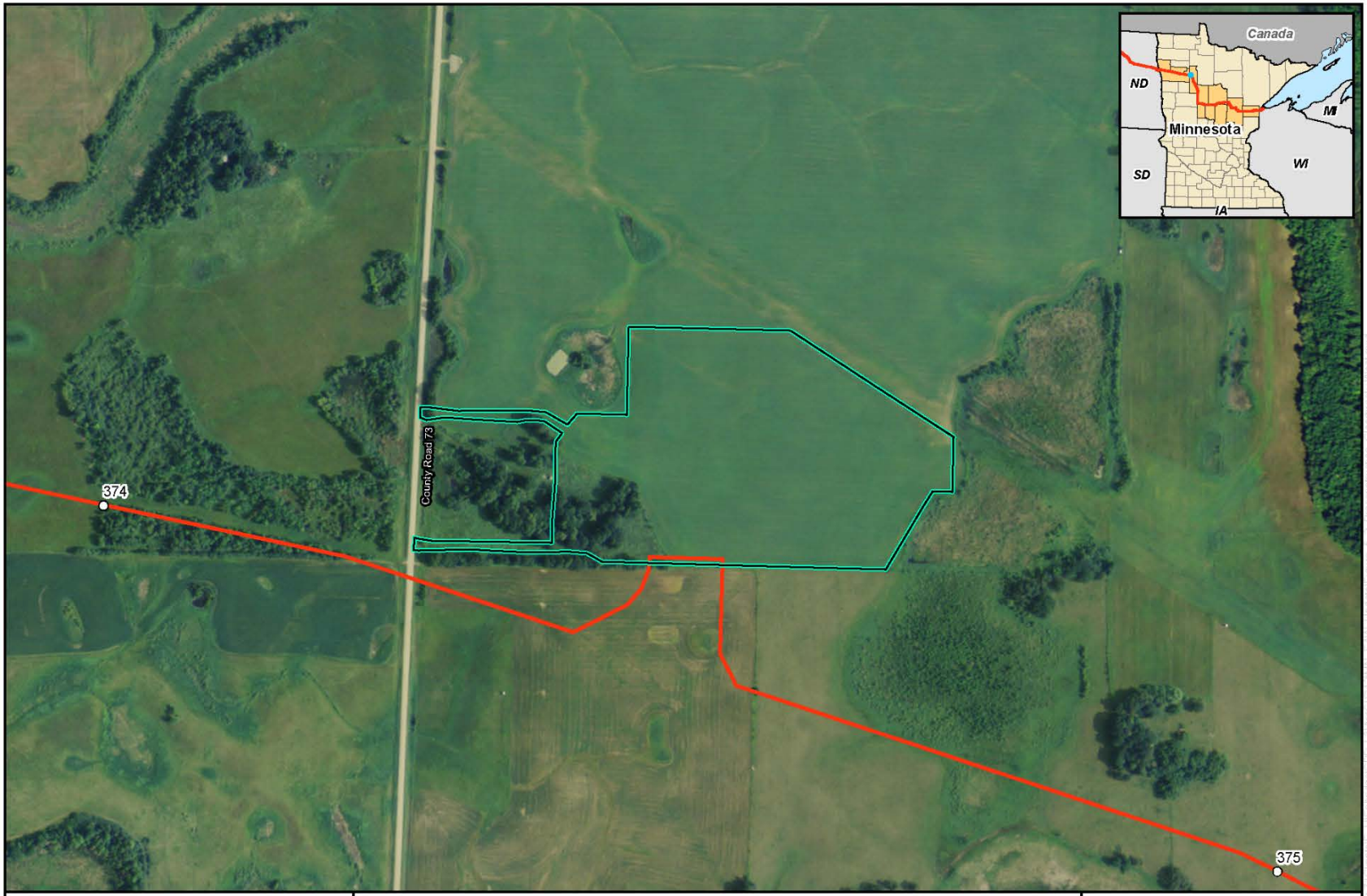
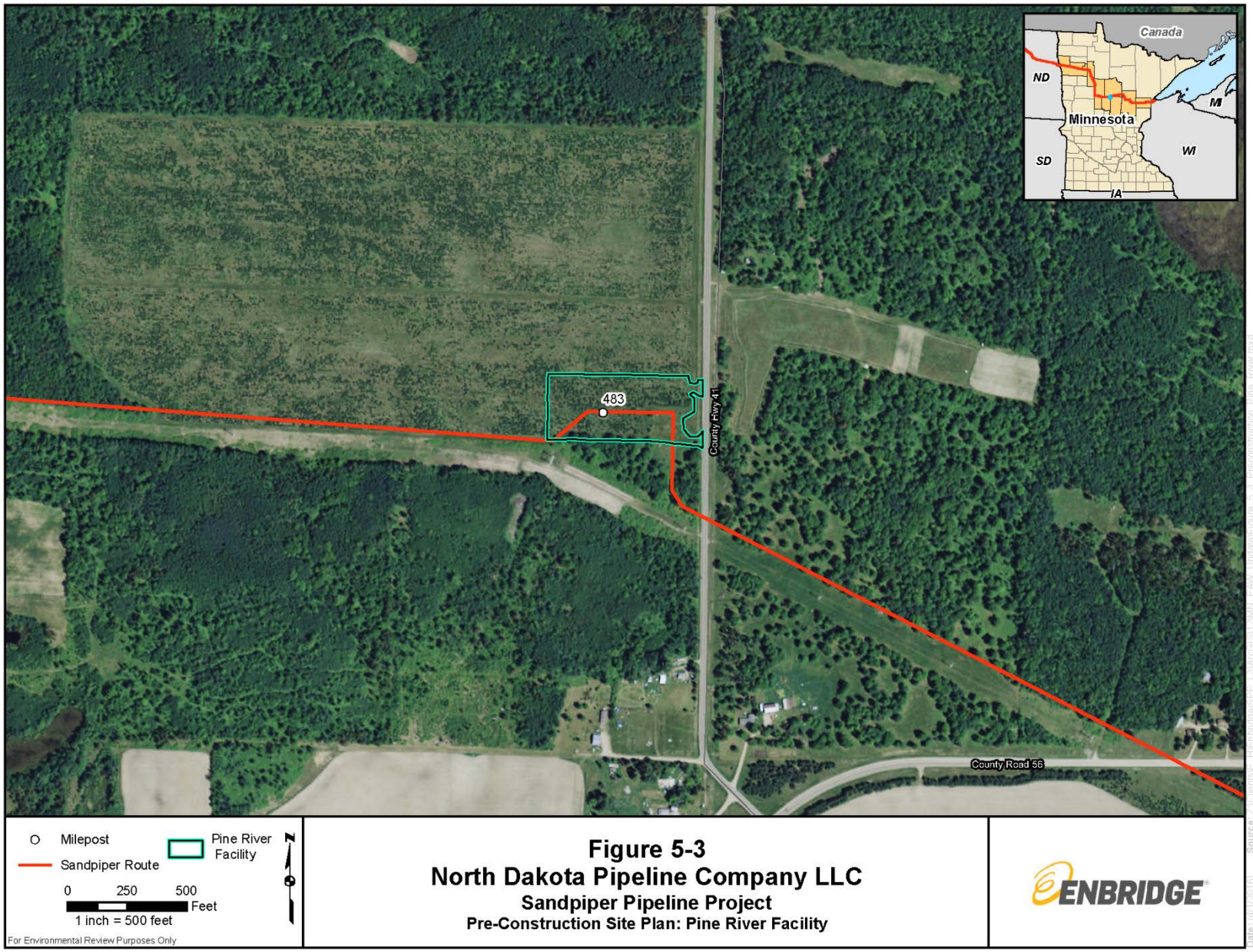
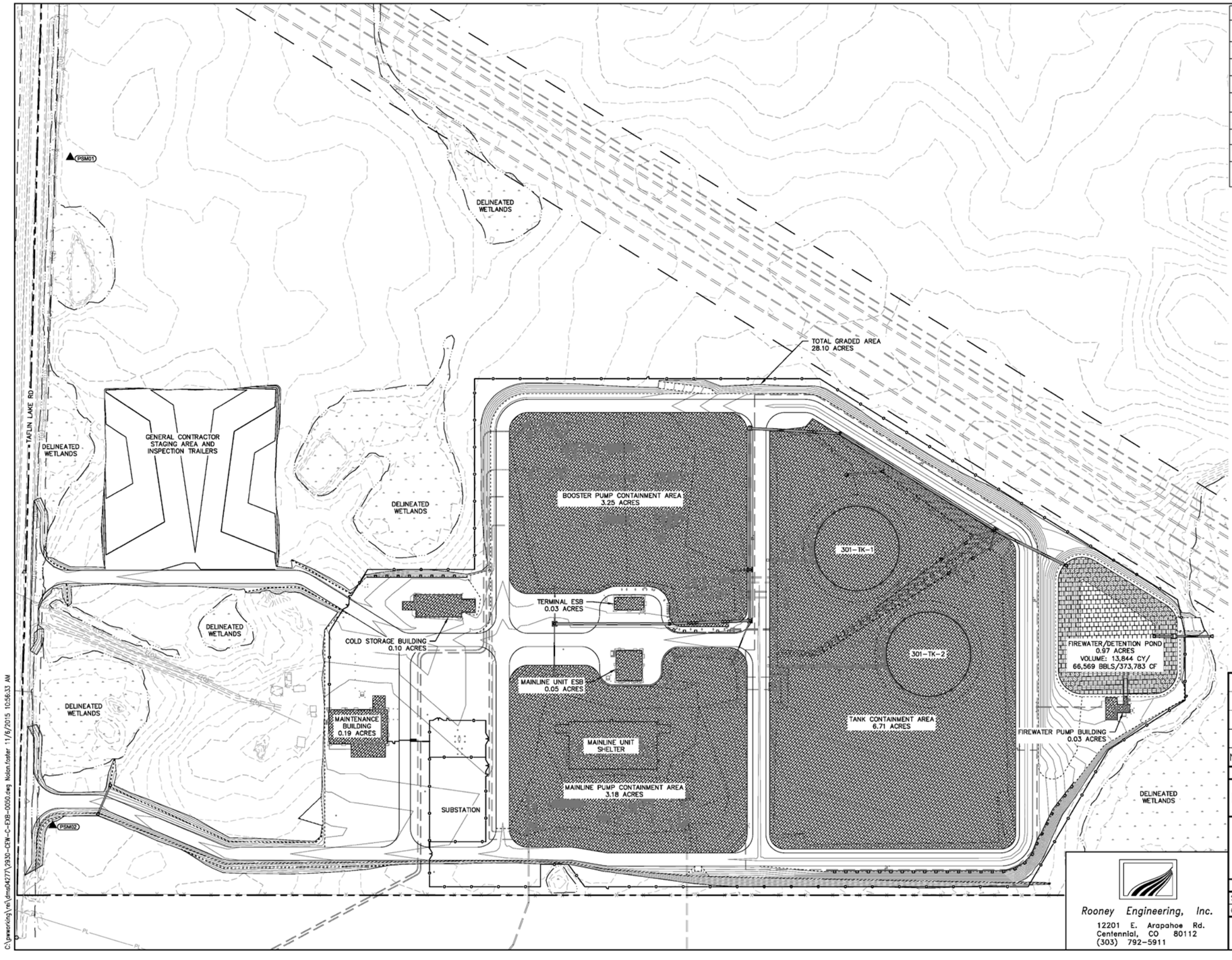


Figure 5-2
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
Pre-Construction Site Plan: Clearbrook West Terminal

ENBRIDGE


Canada
ND
MI
Minnesota
SD
WI
IA
483
County Hwy 41
County Road 56
Milepost
Sandpiper Route
Pine River Facility
0 250 500
Feet
1 inch = 500 feet
For Environmental Review Purposes Only
Figure 5-3
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
Pre-Construction Site Plan: Pine River Facility
ENBRIDGE



SITE EARTHWORKS				
	CUT (CY)	FILL (CY)	NET (CY)	CUT/FILL
OVERALL UNADJUSTED EARTHWORKS	54,046	50,687		
ADJUST FOR TOPSOIL REMOVAL	−40,372			
ADJUST FOR SELECT IMPORT MATERIALS		−49,783		
TOTAL	13,674	904	12,770	CUT (EXCESS)

*FILL QUANTITIES ARE UNADJUSTED. CONTRACTOR TO ACCOUNT FOR MATERIAL SPECIFIC SHRINKAGE FACTORS.

**CONTRACTOR RESPONSIBLE FOR ACCOUNTING FOR OVEREXCAVATION AND UNDERCUT VOLUMES.

NOTE 1: EXPECTED SELECT FILL MATERIALS FOR CLEARBROOK TERMINAL ARE MNDOT CL1 GRAVEL AND 1.5" GRAVEL.

NOTE 2: SHRINKAGE FACTOR FOR ON-SITE SOILS IS 25%, PER TETRA TECH GEOTECHNICAL INVESTIGATION 114-570678, DATED MARCH 28, 2014.

N

80' 0' 80' 160'

SCALE 1" = 80'
WHEN PLOTTED AT 22x34

MINNESOTA ONE CALL
CALL BEFORE YOU DIG AND DIG SAFELY
1-800-252-1166

NO	REVISION	DATE	APPR	BY
A	ISSUED FOR REVIEW	11/06/15	JJT	NRF

NORTH DAKOTA PIPELINE COMPANY LLC

CLEARBROOK WEST (MN) TERMINAL

SOUTH SITE
ENVIRONMENTAL EXHIBIT
SITE PLAN

PROJECT: 02930 – SANDPIPER PIPELINE PROJECT

SCALE: AS NOTED	DATE: 11/05/15	DRAWN: NRF
CHECK: NRF	APPR: JJT	DATE: 11/06/15

2930-CEW-C-EXB-0050 REV A

Rooney Engineering, Inc.
12201 E. Arapahoe Rd.
Centennial, CO 80112
(303) 792-5911

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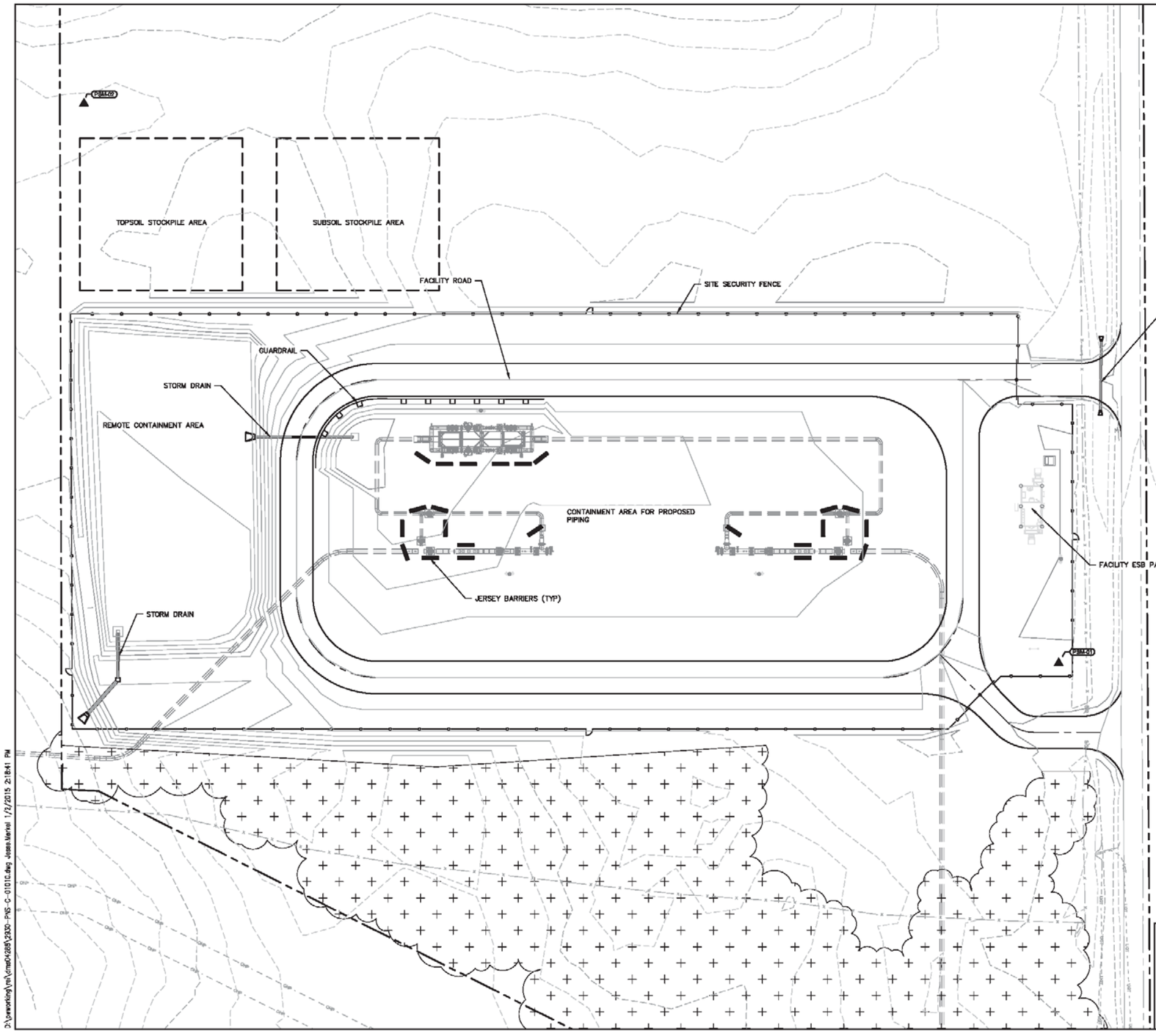


SITE EARTHWORKS				
	CUT (CY)	FILL (CY)	NET (CY)	CUT/FILL
OVERALL UNADJUSTED EARTHWORKS	5,282	5,248		
ADJUST FOR TOPSOIL REMOVAL	−3,309			
ADJUST FOR SELECT IMPORT MATERIALS		−7,198		
TOTAL	1,973	−950	2,923	CUT (EXCESS)
*FILL QUANTITIES ARE UNADJUSTED. CONTRACTOR TO ACCOUNT FOR MATERIAL SPECIFIC SHRINKAGE FACTORS.				
NOTE 1: EXPECTED SELECT FILL MATERIALS FOR PINE RIVER FACILITY ARE MnDOT CLASS 1 GRAVEL, 1.5" GRAVEL, CLAY LINER MATERIAL AND RIPRAP				
NOTE 2: SHRINKAGE FACTOR FOR ON-SITE SOILS IS 5-10%, PER TETRA TECH GEOTECHNICAL INVESTIGATION 114-570678, DATED MARCH 28, 2014				

NOTE: QUANTITIES ARE FOR REFERENCE PURPOSES ONLY

CONTAINMENT VOLUME	REQUIRED		AVAILABLE	
	VOL (CY)		VOL (CY)	VOL (BBL)
LAUNCHER/RECEIVER CONTAINMENT AREA	0	0	3,561	17,124
REMOTE CONTAINMENT AREA	2,148	10,330	2,987	14,364

NOTE: DRAIN BETWEEN RECEIVER CONTAINMENT AREA AND REMOTE CONTAINMENT AREA IS UNVALVED. REMOTE CONTAINMENT AREA IS SIZED TO HOLD THE SUM OF A 25 YEAR, 24 HOUR STORM PLUS THE MAXIMUM SPILL VOLUME. RECEIVER CONTAINMENT AREA IS ADEQUATELY SIZED TO HOLD THIS AMOUNT IF DRAIN BETWEEN RECEIVER AREA AND REMOTE CONTAINMENT AREA IS PLUGGED OR VALVED IN THE FUTURE.

30' 0' 30' 60'

SCALE 1"=30'
WHEN PLOTTED AT 22x34

MINNESOTA ONE CALL
CALL BEFORE YOU DIG AND DIG SAFELY
1-800-252-1166

NO	REVISION	DATE	APPR	BY
1	ISSUED FOR CONSTRUCTION	01/09/15	JRW	JAM
0	ISSUED FOR TENDER	09/09/14	JRW	JAM

Rooney Engineering, Inc.
12201 E. Arapahoe Rd.
Centennial, CO 80112
(303) 792-5911

NORTH DAKOTA PIPELINE COMPANY LLC

PINE RIVER (MN) FACILITY

PROPOSED SCOPE OF WORK
SITE PLAN

PROJECT: 02930 – SANDPIPER PIPELINE PROJECT		
SCALE: AS NOTED	DATE: 01/28/14	DRAWN: RJT
CHECK: JAM	APPR: RML	DATE: 01/02/15

2930-PNS-C-01010 REV 1

6. Project Description:

a. Provide the brief project summary to be published in the *EQB Monitor,* (approximately 50 words).

PROJECT SUMMARY

The applicant's preferred alternative for SPP consists of a pipeline and associated facilities[3] that would transport crude oil from NDPC's Beaver Lodge Station, south of Tioga, North Dakota, to Clearbrook, Minnesota, and then on to an existing terminal in Superior, Wisconsin. The SPP route[4] is approximately 616 miles long; 303 miles are in Minnesota, and the project would also include construction of a new Clearbrook West Terminal and additional facilities at Pine River, Minnesota.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

EIS SCOPING DOCUMENTS

The information and data analysis presented in this Scoping EAW are for the applicant's preferred alternative. Other alternatives will also be considered as part of the EIS scoping process. All projects requiring an EIS must have an EAW filed with the RGU. The EAW shall be the basis for the scoping process (MN Rule 4410.2100). The Scoping EAW is a companion document to the Draft Scoping Decision Document (DSDD). The DSDD will identify alternatives to the proposed project, a tentative schedule, a proposed outline for the EIS, and the types of impacts from alternatives to be addressed in the EIS.

PROJECT DESCRIPTION

SPP consists of approximately 616 miles of new 24-inch- and 30-inch-diameter pipeline, traversing the states of North Dakota, Minnesota, and Wisconsin and terminating at the existing Enbridge Superior station and terminal facility[5] near Superior, Wisconsin. SPP would entail construction and operation of the following infrastructure in Minnesota:

Pipeline

Approximately 303 miles of new 24-inch- and 30-inch-diameter, underground crude oil (light sweet Bakken crude) pipeline would be constructed along the SPP route. In Minnesota, there would be approximately 73 miles of new 24-inch-diameter pipeline (average capacity of 225,000 barrels per day ["bpd"]), beginning at the North Dakota-Minnesota state line near Grand Forks, North Dakota, and extending to a new terminal near Clearbrook, Minnesota (the "Clearbrook

[3] Associated Facilities: Associated facilities are those components of a pipeline system, other than the physical pipeline itself, needed to transport product in the pipeline or construct, operate, or maintain the system. For the purpose of this application, associated facilities are defined as the Clearbrook West Terminal, Pine River Facility, mainline valves, cathodic protection, pipe/material storage yards, contractor yards, and access roads.

[4] SPP route: The SPP route refers to the SPP pipeline and construction workspace, inclusive of ATWS and the permanent ROW.

[5] Terminal facility: A terminal facility is an aboveground facility with large tanks for the temporary containment of crude oil. The crude oil is transported from the terminal to customers or storage facilities via road or rail tankers or other pipeline systems.

West Terminal") and approximately 230 miles of new 30-inch-diameter pipeline (average capacity of 375,000 bpd) extending from the new Clearbrook West Terminal to the Minnesota/Wisconsin border.

The SPP route would cross portions of Polk, Red Lake, Clearwater, Hubbard, Wadena, Cass, Crow Wing, Aitkin, and Carlton counties. Table 6b-1 summarizes the length of pipeline in each county.

Table 6b-1
Location and Length of the Sandpiper Pipeline Project in Minnesota

County	Milepost Range [a]	Pipeline Length (miles)
Polk [b]	301.4 – 332.5	31.1
	343.9 – 370.2	26.4
Red Lake	332.5 – 343.9	11.4
Clearwater	370.2 – 410.1	39.9
Hubbard	410.1 – 454.6	44.5
Wadena	454.6 – 461.7	7.1
Cass [b]	461.7 – 483.2	21.5
	488.0 – 514.0	26.1
Crow Wing	483.2 – 488.0	4.8
Aitkin	514.0 – 564.9	50.9
Carlton	564.9 – 604.6	39.6
	Total [c]	**303.2**

[a] A milepost ("MP") is a point along a pipeline that identifies the approximate distance in miles from the designated starting point. MPs are simply reference points and are not necessarily a true representation of linear distances.

[b] Two MP ranges are presented for Polk County as the route exits Polk County into Red Lake County before entering Polk County again. For Cass County, the route exits Cass County into Crow Wing County before entering Cass County again.

[c] The sum of addends may not total due to rounding.

The SPP route would generally be co-located (within 250-feet from the centerline of a known utility) with existing rights-of-way ("ROWs") in Minnesota for approximately 227 miles, or 75 percent of its length. From the North Dakota border, the SPP route would generally follow NDPC's existing Line 81 ROW across Polk, Red Lake, and Clearwater counties to the new Clearbrook West Terminal. At Clearbrook, the SPP route would turn south and would generally follow the existing Minnesota Pipe Line Company ROW across Clearwater and Hubbard counties to a point near Park Rapids, Minnesota. From Park Rapids, the SPP route would extend east by co-locating with existing electrical transmission, pipeline, and small utility ROWs, and would cross some greenfield[6] parcels across Hubbard, Wadena, Cass, Crow Wing, Aitkin, and Carlton counties to the Minnesota/Wisconsin border.

[6] Greenfield: The term "greenfield" refers to land that has not previously been used for another pipeline, utility, road, or railroad ROW. For the purposes of this document, the term greenfield is applied to land that is more than 250 feet away from an existing parallel pipeline, utility, road, or railroad ROW.

Associated Facilities

Clearbrook West Terminal

A new terminal facility would be constructed near Clearbrook, Minnesota: the Clearbrook West Terminal. The new terminal would be located approximately 3.8 miles west of the existing Enbridge Clearbrook Terminal. The components of the Clearbrook West Terminal would include:

- Two breakout tanks[7] each capable of holding approximately 150,000 barrels ("BBL") of oil;
- Two sets of receiver and launcher traps, one set for SPP and one set for NDPC's existing Line 81, which allow access to the pipeline for sending and receiving smart tools used for internal cleaning and pipeline inspection;
- Two 450 horsepower ("HP") injection pumps[8] to move up to 150,000 bpd from the existing NDPC Line 81 into SPP;
- One 300 HP transfer pump[9] for delivery to NDPC and subsequently the Minnesota Pipe Line System;
- A pump station[10], including four 5,500 HP pumps with four variable frequency drives[11], a 24-inch pipeline inspection gauge ("PIG") receiver and 30-inch PIG launcher traps[12], as well as associated pump station piping and valves[13];
- Associated terminal piping[14], interconnections[15], valves, manifold[16], and sumps[17];
- A fire suppression system, including a pond containing firefighting water; buildings containing pumps and firefighting foam; and associated piping;
- Maintenance, pump shelter, and cold storage buildings;
- Two permanently maintained entrances to connect the site to County Road 73 (Taflin Lake Road) and a new eight-stall parking area;
- Metering equipment to measure incoming and outgoing oil volumes, including:
  - Two coriolis meters[18] for outgoing volumes on SPP (incoming SPP volumes into pump station);

[7] Breakout tank: A breakout tank is a tank used to temporarily hold product. A breakout tank is different than a storage tank in that a breakout tank has relatively high turnover, whereas a storage tank may hold product for a much longer period of time.

[8] Injection pump: An injection pump is used to send crude oil directly into an operating pipeline system but at a lower rate than a mainline pump.

[9] Transfer pump: A transfer pump is a low-pressure, high-volume pump used to move product within a terminal, such as from one tank to another.

[10] Pump station: A pump station is an aboveground facility that includes pumps and other equipment for pumping product through the pipeline.

[11] Variable frequency drive: A variable frequency drive is a set of equipment that provides a means of adjusting the speed of a mechanical load coupled to a motor.

[12] PIG receiver and launcher traps: A PIG is an inspection tool that is inserted into the pipeline to inspect the inside of the pipeline. The tools are propelled through the pipeline by the flow of the pipeline. The tools are inserted into and retrieved from the pipeline at aboveground receiver and launcher traps.

[13] Valve: A valve is a piece of equipment used to control the flow of crude oil inside the pipeline. The valve acts as a gateway that can be opened and closed. A *mainline valve* describes an entire aboveground facility on the pipeline that is equipped with *shutoff valves* capable of stopping pipeline flow in the event of an emergency or for maintenance. A *slide gate valve* is a particular type of shutoff valve that operates by sliding a steel plate across the entire diameter of the pipe to seal off flow.

[14] Terminal piping: Terminal piping is above- and belowground pipe at a terminal site.

[15] Interconnection: An interconnection is the location where one pipeline system connects to another pipeline system.

[16] Manifold interconnection: A manifold interconnection is a collection of valves and interconnects that enable product to flow to and from tanks.

[17] Sump: A sump is a buried tank used for containing product drained out of the system during maintenance activities or pressure relief.

[18] Coriolis meter: A coriolis meter is an instrument used for measuring the amount of oil flowing through the pipeline.

- Two coriolis meters for Line 81 receipts (incoming to tankage);
- Two coriolis meters for receipts from SPP (incoming to tankage);
- Two coriolis meters for delivery from tankage into SPP (delivery from tankage); and
- One coriolis meter for transferring to the Minnesota Pipe Line system (delivery from tankage).

- Power and communications equipment, including:
  - One terminal electrical service building ("ESB");
  - One pump station ESB;
  - A new substation[19]; and
  - A backup power generator.

Pine River Facility

New PIG launcher and receiver traps, along with a mainline valve, coriolis metering equipment, and an ESB would be installed at a site near Pine River, Minnesota. Two permanently maintained entrances to County Highway 41 and a two-stall parking area would also be constructed. A new pump station is not required at this location for the current proposed capacity of SPP, and no tanks would be installed at the Pine River Facility.

Mainline Valves

NDPC is completing an Intelligent Valve Placement[20] ("IVP") analysis to identify optimal valve locations for protecting populated areas, major waterbody crossings, drinking water sources, and environmentally sensitive areas. Currently, there are 21 proposed mainline valve locations. At each valve location, NDPC proposes to install the following equipment: a slide gate valve that would be remotely controlled from the NDPC Control Center ("Control Center") and that could be operated manually as well; digital pressure and temperature monitoring devices that would provide real-time pressure and temperature information to the Control Center; and associated electrical and communications equipment required to control the valve. Based on the IVP analysis and current design, NDPC proposes to install remotely controlled shutoff valves at the following locations relative to downstream waterbodies in Minnesota (Table 6b-2):

Table 6b-2
Waterbodies Downstream from Mainline Valves on the Sandpiper Pipeline Project in Minnesota

Approximate MP	Downstream Waterbody	Waterbody Type	Distance from Upstream Valve (miles)
302.5	Unnamed Stream	Perennial Stream	1.4
310.7	Unnamed Ditch	Ditch/Canal	0.9
325.1	Unnamed Stream	Intermittent Stream	1.2
329.2	Kripple Creek	Intermittent Stream	2.8
348.9	Unnamed Stream	Intermittent Stream	0.7
387.5	Unnamed Stream	Intermittent Stream	0.5
403.9	Bear Creek	Perennial Stream	0.4

[19] Substation: A substation is an aboveground facility for reducing the voltage on electrical power transmission lines to a voltage that is suitable for use. A *transformer* is the piece of electrical equipment used to reduce the voltage.

[20] Intelligent valve placement: Intelligent valve placement is a method by which a pipeline company determines the most effective placement of valves on its pipeline. The method identifies optimal valve locations for protecting populated areas, major waterbody crossings, drinking water sources, and environmentally sensitive areas in the event of a pipeline release.

Table 6b-2 Waterbodies Downstream from Mainline Valves on the Sandpiper Pipeline Project in Minnesota			
Approximate MP	Downstream Waterbody	Waterbody Type	Distance from Upstream Valve (miles)
406.6	Unnamed Stream	Intermittent Stream	2.5
413.1	Unnamed Stream	Intermittent Stream	12.2
423.4	Unnamed Stream	Intermittent Stream	2.1
433.4	Straight River	Artificial Path	4.7
446.1	Shell River	Artificial Path	1.8
466.8	Unnamed Ditch	Ditch/Canal	0.2
473.9	Pine River	Artificial Path	7.5
501.4	Daggett Brook	Perennial Stream	0.2
528.6	White Elk Creek	Intermittent Stream	2.3
536.7	Mississippi River	Artificial Path	0.2
537.4	Unnamed Ditch	Canal/Ditch	1.0
545.5	Sandy River	Artificial Path	0.5
551.3	Sandy River	Canal/Ditch	1.7
599.7	Unnamed Stream	Intermittent Stream	0.8

Cathodic Protection

Cathodic protection systems[21] are installed along buried pipelines to mitigate the threat of external corrosion and maintain safe operation and integrity of pipelines. NDPC proposes to install cathodic protection and alternating current/direct current mitigation[22] to protect the pipeline from the corrosive effects of soil and co-located utilities. In addition, NDPC studied the utilities (specifically powerlines) that would be co-located with SPP in Minnesota to determine their effect on the pipeline. Modeling for both alternating current and direct current mitigation requirements is in progress to determine what equipment would be required.

Pipe/Material Storage Yards and Contractor Yards

NDPC would temporarily use off-ROW areas for pipe and material storage and to receive rail deliveries (rail sidings). In addition, construction contractors would require off-ROW contractor yards to park equipment and stage construction activities. NDPC has identified several pipeyards[23] and rail sidings[24] necessary for construction. Contractor yards would be identified as planning and engineering progresses; therefore, the impacts associated with contractor yards are unknown at this time.

[21] Cathodic protection: Cathodic protection is a method for safeguarding the pipeline against corrosion. In a cathodic protection system, the metal to be protected (the pipeline) is connected to a metal that corrodes more easily (*anode array* or *anode groundbed*). The metal that corrodes more easily corrodes instead of the pipeline. Cathodic protection can be achieved by using reactive anode metals that are electrically connected to the pipeline (also known as a *galvanic anode* systems) or by using inert anode metals and impressing an electric current on the system (also known as an *impressed current* system). NDPC's proposed cathodic protection system includes anode arrays installed in conventional beds near the ground surface as well as in deeper wells.

[22] Alternating current/direct current mitigation: Alternating current and direct current mitigation is a means of protecting the pipeline and its cathodic protection system from electromagnetic-induced voltage and stray current from nearby electric powerlines.

[23] Pipeyard: A pipeyard is a large tract of land near the pipeline ROW that is used to store pipe and other materials.

[24] Rail sidings: A rail siding is a tract of land adjacent to a railroad where pipeline and other materials are off-loaded from trains.

NDPC has considered sensitive environmental features when planning the placement of pipeyards. The use of pipeyards would result in no impact to sensitive environmental features. The yards are leased sites that would be restored upon the completion of SPP. Locations of pipeyards and rail sidings are presented in Table 6b-3. Some pipeyards have already been permitted locally and are currently in use that are related to other projects; other pipeyard permits are under review by the Minnesota Pollution Control Agency ("MPCA").

Table 6b-3
Pipeyards and Rail Sidings Used for the Sandpiper Pipeline Project

County	Facility (number)	Current Use
Polk	Rail Siding (2)	Railroad
	Pipeyard (2)	Existing Outdoor Materials Storage Yard/Actively Cultivated Agricultural Field
Hubbard	Rail Siding (1)	Railroad
	Pipeyard (1)	Pasture/Field
Cass	Pipeyard (1)	Actively Cultivated Agricultural Field
Carlton	Rail Siding (1)	Railroad
	Pipeyard (2)	Existing Outdoor Materials Storage Yard & Developed Gravel Pit/Actively Cultivated Agricultural Field

Access Roads

Public roads would typically be used to gain access to the construction workspace. In areas where public roads are limited, existing privately owned roads may be used. If public or privately owned roads are not available, NDPC may need to construct new access roads[25]. Prior to use of private access roads, modifications to existing non-private roads, and construction of new access roads, NDPC would obtain landowner permission, conduct environmental surveys, and obtain applicable environmental permits and clearances. Permanent access roads would be constructed to each mainline valve.

Land Requirements

The following sections present the land requirements for the SPP and associated facilities, which include the Clearbrook West Terminal, Pine River Facility, mainline valves, cathodic protection, and access roads. The total land requirements for the construction and operation of SPP are 4,682.7 acres and 1,867.7 acres, respectively.

[25] Access road: An access road is a road used to access the pipeline construction workspace, permanent ROW, or associated facility. Access roads can be public roads or private drives and can be existing, modified, or newly constructed.

Pipeline

Construction Workspace and Permanent ROW

The 750-foot-wide route width would encompass the SPP construction workspace (including additional temporary workspace), Clearbrook West Terminal, Pine River Facility, mainline valves, and cathodic protection systems. Construction of SPP would generally require a 120-foot-wide construction workspace[26] in uplands. Uplands are defined as an elevated region of land lying above the level where water flows or collects in basins. This 120-foot-wide construction workspace would allow for temporary storage of topsoil and spoil, as well as accommodate safe operation of construction equipment.

NDPC would acquire a standard 50-foot-wide permanent easement, or ROW, centered on the pipeline. Assuming a 50-foot-wide permanent ROW, 70 feet would be used as temporary workspace in upland areas for a total land use requirement of 120 feet. In wetland areas, including saturated wetlands, 45 feet would be used as temporary workspace for a total land use requirement of 95 feet. Table 6b-4 presents the typical construction workspace and permanent ROW dimensions that would be used for pipeline construction and operation in Minnesota.

West of Clearbrook, 5 feet of NDPC's existing Line 81 permanent ROW would be used as temporary workspace, but this would revert back to the Line 81 permanent ROW upon completion of construction (refer to Figure 6-1). During construction, topsoil would normally be placed on one side of the construction workspace, while the ditch spoil would be separated and located on the opposite side of the construction workspace. The working side (i.e., equipment work area and travel lane) would typically be 90 feet wide in uplands and 65 feet wide in wetlands.

NDPC proposes that following construction, those areas of the construction workspace that are not included within the permanent ROW be allowed to revert to prior vegetation and use. Related mitigation will be discussed in the EIS. The 50-foot-wide permanent ROW would be kept clear of woody vegetation to facilitate aerial inspection[27] of the pipeline and maintain visibility of pipeline markers[28], which would be located at property lines and crossings of roads and waterbodies.

[26] Workspace: The workspace is the area where construction activities are allowed. The main workspace area is sometimes referred to as the *construction workspace*, which consists of 1) the *permanent ROW* and 2) *temporary workspace*. The permanent ROW is the physical area that would be permanently maintained along the pipeline to facilitate the operation and maintenance of the system. The temporary workspace is located adjacent to and contiguous with the permanent ROW and is necessary to accommodate heavy construction equipment and large vehicles used during pipeline installation. The construction workspace can be further defined into three areas: the *trench* (area where the pipeline is placed); the *spoil side* (area where the soil removed from the trench is stored while the pipe is being placed); and the *working side* (area where equipment is staged and vehicles travel).

[27] Aerial inspection: Aerial inspection is a means of surveillance of a pipeline system from aircraft to identify unusual activity (e.g., unauthorized digging), areas of potential concern (i.e., dying vegetation), and to survey the line for potential leaks.

[28] Pipeline marker: Pipeline markers are posts and signs that are visible on the ground and from the air to alert the public and employees to the approximate location of the pipeline.

Table 6b-4 Typical Construction Workspace and Permanent ROW Dimensions for the Sandpiper Pipeline Project				
Route Segment	Permanent ROW (feet)	Temporary Construction Workspace (feet)	Total Land Requirements (feet)	Corresponding Figure Number
West of Clearbrook – Co-located with existing NDPC pipeline (Line 81)	50(~25 new where co-located with Line 81)	70 (upland)	120 (upland)	Figure 6-1a
		45 (wetland)	95 (wetland)	Figure 6-1b
East of Clearbrook – Greenfield	50	70 (upland)	120 (upland)	Figure 6-2a
		45 (wetland / saturated wetland)	95 (wetland / saturated wetland)	Figures 6-2c and 6-2
East of Clearbrook– Co-located with Existing Third-Party Utility	50	70 (upland)	120 (upland)	Figure 6-2b
		45 (wetland / saturated wetland)	95 (wetland / saturated wetland)	Figures 6-2d and 6-2f

Figures 6-1 and 6-2 present the temporary construction workspace and permanent ROW configurations west and east of Clearbrook in both upland and wetland conditions, and when co-located with existing NDPC or third-party utilities. In addition, Figure 6-2 depicts how SPP and L3R would minimize construction impacts by sharing construction workspace where co-located east of Clearbrook.

Figure 6-2a: SPP East of Clearbrook (Uplands – Greenfield)

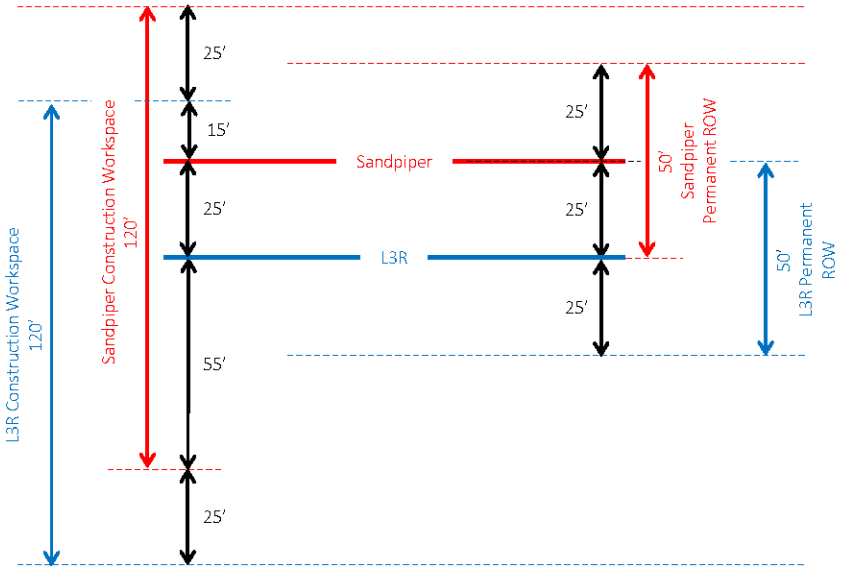


Figure 6-2b: SPP East of Clearbrook (Uplands – Co-located with Existing Third-Party Utility)

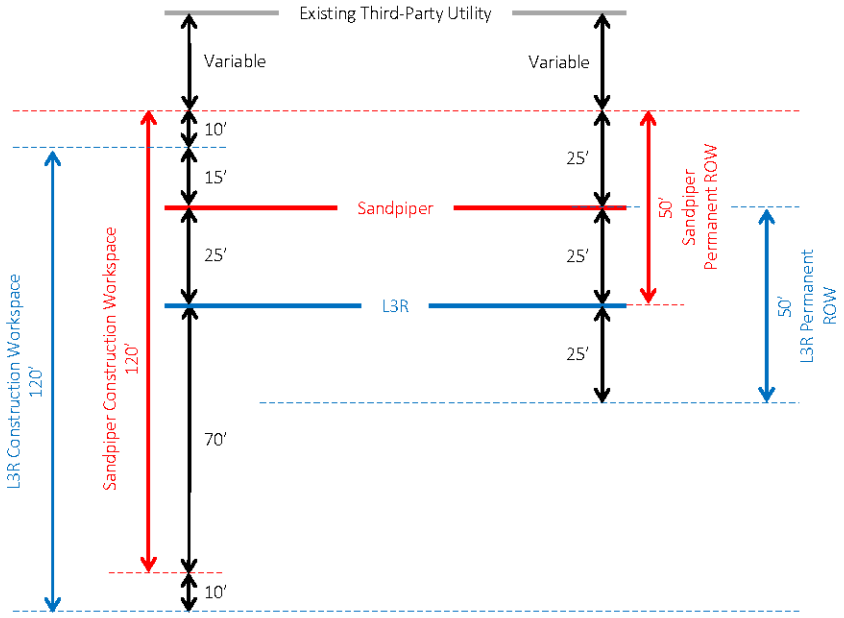


Figure 6-2c: SPP East of Clearbrook (Wetlands – Greenfield)

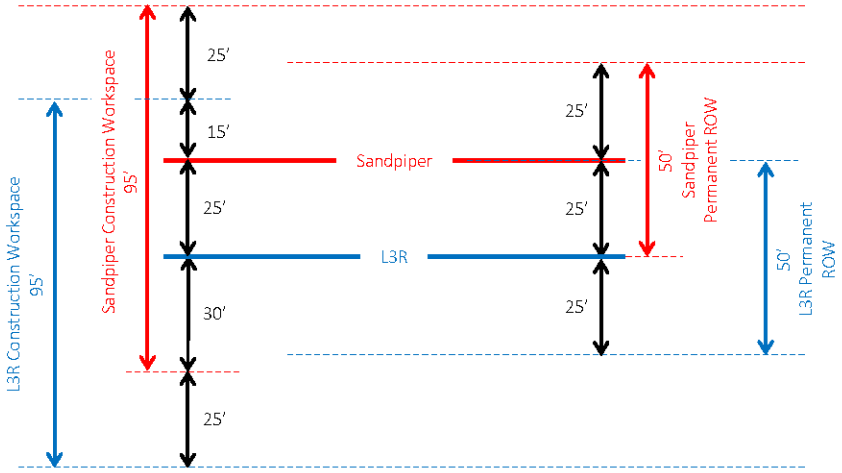


Figure 6-2d: SPP East of Clearbrook (Wetlands – Co-located with Existing Third-Party Utility)

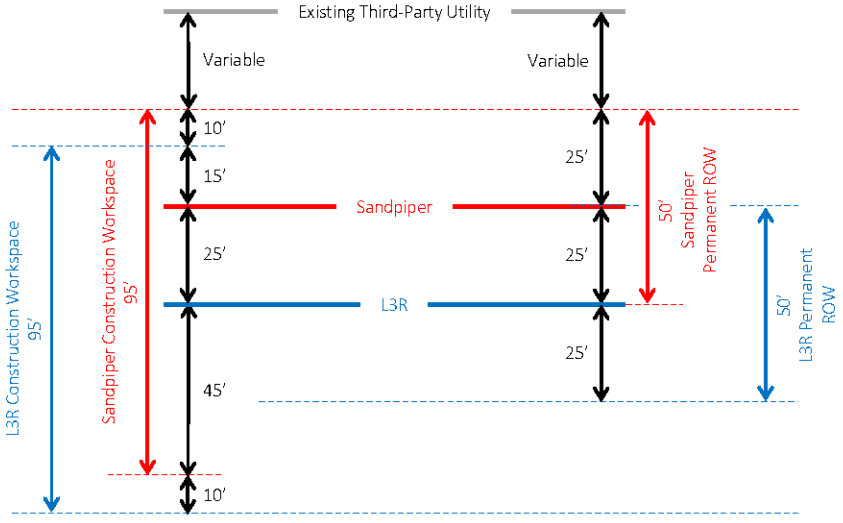


Figure 6-2e: SPP East of Clearbrook (Saturated Wetlands – Greenfield)

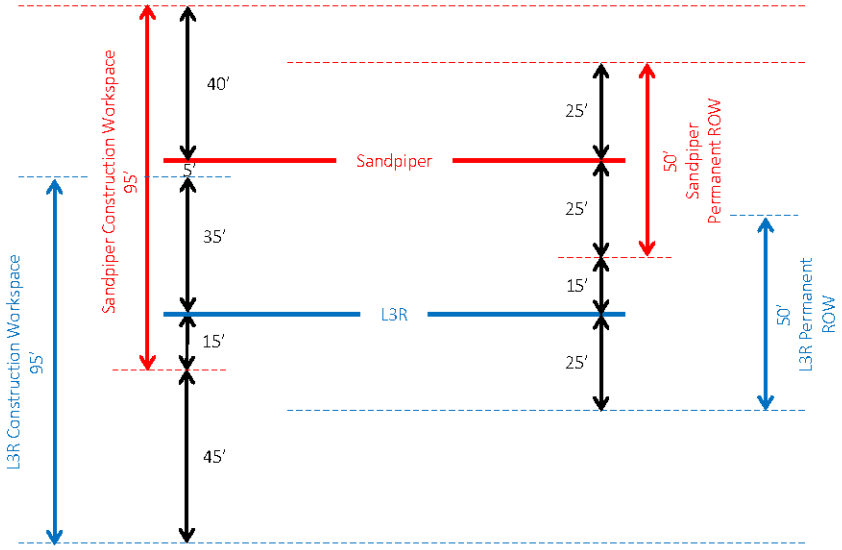
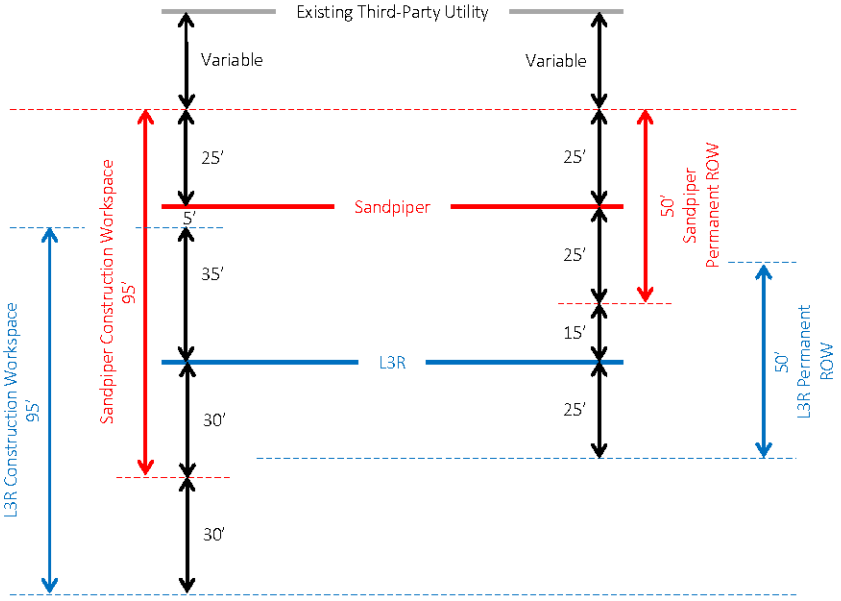


Figure 6-2f: SPP East of Clearbrook (Saturated Wetlands – Co-located with Existing Third-Party Utility)



Additional Temporary Workspaces

Additional temporary workspace[29] ("ATWS") would be required outside of the typical 95- to 120-foot-wide construction workspace to facilitate specific aspects of construction. ATWS would include areas to stage equipment and hold spoil material, and would be in areas where construction methods would require additional workspace. For example, ATWS would be needed where the SPP route would cross features such as waterbodies, wetlands, roads, railroads, foreign pipelines and utilities, horizontal directional drill ("HDD") sites, and other special circumstances. NDPC would also use ATWS to accommodate equipment and resources used for appropriating and discharging water. Dimensions of such ATWS would vary according to site-specific conditions. The EIS will include a description of planned water appropriation and discharge sites and the associated ATWS.

Table 6b-5 lists the typical dimensions of ATWS that would be used for pipeline construction.

Table 6b-5
Typical Dimensions of ATWS for the Sandpiper Pipeline Project

Feature	Approx. Dimensions On Each Side of Feature [a]
Open-cut Road Crossings	100 feet by 75 feet
Bored Road, Foreign Pipeline, and Utility Crossings	100 feet by 75 feet
Railroad Crossings	200 feet by 100 feet
Pipeline Cross-Unders	100 feet by 75 feet
Waterbody Crossings >50 feet wide	200 feet by 100 feet
Waterbody Crossings <50 feet wide	200 feet by 100 feet
HDD Waterbody Crossings	200 feet by 100 feet
Wetland Crossings	200 feet by 75 feet

[a] Areas are in addition to the 120-foot-wide or 95-foot-wide construction workspace.

Impacts from ATWS are assumed to be temporary; once construction has ended, NDPC proposes to allow ATWS to revert to prior vegetation and use.

Based on the construction workspace and permanent ROW dimensions presented in Table 6b-4 and the dimensions of ATWS known at this time (Table 6b-5), the total land requirements for construction and operation of the SPP pipeline are 4,380.6 acres and 1,837.2 acres, respectively.

Associated Facilities

Clearbrook West Terminal and Pine River Facility

The new Clearbrook West Terminal would be located approximately 3.8 miles west of the existing Enbridge Clearbrook Terminal. The components that would be associated with this facility are described under Section 6b above. In addition, the Pine River Facility would be

[29] Additional temporary workspace: Additional temporary workspace is typically a small piece of land (usually less than an acre) adjacent to the construction ROW used temporarily during construction to stage equipment near waterbody, wetland, road, railroad, and foreign utility crossings, steep slopes, and for specialized construction methods. Agreements are negotiated with affected landowners for use of the additional temporary workspace. Additional temporary workspace is restored to its original land use following construction.

installed at a site near Pine River, Minnesota. Table 6b-6 presents the approximate location of these facilities along the SPP route and their associated permanent land requirements.

Table 6b-6
Land Requirements for Facilities for the Sandpiper Pipeline Project

County	Facility	Approximate MP	Permanent Acres
Clearwater	Clearbrook West Terminal	374.5	26.3
Cass	Pine River Facility	483.0	3.9
		Total [a]	**30.2**

[a] The sum of addends may not total due to rounding.

Mainline Valves

Table 6b-7 presents the permanent land requirements for each mainline valve. The footprints of all mainline valves would be located within the pipeline construction workspace; therefore the land requirements presented in Table 6b-7 have already been accounted for in the temporary land requirements identified for the pipeline's construction workspace. The mainline valves located east of SPP MP 379.2 (L3R MP 912.3) would be utilized for both SPP and L3R.

Table 6b-7
Land Requirements for Mainline Valves for the Sandpiper Pipeline Project

County	Approximate MP	Acres
Polk	302.5	0.1
	310.7	0.1
	325.1	0.1
	329.2	0.1
	348.9	0.1
Clearwater	387.5	0.1
	403.9	0.1
	406.6	0.1
Hubbard	413.1	0.1
	423.4	0.1
	433.4	0.1
	446.1	0.1
Cass	466.8	0.1
	473.9	0.1
	501.4	0.1
Aitkin	528.6	0.1
	536.7	0.1
	537.4	0.1
	545.5	0.1
	551.3	0.1
Carlton	599.7	0.1
	Total [a]	**1.7**

Table 6b-7 Land Requirements for Mainline Valves for the Sandpiper Pipeline Project		
County	Approximate MP	Acres
[a] The sum of addends may not total due to rounding.		

Cathodic Protection

Table 6b-8 presents the approximate location of cathodic protection systems along the SPP route as well as the associated land requirements. With the exception of a junction box and small-diameter vent pipe posted above deep well beds (see footnote 19), cathodic protection systems would be buried and the area disturbed for construction would be maintained in an herbaceous state similar to the permanent ROW (see Graphic 6b-1). Cathodic protection systems located east of SPP MP 379.2 (L3R MP 912.3) would be used for both SPP and L3R.

Graphic 6b-1. Aboveground component of a deep well cathodic protection system.

Table 6b-8 Land Requirements for Cathodic Protection for the Sandpiper Pipeline Project		
County	Approximate MP	Acres
Clearwater	392.2	0.4
	402.8	0.4
Hubbard	415.2	0.4
	422.3	0.4
	436.7	0.6
	442.7	0.5
	450.1	0.6
Wadena	456.6	0.4
Cass	466.8	0.4
	475.9	0.4
	483.1	0.1
	494.2	0.2
	505.3	0.4
Aitkin	516.7	0.4
	526.9	0.5
	537.4	0.3
	549.2	0.2
	559.6	0.2
Carlton	572.3	0.4
	584.7	0.5
	591.4	0.4
	595.5	0.7

Table 6b-8 Land Requirements for Cathodic Protection for the Sandpiper Pipeline Project		
County	Approximate MP	Acres
	599.6 (south of pipeline)	0.2
	599.6 (north of pipeline)	0.5
	Total [a]	**9.4**

[a] The sum of addends may not total due to rounding.

Access Roads

NDPC has compiled a preliminary list of access roads that may be used to gain access to the construction workspace; additional access roads would be identified as planning and engineering progresses. While the locations of the access roads are subject to change and the need for improvements to individual roads is not known at this time, a list of access roads proposed for use is presented in Appendix C. Temporary access roads located east of SPP MP 379.2 (L3R MP 912.3) would be used for both SPP and L3R. Based on current information, NDPC anticipates approximately 258.0 acres of impacts related to access roads, assuming a standard 30-foot-wide workspace centered on the road. Impacts from temporary access roads are currently assumed to be temporary.

NDPC has designed permanent access roads to the mainline valves (previously presented in Tables 6b-2 and 6b-7). Table 6b-9 provides a list of the access roads to mainline valve sites as well as the associated land requirements assuming a standard 30-foot-wide workspace centered on the road; impacts from these access roads are assumed to be permanent. The permanent access roads to mainline valves located east of SPP MP 379.2 (L3R MP 912.3) would also be used for L3R.

Table 6b-9 Land Requirements for Permanent Access Roads for the Sandpiper Pipeline Project		
Approximate MP	Length (feet)	Acres [a]
302.5	236.2	0.1
310.7	290.1	0.2
325.1	115.5	0.1
329.2	373.6	0.2
348.9 [b]	N/A	N/A
387.5	160.2	0.1
403.9	199.6	0.1
406.6	174.7	0.1
413.1	94.5	0.1
423.4	440.2	0.2
433.4	112.3	0.1
446.1	398.9	0.2
466.8	93.0	0.1
473.9	500.0	0.3
501.4	120.3	0.1
528.6	457.0	0.2

Table 6b-9 Land Requirements for Permanent Access Roads for the Sandpiper Pipeline Project		
Approximate MP	Length (feet)	Acres [a]
536.7	571.9	0.3
537.4	108.0	0.1
545.5	86.8	0.1
551.3	107.7	0.1
599.7	190.1	0.1
	Total [c]	**2.8**

[a] Impacts based on a 30-foot-wide workspace centered on the road.

[b] Access to the mainline valve site at MP 348.9 would be via an existing access road associated with the NDPC facility at this location.

[c] The sum of addends may not total due to rounding.

Construction and Operation Methods

Pipeline

The typical pipeline construction sequence is as follows:

First, the workspace would be surveyed, staked, and prepared for clearing. The workspace would then be cleared and graded, as necessary, to provide construction access and safe movement of equipment and personnel during construction. Silt fence[30] and other erosion control measures would be installed, and sensitive areas would be marked for avoidance. Appropriate safety measures would be implemented before excavation begins, including notification through the One-Call system to ensure third-party utilities and adjacent pipelines are properly marked. Pipe, valves, and fittings would be transported to the workspace by truck and placed along the workspace by sideboom tractors (also known as pipelayers) or cranes.

After individual pipe sections are strung along the workspace, they would be bent to conform to the contours of the trench and terrain. The pipe segments would be lined up, clamped, welded, and treated with a protective coating, and the welds would be inspected. Trenching may occur before or after the pipe has been welded. Trenching is typically conducted using a backhoe or trenching machine. Where appropriate, topsoil would be segregated according to applicable permit conditions. The prepared pipe would be lowered into the trench and, where applicable, tied into existing facilities. During backfilling, subsoil would be replaced first and then the topsoil would be replaced. Precautions, such as padding the trench with soil, would be taken during backfilling to protect the pipe from rock damage.

Once the pipeline has been welded and inspected, and the trench has been backfilled, the pipeline would be hydrostatically tested[31] to ensure its integrity prior to the line being filled with crude oil and placed into service. The construction workspace would then be cleaned up and

[30] Silt fence: A silt fence is a sediment control device used on construction sites to protect nearby wetlands and waterbodies from stormwater runoff. A typical fence consists of a piece of synthetic fabric (sometimes referred to as geotextile fabric) stretched between a series of stakes where runoff is expected to reach wetlands or waterbodies. The fabric filters remove sediment from the water before it reaches the wetland or waterbody.

[31] Hydrostatic testing: Hydrostatic testing is a process of verifying the integrity of the pipeline before it is placed into service. Hydrostatic testing involves filling the pipeline with water to a designated pressure and holding it for a specified period of time.

restoration activities would commence. Restoration would include implementing temporary and permanent stabilization measures, such as slope breakers[32], mulching, and seeding.

Operation and maintenance of the pipeline would have additional effects on vegetation within the permanent ROW after site clearing and workspace restoration are complete. The permanent ROW would be initially cleared of woody vegetation (and periodically thereafter every 3 to 5 years) to facilitate aerial inspection of the pipeline and maintain visibility of pipeline markers, which would be located at property lines and crossings of roads and waterbodies. Additional information regarding planned operation and maintenance activities is provided in NDPC's revised Route Permit application dated January 31, 2014.

Associated Facilities

Clearbrook West Terminal and Pine River Facility

Facility construction would follow a typical sequence as described in the following paragraphs.

First, the workspace would be surveyed, staked, and prepared for clearing. Silt fence and other erosion control measures would be installed, and sensitive areas would be marked for avoidance. The required workspace would then be cleared and graded, as necessary, to provide construction access and safe movement of equipment and personnel during construction. Appropriate safety measures would be implemented before excavation begins, including notification through the One-Call system to ensure third-party utilities and adjacent pipelines are properly marked. Two independent four-way sweeps[33] would be conducted to positively locate any existing underground utilities. Temporary construction trailers would be placed, material laydown areas[34] prepared, and temporary utilities (e.g., power, telephone) would be installed at the site.

Fire protection piping, if included in the design, and any other lines designed to be deeply buried would then be installed. Equipment, building, and tank (if being constructed) foundations would be excavated and concrete forms constructed. As called for in the design, some areas would be over excavated and engineered fill placed to provide a stable base for foundations. Pipe and cable tray supports[35] would be constructed, usually in the form of deep concrete piers. Sheets of steel that form the base or annular plate[36] for the tanks would be installed followed by the progression of ring walls[37] pending tank height. The pump building would be constructed, which would include the use of an overhead crane for maintenance activities. Upon completion of the concrete work, large equipment would be placed on the foundations (pumps, transformers,

[32] Slope breaker: A slope breaker is an erosion control device to reduce stormwater runoff velocity and divert it from the disturbed construction area to more stable ground. A typical slope breaker consists of a ridge or channel constructed diagonally across the ROW on a hill.

[33] Four-way sweep: Four-way sweep is a method of locating underground utilities. A four-way sweep involves scanning the ground with electromagnetic induction or ground-penetrating radar equipment to detect the presence of buried features; it does not involve digging or other ground-disturbing activities. The term "four-way sweep" comes from the fact that an area typically is scanned (or swept) in at least four directions.

[34] Material laydown area: A material laydown area is a piece of land where materials are stored and staged for construction.

[35] Pipe and cable tray supports: Pipe and cable tray supports are the posts and piers on which aboveground pipes and cables are supported.

[36] Annular plate: The annular plate on a storage tank is the portion of the floor plate directly under the tank wall. It is thicker than the rest of the floor plate because it provides support for the tank wall.

[37] Ring wall: A ring wall is a reinforced concrete wall under the shell of an aboveground storage tank.

booster pumps[38], etc.). Process areas[39] would be lined with a clay liner and bermed to provide secondary containment as per NDPC standards.

Piping would be installed, either by being welded on-site or by placing shop-fabricated installations. The shop-fabricated installations, in which the pipe already has been bent and welded together at the factory, are usually hydrostatically tested before arriving on-site; the field fabrications would be hydrostatically tested in place. Above-grade piping would be tested for 4.25 hours; below-grade piping would be tested for 8.25 hours. Tanks would be hydrostatically tested by filling with water at atmospheric pressure and performing a 24-hour hold.

The ESB(s), either modular design or built on-site, would be placed and all associated electrical and controls equipment would be installed. Power and control cables would be routed and additional pre-operational testing could begin once the system(s) are energized. Some sites would require the construction of a new electrical substation. This work may be performed by the utility supplying the power to the site or by an NDPC contractor.

Upon completion of all pre-operational testing, the equipment would be flooded with crude oil according to the detailed flood plans developed for each site. Equipment operation would then be re-checked. Final site civil work and painting would be completed, and the site would then be cleaned up. Once all final checks have been completed, the facility would be turned over to NDPC Operations for service.

Mainline Valves

Mainline valve construction would follow a typical sequence as described in the following paragraphs.

First, the workspace would be surveyed, staked, and prepared for clearing. Silt fence and other erosion control measures would be installed, and sensitive areas would be marked for avoidance. The required workspace would then be cleared and graded, as necessary, to provide construction access and safe movement of equipment and personnel during construction. Appropriate safety measures would be implemented before excavation begins, including notification through the One-Call system to ensure third-party utilities and adjacent pipelines are properly marked. Two independent four-way sweeps would be conducted to positively locate any existing underground utilities.

The mainline pipe, valve foundation, and valve would be installed and backfilled. After backfilling is complete, the valve would be filled with water and hydrostatically tested. The ESB would be placed and all associated electrical and controls equipment would be installed. Power and control cables would be routed and additional pre-operational testing would begin once the system(s) are energized. Some sites would require the construction of a new electrical service. This work may be performed by an electric utility supplying the power to the site or by an NDPC contractor.

[38] Booster pump: A booster pump is a low-pressure, high-volume pump used to move product out of a tank and into a higher-pressure pump on the pipeline.

[39] Process area: The process area is the area within a pump station or terminal where product is handled, transported, or stored. It includes piping, tanks, sumps, meters, etc. The process area is usually classified as hazardous due to the hazardous nature of the product and the potential for hazardous vapors.

Upon completion of all pre-operational testing, the valve would be ready for use. Equipment operation would be re-checked and final site civil work including fencing installation, permanent access road construction, and painting would be completed. After the final site civil work is complete, the site would be cleaned up and restored. After all final checks have been completed, the valve site would be turned over to NDPC Operations for service.

Cathodic Protection

For SPP, an Impressed Current Cathodic Protection System (see footnote 19) would be constructed. Construction of this system includes both anode arrays installed in both conventional beds near the surface as well as in deep wells. Construction of cathodic protection systems includes excavation of soils at the site of installation. Methods utilized typically involve digging a trench for a cable using a mini-excavator, or ground trenching equipment such as a Ditch Witch. The technique used to trench the cables associated with the cathodic protection system is similar to the methods used for installing fiber optic or telephone lines used for communications, which typically require a 20- to 30-foot-wide construction workspace.

For SPP, eight conventional surface bed type cathodic protection systems would be installed 600 feet perpendicular to the pipeline. Anodes would be installed in either vertical or horizontal fashion, and cables would be trenched to connect the anodes electrically to the protected metallic structures.

NDPC would also construct 15 deep well cathodic protection systems, where the anodes would be installed vertically in a well using construction methods similar to that of water wells. Deep well cathodic protection systems are normally installed closer to the pipeline, while the anodes themselves would be installed deeper (200-400 feet deep) than a conventional surface bed.

Both types of systems utilize native backfill for areas where trenching for the cable occurs. However, the area directly around the anodes would be backfilled with a more suitable backfill such as coke breeze[40]. Additionally, in a deep well cathodic protection system, a natural clay plug would be installed above the anodes to seal the well and prevent water from entering the hole.

Access Roads

NDPC would use existing public and private roads to gain access to SPP. Many of the existing roads are presently in a condition that can accommodate construction traffic without modification or improvement. Some roads, however, are dirt or gravel roads that are not currently suitable for construction traffic. NDPC is proposing to improve unsuitable dirt and gravel roads through widening and/or grading. Widening would involve increasing the width of the road bed. Grading would be confined to the existing road bed or to the footprint of the newly widened road. NDPC has identified potential access roads for SPP (refer to Appendix C); however, NDPC is currently in the process of identifying the type of improvements or modifications that would be required for each access road.

[40] Coke Breeze: Coke breeze is common carbonaceous backfill material used in cathodic protection. It provides a conductive path for current flow and ensures optimal effectiveness of the cathodic protection system.

After construction, NDPC would return improved roads to their pre-construction condition unless the landowner or land-managing agency requests that the improvements be left in place. To return the roads to pre-construction conditions, NDPC would re-contour the disturbed areas outside the original road footprint and seed disturbed areas with an appropriate seed mix.

As discussed above and presented in Table 6b-9, permanent access roads to the mainline valves along the SPP route would be constructed and maintained by NDPC.

Modifications to Existing Equipment

Once SPP is placed in service, the existing interconnection between NDPC's Line 81 and the Enbridge Mainline System at the existing Clearbrook Terminal would be terminated and all Line 81 volumes intended for delivery to Superior, Wisconsin, would be transported via SPP, rather than via the Enbridge Mainline System.

A limited number of new facilities must be modified at the existing Clearbrook Terminal in order to disconnect Line 81. After SPP is constructed, NDPC would disconnect delivery capability to the Enbridge Energy Partners' pipeline side of the terminal, meaning volumes transported on the NDPC system (Line 81) would no longer be able to be transferred to the Enbridge Mainline System at Clearbrook. NDPC would keep the existing Minnesota Pipe Line Company system delivery connection at Clearbrook, which allows Bakken crude to be delivered to the Minnesota Pipe Line Company system for transportation to Minnesota's two refineries.

Demolition

NDPC plans to demolish approximately 35 structures to construct SPP. NDPC has obtained voluntary agreements with all affected landowners.

Timing and Duration of Construction

NDPC plans to commence construction of the new pipeline and associated facilities as soon as all regulatory approvals have been obtained. NDPC plans to complete construction, testing, and commissioning of the new pipeline and associated facilities in approximately 12 months. Final restoration activities would likely extend beyond 12 months.

c. Project magnitude:

PROJECT MAGNITUDE

Table 6c-1
Sandpiper Pipeline Project Magnitude

Total Project Acreage	**Construction Impacts (Temporary): 4,682.7** Pipeline [a]: 4,380.6 acres Associated Facilities [b]: 310.2 acres Clearbrook West Terminal: 26.3 acres Pine River Facility: 3.9 acres Mainline Valves: 1.7 acres [c] Cathodic Protection: 9.4 acres Temporary Access Roads [d]: 258.0 acres Permanent Access Roads: 2.8 acres **Operation Impacts (Permanent): 1,867.7** Pipeline [e]: 1,837.2 acres Associated Facilities [f]: 34.7 acres Clearbrook West Terminal: 26.3 acres Pine River Facility: 3.9 acres Mainline Valves: 1.7 acres Cathodic Protection: 0.0acres

Table 6c-1 Sandpiper Pipeline Project Magnitude	
	Permanent Access Roads [g]: 2.8 acres
Linear project length	303.2 miles (in Minnesota)
Number and type of residential units	N/A
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	25.5 [h]
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	N/A
Structure height(s)	**See below**
Facility	Structure height(s) (in feet)
PIPELINE	
Mainline Valves	15
Communication Towers at Mainline Valve Sites	50
CLEARBROOK WEST TERMINAL	
Maintenance Building	26
Cold Storage Building	23
Mainline Unit Shelter	51
Mainline Unit ESB	24
Terminal ESB	20
Foam Valve House	10
Fire Pump House	15
DRA Skid	10
301-TK-1 & 2 Shell	48
301-TK-1 & 2 Gauging Platform Light	63
Facility Lighting	32

[a] Calculations based on the 120-foot-wide (uplands) and 95-foot-wide (wetlands) construction workspace and ATWS.

[b] Encompasses the area within the outer disturbance boundaries associated with the Clearbrook West Terminal and Pine River Facility.

[c] Mainline valves are located within the temporary construction workspace and therefore the land requirements associated with these facilities are already accounted for in the temporary pipeline impacts.

[d] Calculations based on a 30-foot-wide workspace along temporary access roads.

[e] Calculations based on the 50-foot-wide permanent ROW.

[f] Includes the permanent footprints associated with the Clearbrook West Terminal and Pine River Facility.

[g] Calculations based on a 30-foot-wide workspace along permanent access roads to mainline valve sites.

[h] Encompasses the area within the outer disturbance boundaries associated with the Clearbrook West Terminal and Pine River Facility, including 1.0 acre of stormwater pond associated with the Clearbrook West Terminal.

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

PROJECT PURPOSE

Crude oil production in the Williston Basin in eastern Montana and northwestern North Dakota has risen rapidly in recent years. NDPC has invested over $1 billion since 2006 to increase the capacity of its existing North Dakota Pipeline System in order to move the increasing amounts of crude oil from the Williston Basin to refineries. Williston Basin production exceeds the currently available pipeline capacity, causing frequent periods where shippers are not able to transport the desired volumes of crude oil through the existing pipeline system. Instead, shippers have turned to other transportation modes, primarily rail, to transport Bakken crude oil to refineries in the Midwest and other areas.

The region, therefore, needs more oil pipeline capacity to reduce the use of trains and trucks for oil transport. NDPC is proposing the SPP to help address this need by providing an additional 225,000 bpd of capacity for deliveries of Bakken crude oil to refineries located throughout the Midwest, Midcontinent, and East Coast via the existing Minnesota Pipe Line System at Clearbrook, Minnesota, via an existing terminal in Superior, Wisconsin.

SPP is designed to use existing NDPC and Enbridge pipeline facilities, enhance the reliability of deliveries to the Minnesota Pipe Line System, and increase pipeline capacity for crude oil deliveries from the Williston Basin to Enbridge's existing terminal at Superior, Wisconsin.

NDPC completed its open season in January 2014. As a result of its open season, NDPC secured shipper commitments for 155,000 bpd, which NDPC maintains is a sufficient volume to support the commercial viability of the SPP.

e. Are future stages of this development including development on any other property planned or likely to happen? X Yes ☐ No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

Under Minnesota Rule 4410.2000, Subp. 4, for proposed projects such as pipelines, utility lines, or systems where the proposed project is related to a large existing or planned network, for which a governmental unit has determined environmental review is needed, the RGU shall treat the present proposal as the total proposal or select only some of the future elements for present consideration in the threshold determination and EIS. These selections must be logical in relation to the design of the total system or network and must not be made merely to divide a large system into exempted segments. When review of the total of a project is separated under this subpart, the components or stages addressed in each EIS or supplement must include at least all components or stages for which permits or approvals are being sought from the RGU or other governmental units.

SPP is being designed to accommodate future possible expansion by 140,000 bpd to an ultimate annual capacity of 365,000 bpd from Beaver Lodge to Clearbrook through the addition of new pumping units and/or pump stations along the SPP route. From Clearbrook to Superior, SPP is being designed to expand by 265,000 bpd to an ultimate annual capacity of 640,000 bpd. NDPC would obtain any local, state or federal approvals necessary prior to undertaking any future expansions.

In addition, the SPP route parallels L3R between Clearbrook and Superior. The Minnesota Public Utilities Commission ("MPUC") accepted the L3R Route Permit application on July 1, 2015[41]. If the Route Permit is issued, the Applicants plan to co-locate the pipelines from east of Clearbrook to the Minnesota/Wisconsin border. L3R is being designed with an increased pipeline diameter to restore the aging line to its historical capacity of 760,000 bpd (current capacity of 390,000 bpd).

[41] See Notice of Application Acceptance and Public Information and Environmental Analysis Scoping Meetings PL-9/CN-14-916; PL-9/PPL-15-137 (Document ID: **20157-112551-02)**

NDPC requested electric service for the SPP pump station at the Clearbrook West Terminal from Clearwater-Polk Electric, a distribution cooperative and member-owner of Minnkota Power Cooperative, Inc. An application has been submitted to MPUC for a Routing Permit for the necessary facilities, known as the Clearbrook-Clearbrook West 115 kilovolt ("kV") Transmission Line and Substation Project in Clearwater County ("Minnkota Transmission Line Project"). Additional information regarding this project can be found in MPUC Docket No. ETL/TL-14-665. Permitting and environmental review of the Minnkota Transmission Line Project will be conducted pursuant to Minn. Stat. Ch. 216E and Minn. R. Ch. 7850; therefore, the impacts of the Minnkota Transmission Line Project are not discussed further in this EAW.

Other permitted and/or planned transmission line projects that could potentially be directly associated with the proposed SPP will be identified during the planning process. If identified, the local electric utility would submit an application MPUC for a Routing Permit for the necessary facilities.

f. Is this project a subsequent stage of an earlier project? ☐Yes X No
If yes, briefly describe the past development, timeline and any past environmental review.

7. Cover types: Estimate the acreage of the site with each of the following cover types before and after development:

LAND COVER TYPES

Table 7-1 shows expected land use before and after construction using based on GAP Land Cover data.

Table 7-1
Land Cover Types Crossed by the Sandpiper Pipeline Project

	Before [a]	After [b]		Before [a]	After [b]
Wetlands	553.2	552.5	Lawn/Landscaping/Developed Open Space [d]	160.9	160.1
Deep water/Streams	10.5	10.5	Impervious Surface [e]	0.0	24.5
Wooded/Forest [c]	2,207.7	1,334.8	Stormwater Pond [f]	0.0	1.0
Brush/Grassland [c]	126.5	995.8	Developed/Other	7.5	16.6
Cropland	1,616.5	1,587.0			
			Total [g]	**4,682.7**	**4,682.7**

[a] Acres presented in the "Before" column represent impacts associated with the pipeline construction workspace and ATWS, Clearbrook West Terminal, Pine River Facility, mainline valves, cathodic protection, and permanent access roads. This does not include impacts from temporary access roads. The locations of the temporary access roads are subject to change and the need for improvements to individual roads is not known at this time.

[b] Acres presented in the "After" column represent impacts associated with the permanent ROW, Clearbrook West Terminal, Pine River Facility, mainline valves, cathodic protection, and permanent access roads. The permanent footprints associated with the Clearbrook West Terminal, Pine River Facility, mainline valves, and permanent access roads are captured under the impervious surfaces, stormwater ponds, and developed/other categories.

[c] Following the completion of construction, wooded/forested areas within the permanent ROW would not be reestablished; the permanent ROW would be maintained in an herbaceous state. Temporary construction workspace areas outside of the permanent ROW that were previously wooded/forested would be allowed to regenerate and are accounted for under the "Brush/Grassland" land cover type.

[d] Less than one acre of lawn/landscaping would be maintained within the fence line of the Clearbrook West Terminal. All other lawn and landscaped areas are captured under the Developed/Open Space cover type.

[e] Impervious surfaces include footprints associated with the Clearbrook West Terminal, Pine River facility, mainline valves, and permanent access roads.

[f] The stormwater ponds are associated with the Clearbrook West Terminal.

[g] The sum of addends may not total due to rounding.

Source: Minnesota Geospatial Commons website. Available at: https://gisdata.mn.gov/ (MNGeo 2016).

GAP Land Cover data available from the Minnesota Geospatial Commons website (MNGeo 2016) was used to calculate the cover types in Table 7-1. Table 7-2 lists the GAP data categories that are included in each individual cover type shown in Table 7-1.

Table 7-2
GAP Land Cover Types Crossed by the Sandpiper Pipeline Project

Land Cover Type in Table 7-1	GAP Land Cover Classification
Wetlands	Boreal Acidic Peatland Systems
	Central Interior and Appalachian Floodplain Systems
	Central Interior and Appalachian Shrub-Herbaceous Wetland Systems
	Central Interior and Appalachian Swamp Systems
	Eastern Boreal Floodplain
	Eastern Great Plains Floodplain Systems
	Eastern Great Plains Wet Meadow, Prairie, and Marsh
	Great Plains Prairie Pothole
	Laurentian-Acadian Floodplain Systems
	Laurentian-Acadian Swamp Systems
	Western Great Plains Depressional Wetland Systems
Deep Water/Streams	Open Water (Fresh)
Wooded/Forest	Boreal Aspen-Birch Forest
	Boreal Jack Pine-Black Spruce Forest
	Boreal White Spruce-Fir-Hardwood Forest
	Eastern Great Plains Tallgrass Aspen Parkland
	Laurentian Pine-Oak Barrens
	Laurentian-Acadian Northern Hardwoods Forest
	Laurentian-Acadian Northern Pine-(Oak) Forest
	North-Central Interior Dry Oak Forest and Woodland
	North-Central Interior Dry-Mesic Oak Forest and Woodland
	North-Central Interior Maple-Basswood Forest
Brush/Grassland	Harvested Forest - Grass/Forb Regeneration
	Introduced Upland Vegetation - Perennial Grassland and Forbland
	North-Central Interior Sand and Gravel Tallgrass Prairie
	Northern Tallgrass Prairie
	Recently Burned Shrubland
Cropland	Cultivated Cropland
	Managed Tree Plantation
	Pasture/Hay
Lawn/Landscaping [a]	N/A
Impervious Surface	N/A
Stormwater Pond	N/A
Other (Open Space)	Developed, Open Space

Table 7-2 GAP Land Cover Types Crossed by the Sandpiper Pipeline Project	
Land Cover Type in Table 7-1	GAP Land Cover Classification
Other (Developed)	Developed, High Intensity
	Developed, Medium Intensity
	Disturbed, Non-specific
N/A	This cover type is not a GAP Land Cover Category, but is a requirement of the EAW filing criteria.
[a]	Lawns and landscaped areas are captured under the Developed, Open Space category.

Changes in cover types under each alternative will be quantified and included in the EIS. Evaluation of cover type changes will take into consideration the pipeline route and associated facilities. The EIS will further describe potential impacts to the following cover types:

- Urban Areas
- Wetlands and Deep Water/Streams
- Wooded/Forest Land
- Brush/Grassland
- Crop Land
- Lawn/Landscaping and Developed/Open Spaces
- Impervious Surfaces and Stormwater Ponds
- Developed/Other

The EIS will take into account the potential cumulative impacts of both the SPP and L3R Project, including impacts relative to the ROW needed to co-locate the two lines between Clearbrook and Superior along the Applicant's preferred route and all alternatives as well as new transmission lines proposed for new pumping stations.

8. Permits and approvals required: List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. ***All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.***

PERMIT TABLE

Table 8-1
Permits and Approvals Required

Unit of Government	Type of Application	Status	Reason Required
USACE – St. Paul District and MPCA	Section 10/404 Individual Permit and associated state 401 Individual Water Quality Certification	Application submitted and determined complete (December 17, 2015)	Authorizes discharge of dredged and fill material into waters of the United States, including wetlands, and crossing of navigable waters of the United States.
USFWS	Section 7 ESA Consultation (Federal endangered species)	Consultation ongoing	Establishes conservation measures and authorizes, as needed, take of federally protected species
	Bald Eagle Removal Permit	Pending submittal	Allows for removal of a known bald eagle nest in proximity to construction activities
MPUC	Certificate of Need	Application submitted	Determines need for the pipeline, including questions of size, type and timing
	Route Permit	Application submitted	Authorizes construction of the pipeline along a specific route, subject to certain conditions
MDNR	License to Cross Public Waters	Application submitted	50 year license that allows for crossing of public waters with proposed utility
	License to Cross Public Lands	Application submitted	50 year license that allows for crossing of public lands with proposed utility
	Water Appropriation Permit – Pipeline and Facilities	Pending submittal	Authorizes withdrawal and use of water from surface or ground sources
	State Endangered Species Permit and Avoidance Plan	Pending submittal	Outlines plans for avoidance, minimization, and mitigation of take of state-listed species
	Osprey Nest Disturbance Permit	Pending submittal	Allows for removal of a known osprey nest
	Fen Management Plan	Pending submittal	Outlines plans for avoidance, minimization, and mitigation of fens within project corridor
MPCA	Clearbrook West Terminal – Option A Registration Permit and New Source Performance Standards Notifications and Submittals	Pending submittal	Authorizes operation of the terminal and compliance demonstration requirement for new sources of air emissions under the CAA
	NPDES Individual Construction Stormwater, Hydrostatic Test, and Trench Dewatering Permit – Pipeline Construction	Pending submittal	Authorizes ground disturbance with approved protection measures to manage soil erosion and stormwater discharge on construction site; discharge of water from hydrotesting activities; and removal of water that may accumulate in pipeline trench
	NPDES General Construction Stormwater	Pending submittal	Authorizes ground disturbance with approved protection measures to manage soil erosion and

Table 8-1 Permits and Approvals Required			
Unit of Government	Type of Application	Status	Reason Required
	Coverage – Facilities		stormwater discharge on construction site
	NPDES General Construction Stormwater Coverage – Pipeyards, Staging Areas, and Contractor Yards	Pipeyard permits received [a]	Authorizes ground disturbance with approved protection measures to manage soil erosion and stormwater discharge on construction site
Minnesota SHPO	Cultural Resources Consultation, NHPA Section 106 Clearance	Consultation ongoing	Ensures adequate consideration of impacts to significant cultural resources
MDA	Agricultural Protection Plan	Consultation initiated	Establishes measures for agricultural protection
MNDOT	Road Crossing Permits	Pending submittal	Authorizes crossings of state-jurisdictional roadways
Mississippi Headwaters Board	Local Land Use Review	Consultation only (in progress)	Ensures compatibility with land use plan
Red Lake and Wild Rice Watershed Districts	Watershed District Permits	Pending submittal	Authorizes crossing of legal drain and ditches within watershed
Minnesota Department of Health ("MDH") and Wrenshall and Sundruds Court Drinking Water Supply Management Area	Drinking Water Supply Management Area/Wellhead Protection Area Consultation	Consultation only (in progress)	Ensures pipeline construction and operation are compatible with goals of relevant plans
Minnesota Board of Water and Soil Resources/WCA Local Governmental Units	Notice of Intent to Utilize Federal Approvals for Utilities Project Exemption	Notice submitted	Notice of use of exemption required
Local/County	Permits pertaining to off-ROW yard use	Pending submittal	Ensures compatibility with relevant land use plans
[a] Issuance of the NPDES General Construction Stormwater is currently under review and pending further action.			

DESCRIPTION OF PROCEDURAL HISTORY AND ROUTE CHANGES

NDPC filed Certificate of Need and Routing Permit pplications (the "Applications") on November 8, 2013. NDPC subsequently filed revised applications on January 31, 2014, to reflect changes in NDPC's ownership and route modifications to address concerns raised in Carlton County. Both the November 2013 and January 2014 applications contained a Minnesota Environmental Information Report ("EIR"). The MPUC accepted the SPP Routing Permit application as complete on February 11, 2014, and the Certificate of Need application as complete on March 19, 2014.

Following the public information meetings held in March 2014, NDPC modified the SPP route to address new landowner, environmental, engineering, design, or constructability concerns. NDPC described these modifications in its April 4, 2014, Route Alternatives Comments and its May 30, 2014, Route Alternatives Comments. These modifications were identified as RA-02, RA-03, RA-04, RA-05, RA-11, RA-12, RA-13, RA-14, RA-17, RA-18, RA-19, RA-24, RA-25, RA-26, RA-29, RA-30, RA-36, RA-38, RA-41, RA-47, RA-50, RA-53, and RA-54 in Department of Commerce Energy and Environmental Review Analysis's ("DOC-EERA") Alternative Routes Summary Report dated July 16, 2014. In addition, NDPC adopted the route alternative requested by DOC-EERA and Minnesota Department of Natural Resources ("MDNR") to avoid the Crow Wing Chain Wildlife Management Area ("WMA") on June 27, 2014. DOC-EERA

identified this as RA-16 in its Alternative Routes Summary Report. NDPC provided the MPUC with an updated shapefile of these collective changes to the SPP route on August 22, 2014.

On August 25, 2014, the MPUC accepted 53 route alternatives, including all the alternatives proposed by NDPC, SA-03 as modified, and seven expanded route widths for referral in the Routing Permit proceedings.

On October 7, 2014, the MPUC bifurcated the Certificate of Need and Routing Permit proceedings and postponed further action on the Routing Permit until a decision on the Certificate of Need had been made. While the regulatory route proceeding was put on hold, NDPC continued to engage with landowners and other stakeholders, and continued to further refine the engineering design plans for SPP.

On April 23, 2015, Enbridge submitted Certificate of Need and Routing Permit applications for L3R. Consistent with NDPC's notification to the MPUC on May 30, 2014, in the SPP route proceeding, the L3R route parallels the SPP route between Clearbrook, Minnesota, and Superior, Wisconsin. The MPUC accepted the L3R applications as complete on July 1, 2015.

On August 3, 2015, the MPUC issued two orders related to SPP. It issued an Order Granting the Certificate of Need with Conditions and an Order Authorizing Recommencement of Routing Permit Proceeding and Providing Direction for the Scope of the Comparative Environmental Analysis.

On September 14, 2015, the Minnesota Court of Appeals held that in a bifurcated pipeline Certificate of Need proceeding, where the Routing Permit proceeding occurs subsequent to the Certificate of Need proceeding, the Minnesota Environmental Policy Act requires the MPUC to conduct an EIS before making a decision.

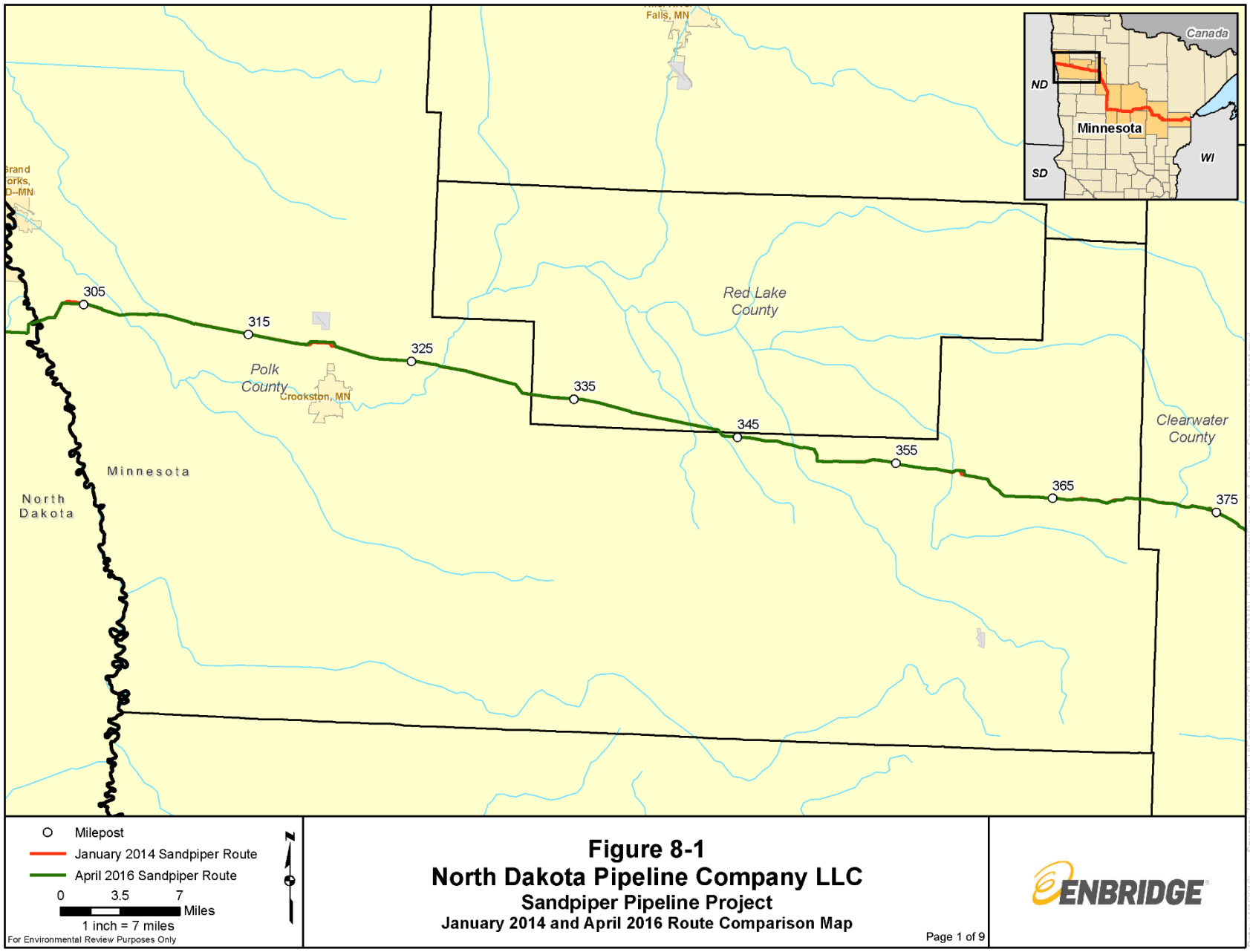
On September 30, 2015, Enbridge submitted comments during the L3R scoping period describing four changes to the L3R route that extended outside the 700-foot route width originally requested in its application. In addition, Enbridge requested a wider route width in seven areas to accommodate ATWS and 67 areas where Enbridge made minor changes to the L3R centerline to address engineering, environmental, or landowner issues.

The MPUC met on December 17, 2015, and referred the Certificate of Need and Routing Permit proceedings to the Office of Administrative Hearings for joint contested case proceedings and authorized the DOC-EERA to prepare an EIS for SPP and L3R.

On January 11, 2016, the MPUC issued its written orders establishing a process for conducting the SPP hearings. In relevant part, the SPP Order (1) lifted the stay of the Certificate of Need docket, (2) rejoined the Certificate of Need and Routing Permit dockets, (3) authorized preparation of an EIS covering need and routing issues pursuant to Minn. Stat. Ch. 116D and Minn. R. 4410, and (4) authorized the DOC-EERA to administer the EIS process in consultation with the MPUC's Executive Secretary, and enter into an interagency agreement with the MPCA and MDNR. This EAW is being submitted to facilitate the EIS review process.

Under Minn. R. 4410.2100, subp. 2, the purpose of this EAW is to serve as the basis of the EIS scoping process. Accordingly, this EAW reflects NDPC's current route and supporting data to ensure the EIS scoping process is starting from the most current available information and reflects the updated route for which NDPC is seeking a Routing Permit.

NDPC is requesting that the MPUC evaluate a route that is generally 750 feet in width (375 feet on each side of the SPP centerline) except in the expanded route width areas already accepted by the MPUC for further review for SPP and those included in the L3R DOC-EERA scope document. NDPC has provided updated maps and supporting data, as required by Minn. R. 7852 and 4410 to ensure this EAW reflects the current SPP centerline and route width sought by NDPC (see Appendix A). Figure 8-1 depicts the changes between the January 31, 2014, SPP route last analyzed in the January 2014 EIR and the SPP route provided in this EAW.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Minnesota
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Polk County
Crookston, MN
Clearwater County
Minnesota
North Dakota
Milepost
January 2014 Sandpiper Route
April 2016 Sandpiper Route
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Miles
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For Environmental Review Purposes Only
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Figure 8-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
January 2014 and April 2016 Route Comparison Map
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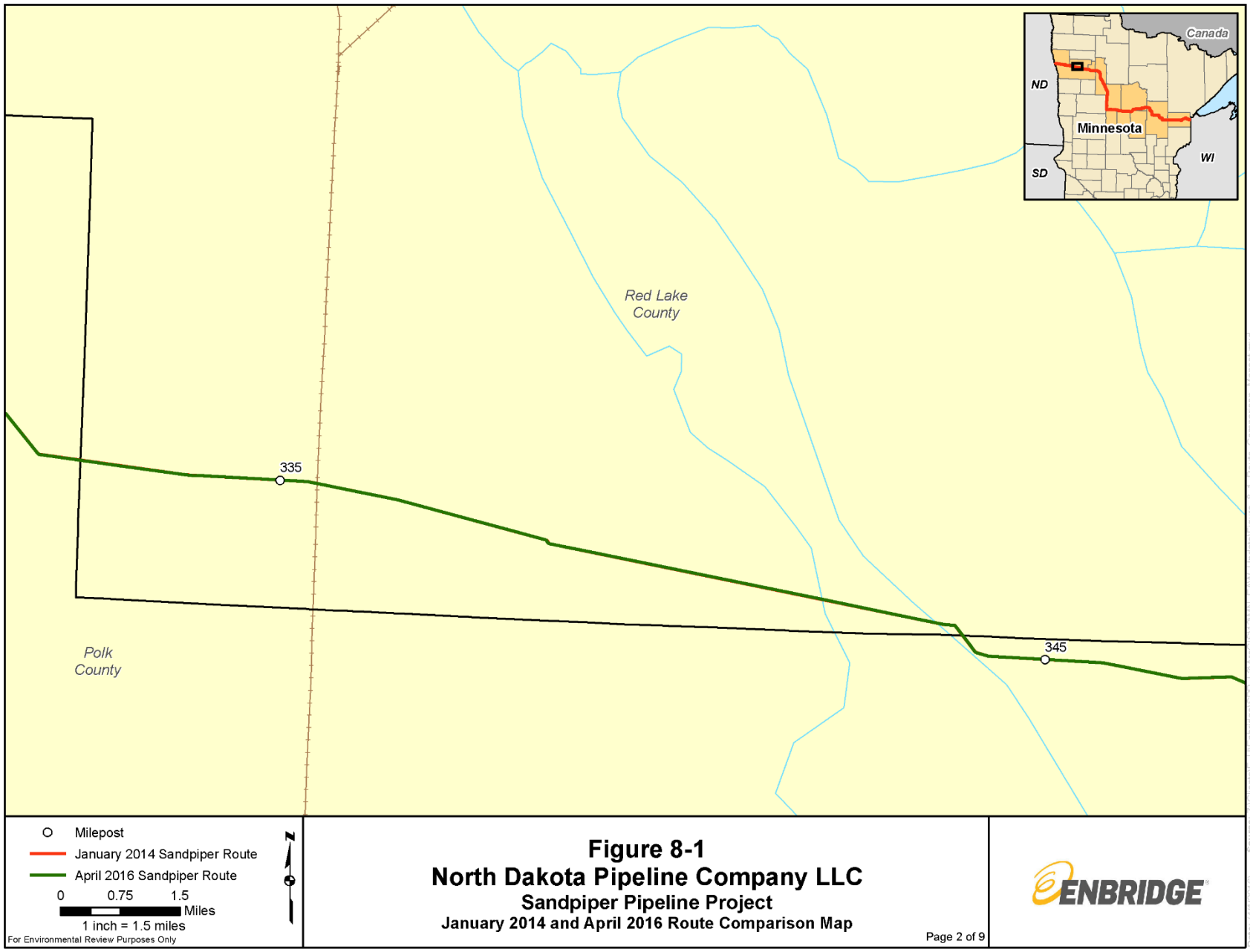
ENBRIDGE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Miles
1 inch = 1.5 miles
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Figure 8-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
January 2014 and April 2016 Route Comparison Map
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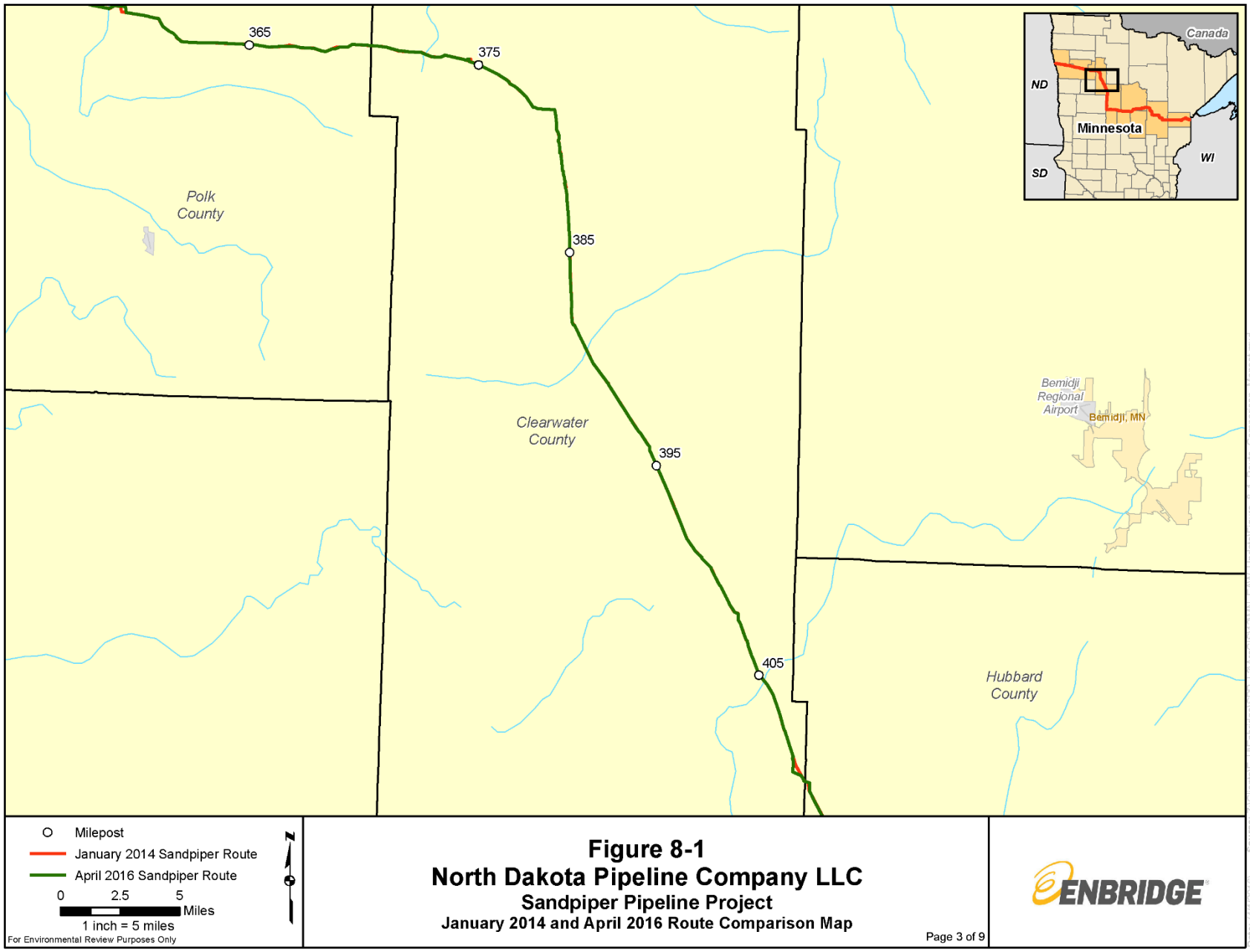
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April 2016 Sandpiper Route
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Miles
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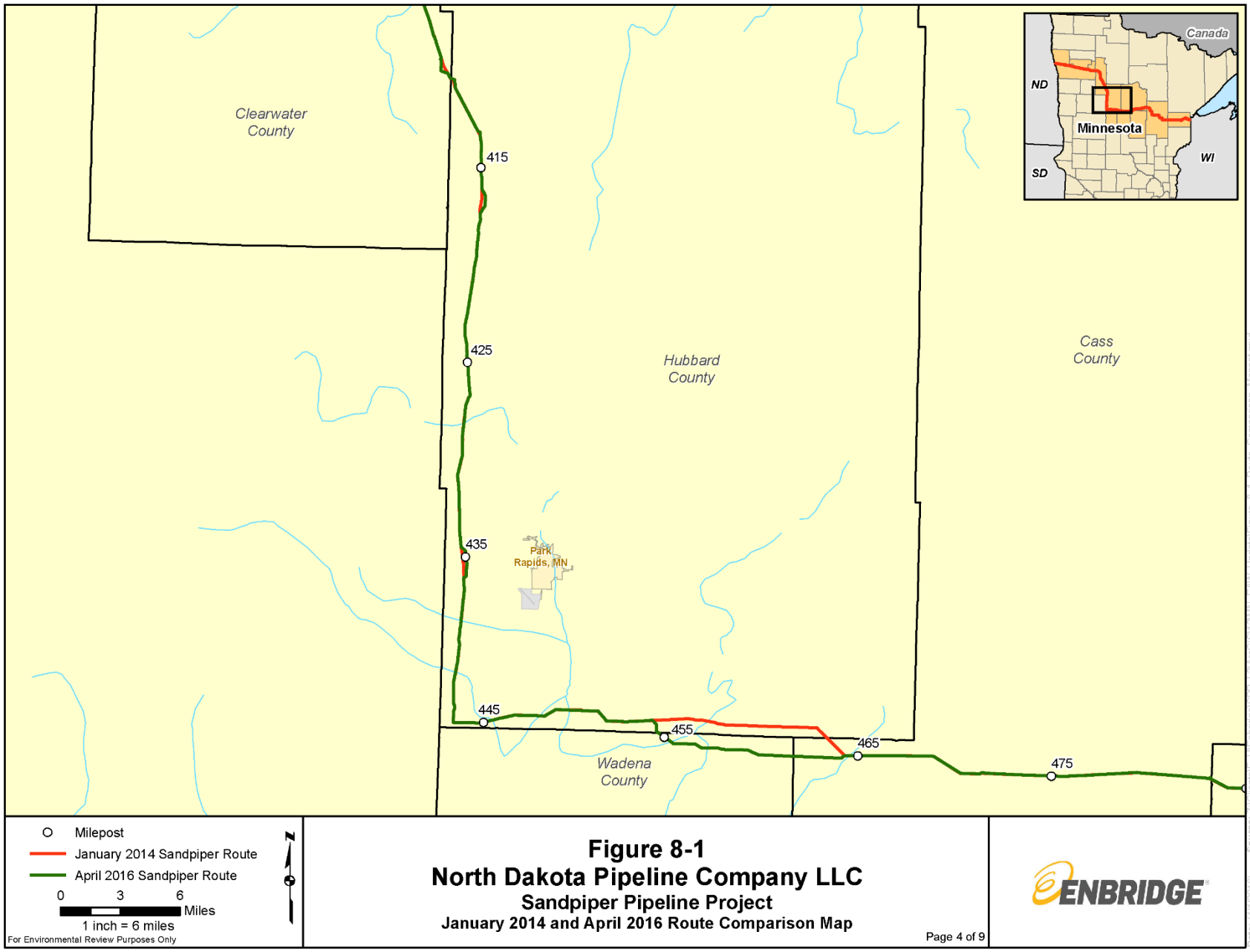
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Milepost
January 2014 Sandpiper Route
April 2016 Sandpiper Route
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Miles
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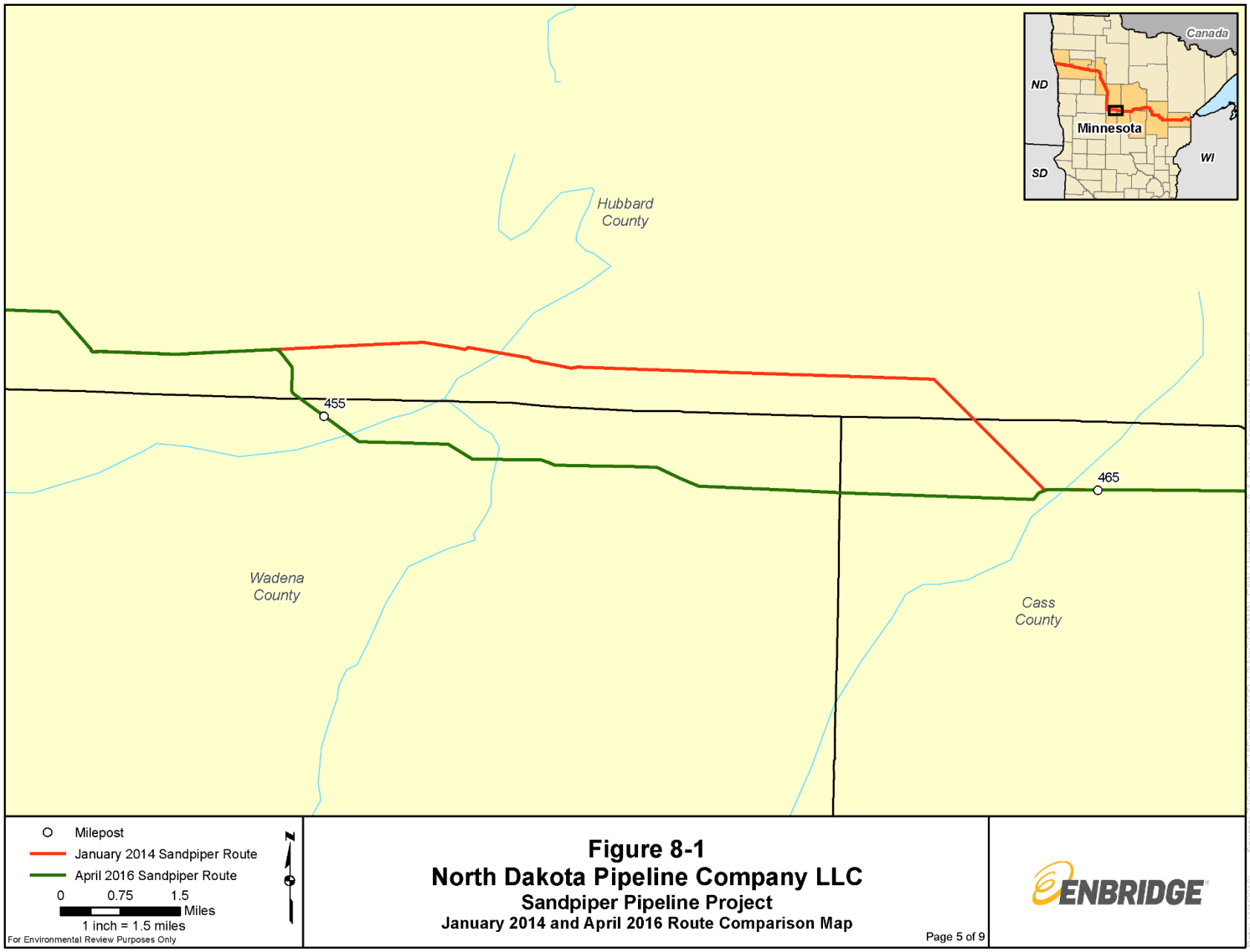
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Miles
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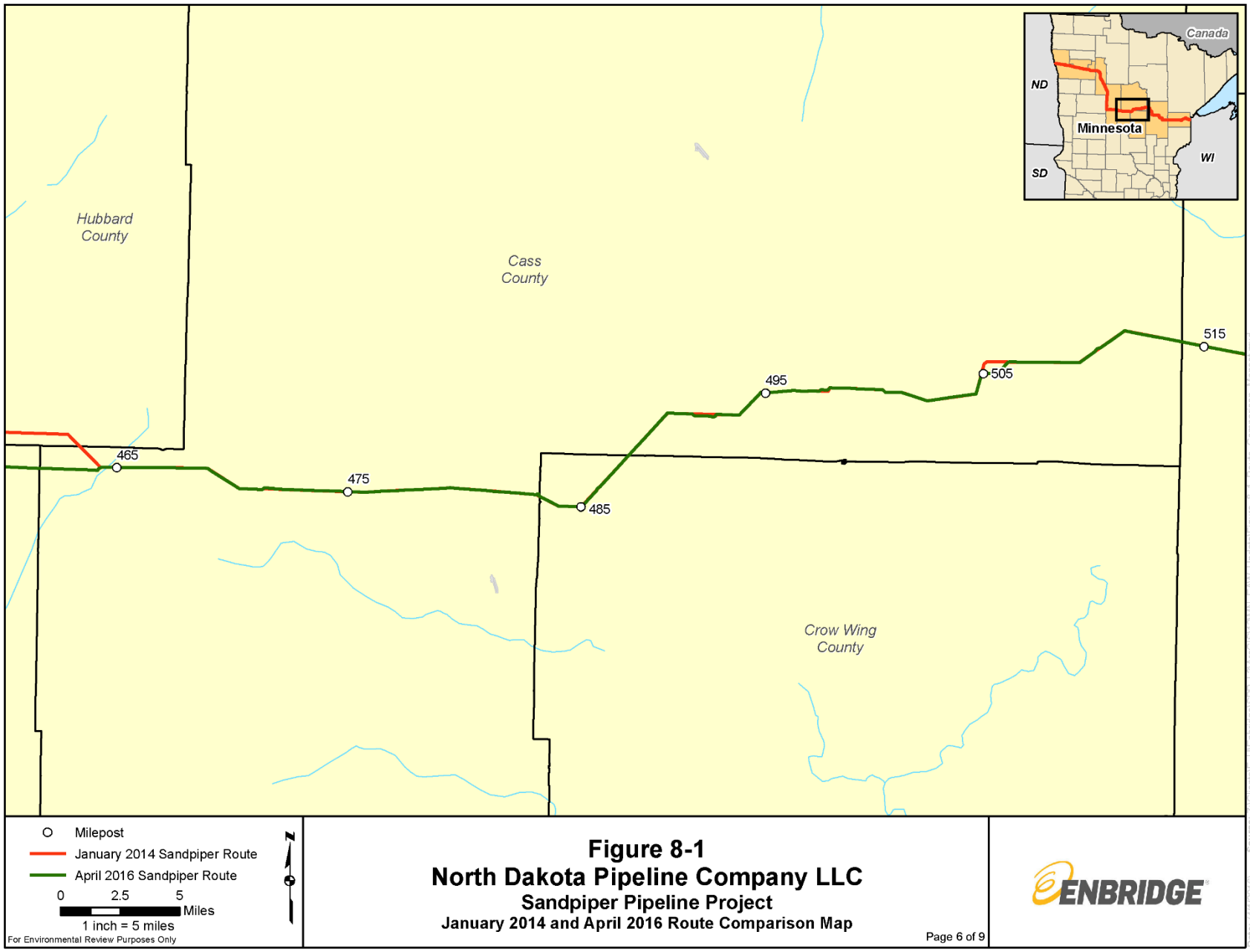
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April 2016 Sandpiper Route
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Miles
1 inch = 5 miles
For Environmental Review Purposes Only
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Figure 8-1
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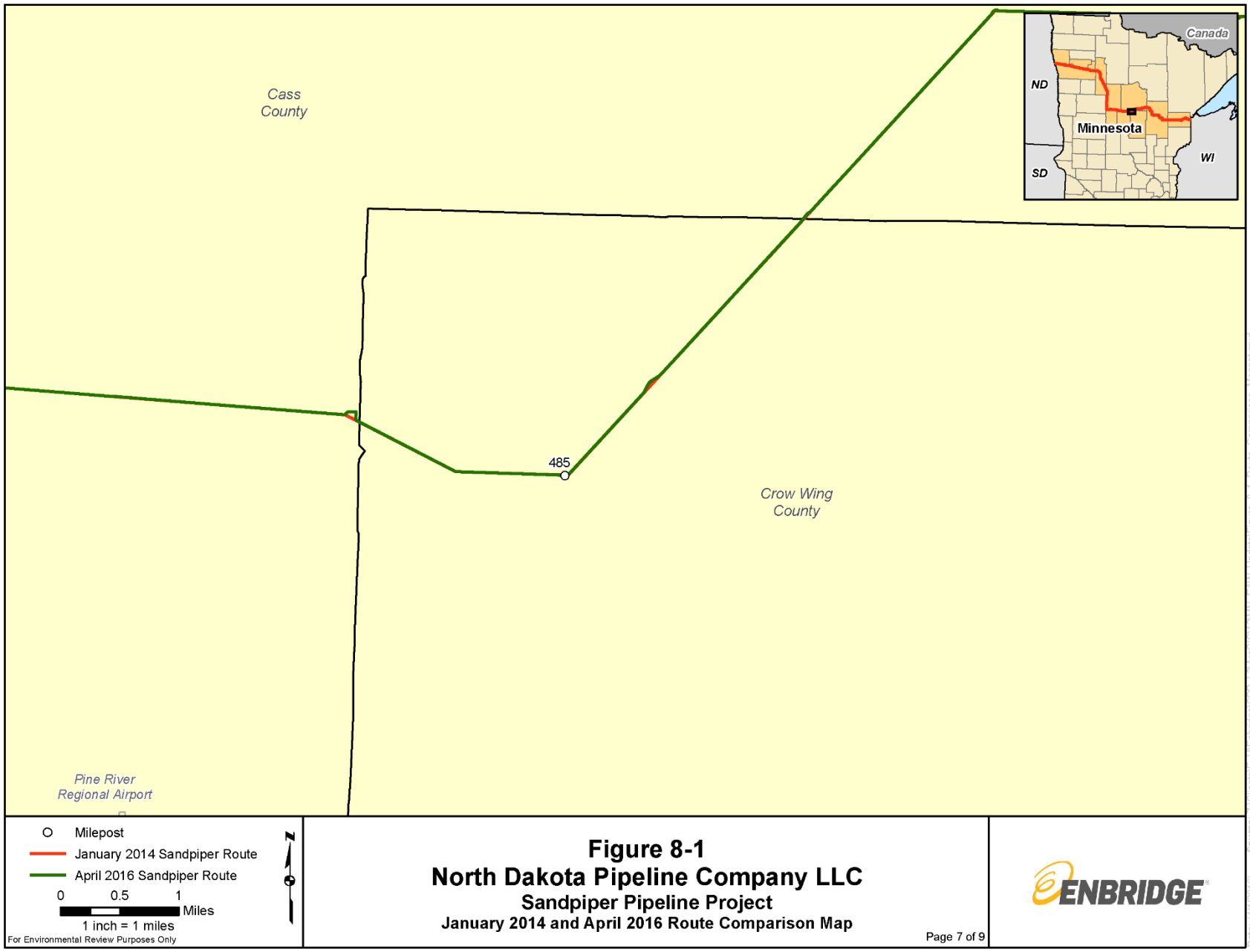
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Pine River
Regional Airport
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January 2014 Sandpiper Route
April 2016 Sandpiper Route
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Miles
1 inch = 1 miles
For Environmental Review Purposes Only
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Figure 8-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
January 2014 and April 2016 Route Comparison Map
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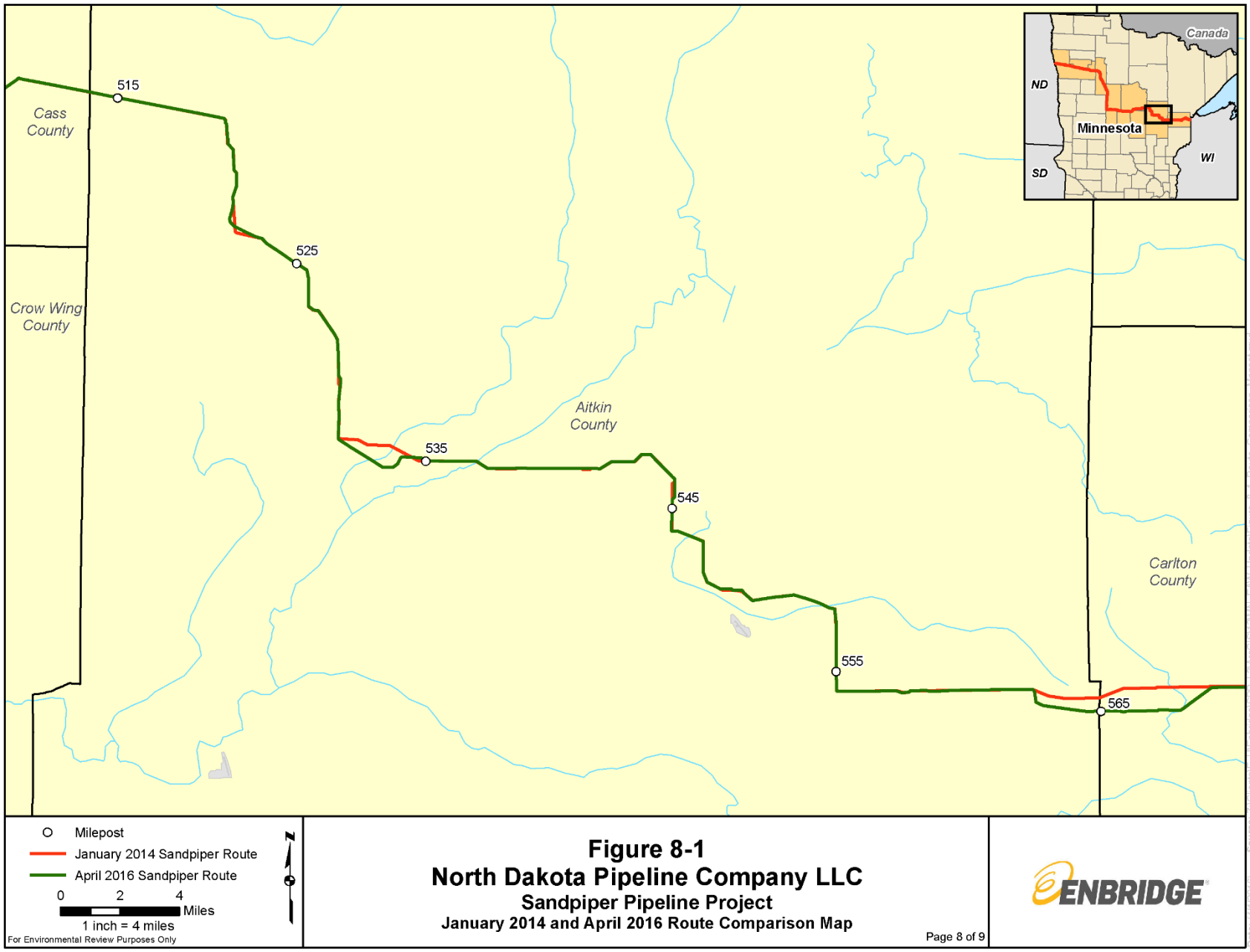
ENBRIDGE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Cass County
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Carlton County
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Milepost
January 2014 Sandpiper Route
April 2016 Sandpiper Route
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Miles
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Figure 8-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
January 2014 and April 2016 Route Comparison Map
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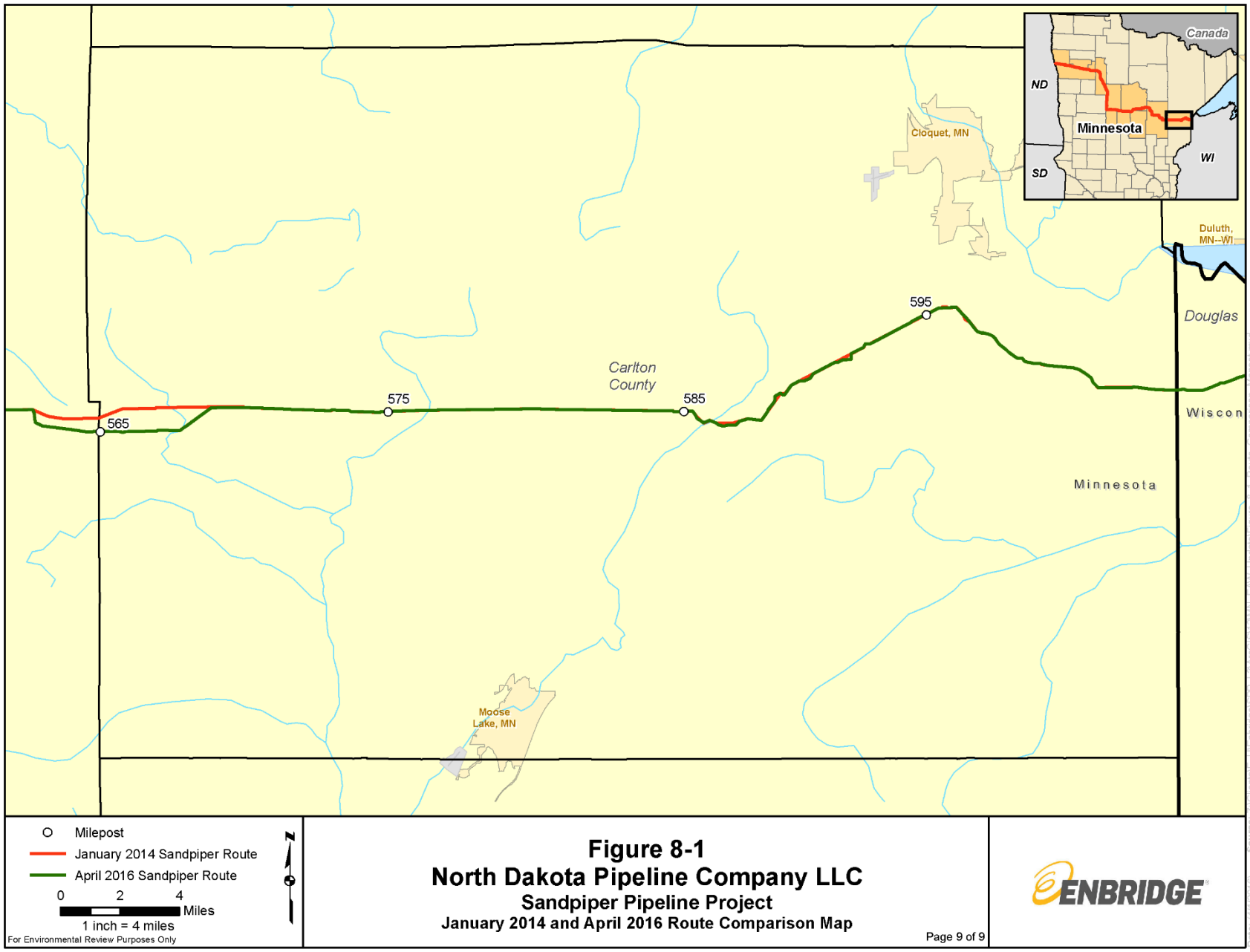
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Minnesota
Moose Lake, MN
Milepost
January 2014 Sandpiper Route
April 2016 Sandpiper Route
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Miles
1 inch = 4 miles
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N
Figure 8-1
North Dakota Pipeline Company LLC
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ENBRIDGE

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19.

9. Land use:

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

EXISTING LAND USE

A description of state and county lands and recreation areas impacted by SPP is provided in the following sections, and was previously provided in Sections 4.0 and 11.0 of NDPC's Supplemental EIR submitted to the MPUC on January 30, 2014.

Pipeline

Table 9-1 presents the state-, private-, and county-owned or managed lands that would be crossed by the proposed SPP route. The route would predominantly cross private lands, with minor crossings of municipal lands (232.1 miles or approximately 77 percent of the route). The route also would cross state lands owned and managed by various state agencies (25.8 miles or 9 percent) and county lands (45.3 miles or 15 percent). County lands include lands that may be owned by the state of Minnesota, but administered by the county (e.g., tax-forfeit lands). The proposed SPP route does not cross any federal or tribal lands in Minnesota.

Table 9-1
Ownership of Lands Crossed by the Sandpiper Pipeline Project – Pipeline [a]

Ownership	Crossing Length (miles)	Percentage of Route
Federal Lands	0.0	0
State Lands	25.8	9
County Lands	45.3	15
Private Lands/Other [b]	232.1	77
Total [c]	**303.2**	**100**

[a] This data was developed primarily from NDPC's landowner tracking database.
[b] Includes municipal lands, roads, and waterbodies not assigned land ownership.
[c] The sum of addends may not total due to rounding.

The proposed SPP route would not cross any national parks, national forests, national landmarks, wilderness areas, wildlife refuges, waterfowl production areas, migratory waterfowl feeding and resting lakes, national WMAs, state parks, state scientific and natural areas ("SNA"), or county parks. However, the SPP route would cross a National Scenic Trail located on county land, a National Scenic Byway, state and county forests, county parks, state WMAs and an aquatic management area ("AMA"), state-designated trails, designated scenic byways, and state-designated water trails as shown in Table 9-2.

Table 9-2 Recreational Areas Crossed by the Sandpiper Pipeline Project and Line 3 Replacement Project – Pipeline				
	SPP		L3R [a]	
Feature	MP Range	Crossing Length (miles)	MP Range	Crossing Length (miles)
FEDERAL INTERESTS				
National Scenic Trails [b]				
North Country Trail	419.5	N/A	952.7	N/A
National Scenic Byways [c]				
The Great River Road (2 crossings)	405.1; 536.8	N/A	938.2; 1069.9	N/A
STATE INTERESTS				
State Forests [d]				
Mississippi Headwaters State Forest	405.7 - 406.3	0.6	938.8 - 939.4	0.6
Huntersville State Forest	455.1 - 460.7	3.2	988.2 - 993.9	3.0
Foot Hills State Forest	469.9 - 472.0	2.1	1003.1 - 1005.2	2.1
Land O' Lakes State Forest	505.9 - 514.1	7.6	1039.0 - 1047.2	7.6
Hill River State Forest	520.2 -524.8 527.1 - 527.4	4.6	1053.3 - 1058.0 1060.2 - 1060.5	4.6
Waukenabo State Forest	527.8 - 528.3 532.2 - 533.1	1.4	1060.9 - 1061.4 1065.3 - 1066.2	1.4
Savanna State Forest	554.3 - 555.0	0.8	1087.4 - 1088.1	0.8
Wildlife Management Areas [d]				
Grayling Marsh WMA	551.3 - 552.4	1.1	1084.5 - 1085.5	1.1
Lawler WMA	559.1 - 559.3	0.2	1092.2 - 1092.5	0.3
Aquatic Management Areas [d]				
La Salle Creek AMA	410.1 - 410.2	<0.1	943.3 - 943.4	<0.1
State Trails [d]				
Paul Bunyan State Trail	475.9	N/A	1009.0	N/A
Hunter Walking Trail	523.0; 523.2	N/A	1056.1; 1056.4	N/A
Willard Munger State Trail	586.1	N/A	1119.3	N/A
State Canoe and Boating Routes / Water Trails [d]				
Red River of the North	301.4	N/A	801.8	N/A
Red Lake River (2 crossings)	307.5 327.1	N/A	864.3	N/A
Pine River	481.5	N/A	1014.6	N/A
Crow Wing River	457.4	N/A	990.6	N/A
Mississippi River (2 crossings)	405.2 536.9	N/A	938.4 1070.0	N/A
State Scenic Byways [c]				
King of Trails Scenic Byway	319.9	N/A	817.0	N/A
Lake Country Scenic Byway (2 crossings)	426.7 435.6	N/A	959.9 968.8	N/A

Table 9-2 Recreational Areas Crossed by the Sandpiper Pipeline Project and Line 3 Replacement Project – Pipeline				
	SPP		L3R [a]	
Feature	MP Range	Crossing Length (miles)	MP Range	Crossing Length (miles)
Veterans Evergreen Memorial Scenic Byway	602.5	N/A	1135.6	N/A

[a] Impacts provided for L3R are for the co-located portion only.

[b] The data was generated by NDPC using publicly available data from the North Country Trail Association (http://northcountrytrail.org/trail/maps/) (2015).

[c] The data was generated by NDPC digitizing the information by description.

[d] The source of this data is the Minnesota Geospatial Commons website. Available at: https://gisdata.mn.gov/ (MNGeo 2016).

Federally Designated Recreational Areas

National Scenic Trails

The SPP route would cross the North Country National Scenic Trail at MP 419.5 in Hubbard County.

National Wild and Scenic Rivers

The SPP route would cross the Red River of the North, Red Lake, Clearwater, Shell, Crow Wing, Moose, and Willow Rivers, which are listed on the National Rivers Inventory ("NRI"). The SPP route would not cross any river segments that are listed on the NRI as designated or potentially designated National Wild and Scenic Rivers. The Mississippi and Kettle Rivers have segments that are designated as Minnesota State Wild and Scenic Rivers; however, the SPP route does not cross either river within these designated segments.

State-Designated Recreational Areas

State Parks and Forest Lands

The SPP pipeline would not cross any state parks, but would cross approximately 20.3 miles of MDNR-administered state forest land (Table 9-2), including MDNR Division of Forestry-administered consolidated conservation and school trust lands.

State Wildlife Management Areas, Aquatic Management Areas, Scientific and Natural Areas, and Recreation Areas

The SPP route would cross the Grayling Marsh WMA from MP 551.3 to 552.4 and Lawler WMA from MP 559.1 to 559.3, both in Aitkin County. The SPP route would cross the La Salle Creek AMA from MP 410.1 to 410.2 and would be located in the vicinity of an existing pipeline ROW at this crossing. The January 2014 EIR discussed SPP's crossing of the Spire Valley AMA; however, the route analyzed in this EAW avoids the boundaries of the Spire Valley AMA. The SPP route would not cross any SNAs or designated State Recreational Areas.

State-Designated Trails

The SPP route would cross two state-designated trails (Table 9-2), including the Paul Bunyan State Trail at MP 475.9 in Cass County and the Willard Munger State Trail at MP 586.1 in Carlton County. The state forest designated Hunter Walking Trail system would be crossed twice by the SPP route at MP 523.0 and MP 523.2 in the Hill River State Forest in Aitkin County.

State-Designated Rivers

The Minnesota State Wild and Scenic Rivers Program was established in 1973 to protect rivers that have outstanding natural, scenic, geographic, historic, cultural, and recreational values. Six rivers in Minnesota, including the Mississippi and Kettle Rivers, have segments that are designated as wild, scenic, or recreational under the state program, and each segment has a management plan that outlines the rules and goals for that waterway. None of the segments of the Mississippi and Kettle Rivers that would be crossed by the SPP route have been designated as a Minnesota State Wild and Scenic River.

State-Designated Canoe and Boating Routes

The SPP route would cross five waterbodies listed as state-designated canoe and boating routes (MNGeo 2016) in seven different locations: the Red River of the North, Red Lake River (twice), Pine River, Crow Wing River, and the Mississippi River (twice). The MDNR manages Minnesota's canoe/boating routes.

Designated Scenic Byways

The SPP route would cross one federal- and state-designated scenic byway in two locations and three state-designated scenic byways in four locations (Table 9-2).

The Great River Road

The Great River Road Scenic Byway in Minnesota has two components: a federally designated 430-mile National Route and a 755-mile state-designated alternate route. Combined, the routes provide 1,185 miles of scenic, historic, and recreational opportunities for travelers. The SPP route would cross the Great River Road at approximate MP 405.1 in Clearwater County and approximate MP 536.8 in Aitkin County.

King of Trails Scenic Byway

The King of Trails Scenic Byway (Minnesota State Highway 75) stretches along 414 miles of Minnesota's western border. Scenery along the byway includes prairies and farmlands. The SPP route would cross Minnesota State Highway 75 at approximate MP 319.9.

Lake Country Scenic Byway

The Lake Country Scenic Byway is approximately 88 miles long and received designation status as a state scenic byway in 1999. A 67-mile stretch follows Minnesota State Highway 34 between Detroit Lakes and Walker and includes a 21-mile spur on US Highway 71 stretching from Park Rapids to Itasca State Park. The SPP route would cross Minnesota State Highway 34 in two locations at approximate MP 426.7 and MP 435.6.

Veterans Evergreen Memorial Scenic Byway

The Veterans Evergreen Memorial Scenic Byway occurs along a 50-mile stretch of State Highway 23 that runs from Banning State Park to New Duluth. The SPP route would cross Minnesota State Highway 23 at approximate MP 602.5.

Associated Facilities

Clearbrook West Terminal and Pine River Facility

The Clearbrook West Terminal and the Pine River Facility would be entirely located on private land and would not impact federal-, state-, or county-owned or administered lands or recreation areas.

Mainline Valves

With one exception, mainline valve sites associated with SPP would be installed on privately owned land and land owned by NDPC. One mainline valve, at MP 406.6 in Clearwater County, would impact approximately 0.1 acre of county-owned land. The mainline valves would not impact federal- or state-owned or administered lands or recreation areas.

Cathodic Protection

A cathodic protection system at MP 456.6 would impact 0.3 acre of the Huntersville State Forest in Wadena County and cathodic protection systems at MP 494.2 and MP 591.4 would impact a combined total of less than 0.1 acre of county-owned land in Cass and Carlton counties, respectively. The remainder of the cathodic protection systems associated with SPP would be installed on privately owned land and land owned by NDPC. The cathodic protection systems would not impact federal- or state-owned or administered lands or recreation areas.

Access Roads

Table 9-3 presents the state-, private-, and county-owned or managed lands that would be crossed by SPP temporary access roads and permanent access roads. Temporary access roads would predominantly cross private lands (49.0 miles or 69 percent of access roads). Temporary access roads also would cross state lands owned and managed by state agencies (6.1 miles or 9 percent) and county lands (16.2 miles or 22 percent). County lands include lands that may be owned by the state of Minnesota, but administered by the county (e.g., tax-forfeit lands).

Permanent access roads would primarily impact private lands, with 0.2 acres of state conservation land crossed in Hubbard County and 0.1 mile of county and county tax-forfeit lands crossed in Cass and Clearwater County. Access roads do not cross any federal lands in Minnesota.

Table 9-3
Ownership of Lands Crossed by the Sandpiper Pipeline Project – Access Roads

Ownership	Crossing Length (miles)	Percentage of Route
Temporary Access Roads		
Federal Lands	0.0	0
State Lands	6.1	9
County Lands	16.2	22
Private Lands/Other [b]	49.0	69
Total [c]	**71.2**	**100**
Permanent Access Roads to Mainline Valve Sites		
Federal Lands	0.0	0

Table 9-3 Ownership of Lands Crossed by the Sandpiper Pipeline Project – Access Roads		
Ownership	Crossing Length (miles)	Percentage of Route
Temporary Access Roads		
State Lands	0.2	7
County Lands	0.1	4
Private Lands/Other [b]	2.5	89
Total [c]	**2.8**	**100**

[a] This data was developed primarily from NDPC's landowner tracking database.

[b] Includes municipal lands, roads, and waterbodies not assigned land ownership.

[c] The sum of addends may not total due to rounding.

Table 9-4 presents the recreational areas that would be impacted by SPP access roads. No access roads would cross any national parks, national forests, national landmarks, wilderness areas, wildlife refuges, waterfowl production areas, migratory waterfowl feeding and resting lakes, national WMAs, state parks, state SNAs, or county parks.

Recreational areas would not be affected by permanent access roads (refer to Table 9-4). One permanent access road to a mainline valve at MP 446.1 (refer to Table 6b-7) would be located on undesignated land in Hubbard County administered by the MDNR Forestry Division; permanent impacts of this road would be less than 0.1 acre.

Table 9-4
Recreational Areas Crossed by the Sandpiper Pipeline Project and Line 3 Replacement Project – Access Roads

	SPP Temporary Access Roads		L3R [a] Temporary Access Roads	
Feature	MP	Crossing Length (miles)	MP	Crossing Length (miles)
STATE INTERESTS				
State Forests [b]				
Mississippi Headwaters State Forest	405.6, 405.8, 406.0, 406.2, 407.4	1.9	938.7, 938.9, 939.2, 939.5, 940.7	1.9
Huntersville State Forest	452.5, 456.4, 457.4, 457.5, 458.0, 458.6, 458.8, 459.7, 461.1	2.5	985.8, 989.6, 990.7, 990.8, 991.3, 991.7, 991.8, 991.9, 992.0, 992.9, 993.0, 994.6	2.5
Badoura State Forest	464	0.1	998.0	0.1
Foot Hills State Forest	469.9, 471.5	0.9	1003.1, 1004.9	0.9
Land O' Lakes State Forest	496.6, 497.2, 501.8, 502.5, 502.9, 503.1 (2 access roads), 507.5, 508.5	1.9	1029.8, 1030.5, 1034.8, 1035.0, 1035.8, 1036.1, 1036.2, 1036.3, 1036.4, 1040.8, 1041.7	1.9
Hill River State Forest	519.3, 519.6, 520.2, 521.6, 522.2, 523.8, 525.7, 525.8, 525.9	1.8	1052.5, 1052.8, 1053.5, 1054.9, 1055.4, 1056.9, 1057.0, 1057.1, 1058.7, 1059.0, 1059.2	1.8
Waukenabo State Forest	532.1 (2 access roads)	0.5	1065.3, 1065.4, 1065.5	0.5
Savanna State Forest	554.1, 554.5	<0.1	1087.4, 1087.7	<0.1
Wildlife Management Areas				
Salo Marsh WMA	562.7 (2 crossings)	0.3	1096.0; 1096.2	0.3

[a] Temporary access roads located east of SPP MP 379.2 (L3R MP 912.3) would be utilized for both SPP and L3R. Temporary access roads located in Polk, Red Lake, and Clearwater Counties west of these MPs would apply to SPP only.

[b] The source of this data is the Minnesota Geospatial Commons website. Available at: https://gisdata.mn.gov/ (MNGeo 2016).

The EIS will further describe potential impacts to the following land use features:

- Federally Designated Recreational Areas
- State Designated Recreational Areas
    - State Parks and Forest Lands
    - State Wildlife Management Areas, Aquatic Management Areas, Scientific and Natural Areas and Recreation Areas
    - State Designated Trails
    - State Designated Rivers
    - Stated Designated Canoe and Boating Routes
- Designated Scenic Byways

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

PLANNED LAND USE

While not required, each county is encouraged to prepare and implement a community-based comprehensive plan. A comprehensive plan typically includes the policies, statements, goals, and interrelated plans for private and public land and water use, transportation, and community facilities, including recommendations for plan execution, documented in texts, ordinances, and maps that constitute the guide for the future development of the county or any portion of the county. These might also include goals and objectives for the preservation of agricultural, forest, wildlife, and open space land, and minimizing development in sensitive shoreland areas (Minn. Stat. 394.231). Because counties are not required to have comprehensive plans, other plans may serve to assist with land management (e.g., Shoreland Ordinance). Additionally, SPP is located within some state and local agency jurisdictions that have adopted land use plans and/or regulations that guide the type, time, and intensity of land use specific to a feature (e.g., state forest).

The SPP route would cross nine counties where comprehensive land use plans have been established; these are Polk, Red Lake, Clearwater, Hubbard, Wadena, Cass, Crow Wing, Aitkin, and Carlton counties. The SPP route would also cross the Wild Rice and Red Lake Watershed Districts. In addition, almost all counties crossed by the project have water management plans which will be consulted and utilized in the evaluation of impacts.

Each of these counties and watershed districts has adopted land-use plans, zoning ordinances, and/or development codes. All counties will be examined for any updated land-use plans, zoning ordinances, and development codes throughout the EIS process. A summary of the land uses crossed by the SPP route and the applicable comprehensive plans, zoning ordinance and/or development codes are discussed in Section 9.a.iii below.

The EAW has preliminarily identified planned land uses, as well as available comprehensive land use plans. Other applicable management plans, as they are discovered, will be considered in the EIS such as for regional land use, water or resources managed by a local, regional, state or federal agency.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

COUNTY ZONING AND LAND USE

While detailed land use data was not immediately available for Polk County, the county is heavily agricultural in character, leading the state of Minnesota in the production of spring wheat, dry beans, and sugar beets[42]. The Polk County Zoning Ordinance was implemented to mitigate flood hazards, promote the orderly development of shoreland and the unincorporated area of the county, as well as the sustainability of the county's livestock industry, and to enhance public health, safety, and general welfare[43].

Red Lake County is 77 percent cultivated, and 10 percent forested; the remainder is largely covered in water and wetlands, with sparse human habitation[44]. The Red Lake County Shoreland Ordinance was implemented to provide for the "wise subdivision, use, and development of shorelands of public waters"[45].

Clearwater County is rural in nature, with the southern portion of the county chiefly covered by forest land, the northern portion mostly covered by agricultural land, and the middle portion featuring a mixture of the two[46]. The Clearwater County Comprehensive Local Water Management Plan was enacted to protect the soil, water, and other natural resources located in Clearwater County[47]. The Clearwater County Shoreland Management Ordinance was implemented to regulate the use and development of shorelands and to provide for the wise use of waters and related land resources[48]. The Clearwater County Resource Management Plan primarily focuses on promoting the orderly management of the county's forests[49].

Hubbard County is also rural in nature; 65 percent is covered by forest, 19 percent by water and wetlands, and 14 percent by agricultural land, with a modest amount of developed, urban land[50]. The county has promulgated the Hubbard County Shoreland Ordinance No. 17[51] and the Hubbard County Local Water Management Plan[52] to promote the orderly development of its water resources.

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[42] Polk County Minnesota (last visited January 18, 2016), http://www.co.polk.mn.us/.

[43] Polk County Zoning Ordinance §§ 1.2000-.3000 (March 2014), http://www.co.polk.mn.us/vertical/sites/%7B4649BB22-31C0-4F09-8D7C-B36D1E78E519%7D/uploads/2014_Complete_Zoning_Ordinance.pdf.

[44] Red Lake Priority Concerns Scoping Document (2008), http://redlakecountyswcd.org/uploads/3/5/3/4/3534080/rlc_priority_scoping-website.pdf.

[45] Red Lake County Shoreland Ordinance (2010), http://www.co.red-lake.mn.us/vertical/sites/%7B2C807525-C262-4592-9BD4-DF75FE4B01C9%7D/uploads/Red_Lake_County_Shoreland_Ordinance.pdf.

[46] Clearwater County Comprehensive Local Water Management Plan 3-4 (2010), http://www.clearwaterswcd.org/2010.final.plan.official.pdf.

[47] *Id.*

[48] Clearwater County Shoreland Management Ordinance 5 (2010), http://www.co.clearwater.mn.us/vertical/Sites/%7BD1BE6F66-A19E-4CC1-ADD8-8DF38E31F1E3%7D/uploads/shore_ord_2010.pdf.

[49] See Clearwater County Resource Management Plan 2-3 (July 2008), http://www.co.clearwater.mn.us/vertical/sites/%7BD1BE6F66-A19E-4CC1-ADD8-8DF38E31F1E3%7D/uploads/Resource_Management_Plan.pdf.

[50] See Hubbard County Local Water Management Plan 6 (January 24, 2007), http://www.co.hubbard.mn.us/Environmental/Forms/HubbardCountyLWP.pdf.

[51] Hubbard County Shoreland Management Ordinance No. 17 (February 25, 2015), http://www.co.hubbard.mn.us/Ordinances/Ord%2017%20amendment%2017%2002252015.pdf.

[52] Hubbard County Local Water Management Plan (January 24, 2007), http://www.co.hubbard.mn.us/Environmental/Forms/HubbardCountyLWP.pdf.

Wadena County is also rural in character, with 42 percent covered by agricultural land, 30 percent of its area covered by wetlands, and most of the rest of the land covered by forests and sparse human habitation[53]. The Wadena County Comprehensive Plan was designed "to serve as a guide for the future development of, and use of land in, Wadena County"[54]. The Wadena County Zoning Ordinance was implemented to ensure that county zoning decisions were made in conformity with the Wadena County Comprehensive Plan, and to facilitate the orderly development of land in Wadena County[55].

Much of Cass County is covered in forest, water, and wetlands[56]. The Cass County Comprehensive Plan was implemented to guide the county in making decisions related to land use[57]. The Cass County Land Use Ordinance was designed to preserve the county's natural resources and to promote orderly development in the county[58]. The Cass County Comprehensive Local Water Management Plan is a five-year strategic plan designed to achieve county water resource and management goals[59].

Crow Wing County is rural in character, with approximately 50 percent of the county covered by forests, and 28 percent covered by lakes, streams, and wetlands. Urban development is primarily clustered in the Brainerd/Baxter area[60]. The Crow Wing County Comprehensive Plan was created to promote sustainable development, environmental conservation, and economic growth[61]. Similarly, the Crow Wing County Land Use Ordinance was implemented to protect the county's natural resources and promote orderly development in the county[62]. The county has also promulgated the Unorganized Territory Comprehensive Plan, which regulates development in two parcels under the direct jurisdiction of the Crow Wing County Board[63].

Forty percent of Aitkin County is covered in wetlands or water, and an additional forty percent consists of forest[64]. The remaining land is chiefly used for agricultural or pastoral purposes, with less than one percent of land classified as urban or industrial[65]. The Aitkin County Comprehensive Land Use Management Plan seeks to encourage forestry, agriculture, residential density, economic growth, responsible resource management, and recreation[66]. Aitkin's Zoning Ordinance establishes zoning districts "with a view to encouraging the most appropriate use of land in the county"[67]. Aitkin's Shoreland Ordinance is designed to balance development of shorelands with protection of the county's natural resources[68]. Aitkin County

[53] Wadena County Comprehensive Plan 50-51 (2013), http://www.co.wadena.mn.us/DocumentCenter/View/233.
[54] *Id.* at 2.
[55] Wadena County Zoning Ordinance #1 at 1 (amended August 5, 2014), http://www.co.wadena.mn.us/DocumentCenter/View/235.
[56] See Cass County Comprehensive Plan 33 (2007), http://www.co.cass.mn.us/document_center/esd/Comprehensive_Plan_Update.pdf.
[57] See *id*. at 3.
[58] Cass County Land Use Ordinance § 201 (amended September 5, 2005), http://www.co.cass.mn.us/document_center/ordinances/200501_landuse.pdf.
[59] See Cass County Local Water Management Plan 3-4 (January 2009), http://www.co.cass.mn.us/document_center/esd/Cass_County_Comprehensive_Local_Water_Management_Plan_2009_2014.pdf.
[60] See Crow Wing County Comprehensive Plan 10 (2002), http://crowwing.us/DocumentCenter/Home/View/1285.
[61] See *id.* at 5.
[62] See Crow Wing County Land Use Ordinance §1.2 (April 22, 2011), http://crowwing.us/DocumentCenter/View/5397.
[63] Unorganized Territory, Crow Wing County Comprehensive Plan § 2 (June 1997), http://crowwing.us/DocumentCenter/View/1295.
[64] See Aitkin County Comprehensive Land Use Management Plan 48 (April 2000), https://www.co.aitkin.mn.us/departments/enviro-svcs/compUsePlanData/comprehensive-land-use-plan.pdf.
[65] See *id.*
[66] See *id.* at 2-9.
[67] See Aitkin County Zoning Ordinance §1 (amended April 9, 2013), https://www.co.aitkin.mn.us/ordinances/GenZoningOrd_2013.pdf.
[68] See Aitkin County Shoreland Ordinance §1.2 (May 8, 2012), https://www.co.aitkin.mn.us/ordinances/shoreland2012amended.pdf.

also established a Floodplain Management Ordinance to promote public health, safety, and general welfare and to minimize flood losses[69].

While Carlton County does have some urban and suburban development, primarily along the Interstate-35 corridor, the county remains primarily rural in character with approximately 64 percent of Carlton County covered in forest[70]. The Carlton County Community-Based Comprehensive Plan is designed to serve as a guide for development and redevelopment in the county, and emphasizes the county's goal of promoting sustainable economic development while preserving the quality of the county's natural resources[71]. The Carlton County Zoning Ordinance was implemented "to promote the public health, safety, morals and general welfare" through the orderly development of land in a manner consistent with the county's Community-Based Comprehensive Plan[72].

WATERSHED DISTRICTS

The Red Lake Watershed District Rules are designed to keep Watershed District managers apprised of planned projects so they can advise developers and "ensure that land disturbing activity and development occurs in an orderly manner and in accordance with the overall plan for the district"[73]. The Wild Rice Watershed District Rules were implemented "to promote the use of the waters and related resources within the District in a provident an orderly manner so as to improve general welfare and public health for the benefit of its present and future residents"[74].

OTHER USES

A variety of conservation easements are present in Minnesota, residing with various state and federal agencies such as the Minnesota Board of Water and Soil Resources, MDNR, and United States Fish and Wildlife Service ("USFWS"). Easements can also reside with non-profit conservation groups such as Minnesota Land Trust and The Nature Conservancy ("TNC"). Additionally, easements that protect wetland mitigation sites are found throughout the state.

The SPP construction workspace would cross 45 parcels on privately owned and state- and county-managed lands that are associated with conservation easements (see Table 9-5). An additional 10 parcels are located outside of the construction workspace but within the 750-foot-wide requested route width. The 750-foot-wide route width would encompass the SPP construction workspace (including ATWS), Clearbrook West Terminal, Pine River Facility, mainline valves, and cathodic protection systems. Temporary access roads outside of the 750-foot-wide requested route width may cross lands with conservation easements; however, impacts cannot be determined at this time as the extent of improvement on these roads is not currently known. The Applicant will coordinate closely with management entities of the conservation easements to ensure that pipeline-associated activities are permissible in these

[69] See Aitkin County Floodplain Ordinance §1.3 (amended June 6, 2001), https://www.co.aitkin.mn.us/ordinances/floodplain99.pdf.
[70] See Carlton County Community-Based Comprehensive Plan 103 (April 2001), http://www.co.carlton.mn.us/vertical/Sites/%7B315ADE76-21A3-4241-B977-F94AEE8A7F04%7D/uploads/Community_Based_Comprehensive_Plan.pdf.
[71] *Id.* at 1-8.
[72] Carlton County Zoning Ordinance #27 §3 (March 1, 2005), http://www.co.carlton.mn.us/vertical/Sites/%7B315ADE76-21A3-4241-B977-F94AEE8A7F04%7D/uploads/Zoning_Ordinance_27_(051215).pdf.
[73] Red Lake Watershed District Rules §1, http://www.redlakewatershed.org/PDF_Files/RED%20LAKE%20WATERSHED%20DISTRICT%20RULES_Adopted%208-27-15.pdf.
[74] Wild Rice Watershed District Rules §1, http://storm1.afixia.com/~wildrice/files/2013/7995/3362/rules.pdf.

areas. Alternative workspaces could potentially be identified if such activities are determined to be prohibited.

a. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The EIS will further describe the Project's compatibility with existing land use, zoning and plans.

b. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

The EIS will further analyze measures to be incorporated into the proposed project to mitigate any potential incompatibility.

Table 9-5
Conservation Easements within the Sandpiper Pipeline Project Construction Workspace and Requested Route Width

Within the SPP Construction Workspace		Within the SPP 750-foot-wide-Requested Route Width	
County/Pin	Easement Type	County/Pin	Easement Type
Aitkin			
50-0-007000	Forest Incentive Program	39-0-055000	Sustainable Forest
50-0-007100	Forest Incentive Program	39-0-058000	Conservation Easement
35-0-038400	Sustainable Forest		
35-0-038500	Sustainable Forest		
35-0-039700	Sustainable Forest		
35-0-039800	Sustainable Forest		
35-0-039801	Sustainable Forest		
19-0-044400	Sustainable Forest		
39-0-049000	Sustainable Forest		
22-0-028800	Overflow Easement		
30-0-004000	Sustainable Forest		
27-0-002500	Flowage Easement		
27-0-003000	Flowage Easement		
27-0-000900	Flowage Easement		
Cass			
25-006-4401	Sustainable Forest	12-018-3400	Other
25-005-3300	Sustainable Forest		
25-005-3400	Sustainable Forest		
25-005-4201	Sustainable Forest		
12-019-2100	Other		
12-019-1100	Other		
Clearwater			
16-020-0120	Other	03-016-0300	Other
03-021-0300	Forest Incentive Act		

Table 9-5 Conservation Easements within the Sandpiper Pipeline Project Construction Workspace and Requested Route Width			
Within the SPP Construction Workspace		Within the SPP 750-foot-wide-Requested Route Width	
County/Pin	Easement Type	County/Pin	Easement Type
15-002-0300	Other		
15-002-0450	Forest Incentive Act		
15-002-0400	Forest Incentive Act		
15-013-0300	Forest Incentive Act		
10-024-0200	Sustainable Forest		
Carlton			
69-020-3200	Sustainable Forest	81-060-5290	Other
36-010-0220	Other		
36-010-0210	Other		
72-010-0800	Sustainable Forest Incentive		
60-026-0940	Sustainable Forest Incentive		
60-026-0930	Sustainable Forest Incentive		
60-026-0750	Replacement Wetlands		
60-016-0180	Sustainable Forest Incentive		
60-026-0653	Other		
Hubbard			
18-19-02081	Other	25-05-00900	Other
25-06-00100	Riparian Easement	06-31-00160	Forest Incentive Act
25-07-01100	Forest Incentive Act	06-31-00150	Forest Incentive Act
		06-36-08000	Other
Polk			
03-00058-01	Other	38-00076-00	Easement for Waterfowl Mgmt. Rights
03-00056-00	Other		
Wadena			
04-006-2010	Ingress/Egress		
04-005-2010	Ingress/Egress		
04-004-3010	Ingress/Egress		
04-004-1030	Ingress/Egress		

No federal or state Wild and Scenic Rivers are crossed by the SPP route. Table 9-6 identifies the 100-year floodplains that would be crossed by the SPP and L3R routes where co-located.

Table 9-6 100-Year Floodplains Crossed by the Sandpiper Pipeline Project and Line 3 Replacement Project [a]				
County [b]	SPP MP Range	Crossing Length (in miles)	L3R MP Range	Crossing Length (in miles)
Polk	301.4 - 304.1	2.7	--	--
	307.5 - 309.9	2.4	--	--
	326.3 - 326.4	0.0	--	--

Table 9-6
100-Year Floodplains Crossed by the Sandpiper Pipeline Project and Line 3 Replacement Project [a]

County [b]	SPP MP Range	Crossing Length (in miles)	L3R MP Range	Crossing Length (in miles)
	326.6 - 326.7	0.1	--	--
	326.9 - 327.1	0.2	--	--
	348.3 - 348.3	0.1	--	--
	358.6 - 358.7	0.1	--	--
Wadena	455.3 - 455.4	0.1	988.5 - 988.6	0.1
	457.4 - 457.5	0.1	990.6 - 990.7	0.1
Aitkin	523.6 - 523.7	0.1	1056.6 - 1056.6	0.0
	523.8 - 524.2	0.4	1056.7 - 1056.8	0.2
	530.3 - 530.4	0.1	1057.0 - 1057.2	0.3
	530.8 - 531.5	0.7	1063.4 - 1063.5	0.1
	532.4 - 532.5	0.1	1063.9 - 1064.6	0.7
	532.6 - 533.0	0.4	1065.6 - 1065.6	0.1
	533.1 - 533.2	0.1	1065.7 - 1066.1	0.4
	535.9 - 536.1	0.1	1066.3 - 1066.3	0.1
	536.5 - 536.5	0.0	1069.0 - 1069.2	0.1
	536.6 - 536.7	0.2	1069.6 - 1069.6	0.0
	536.9 - 536.9	0.1	1069.7 - 1069.8	0.2
	545.5 - 546.3	0.7	1070.0 - 1070.0	0.1
	546.3 - 546.4	0.1	1078.6 - 1079.4	0.7
	548.1 - 548.2	0.1	1079.4 - 1079.5	0.1
	549.5 - 549.7	0.1	1081.2 - 1081.4	0.1
	549.7 - 551.3	1.7	1082.7 - 1084.5	1.8
	552.6 - 553.1	0.5	1085.7 - 1086.2	0.5
Total		11.2		5.7

[a] Impacts provided for L3R are for the co-located portion only.
[b] Floodplain data is not available for Clearwater, Hubbard, Cass, Crow Wing, and Carlton counties.
Source: Federal Emergency Management Agency data available on the Minnesota Geospatial Commons website. Available at: https://gisdata.mn.gov/ (MnGeo 2016).

10. Geology, soils and topography/land forms:

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

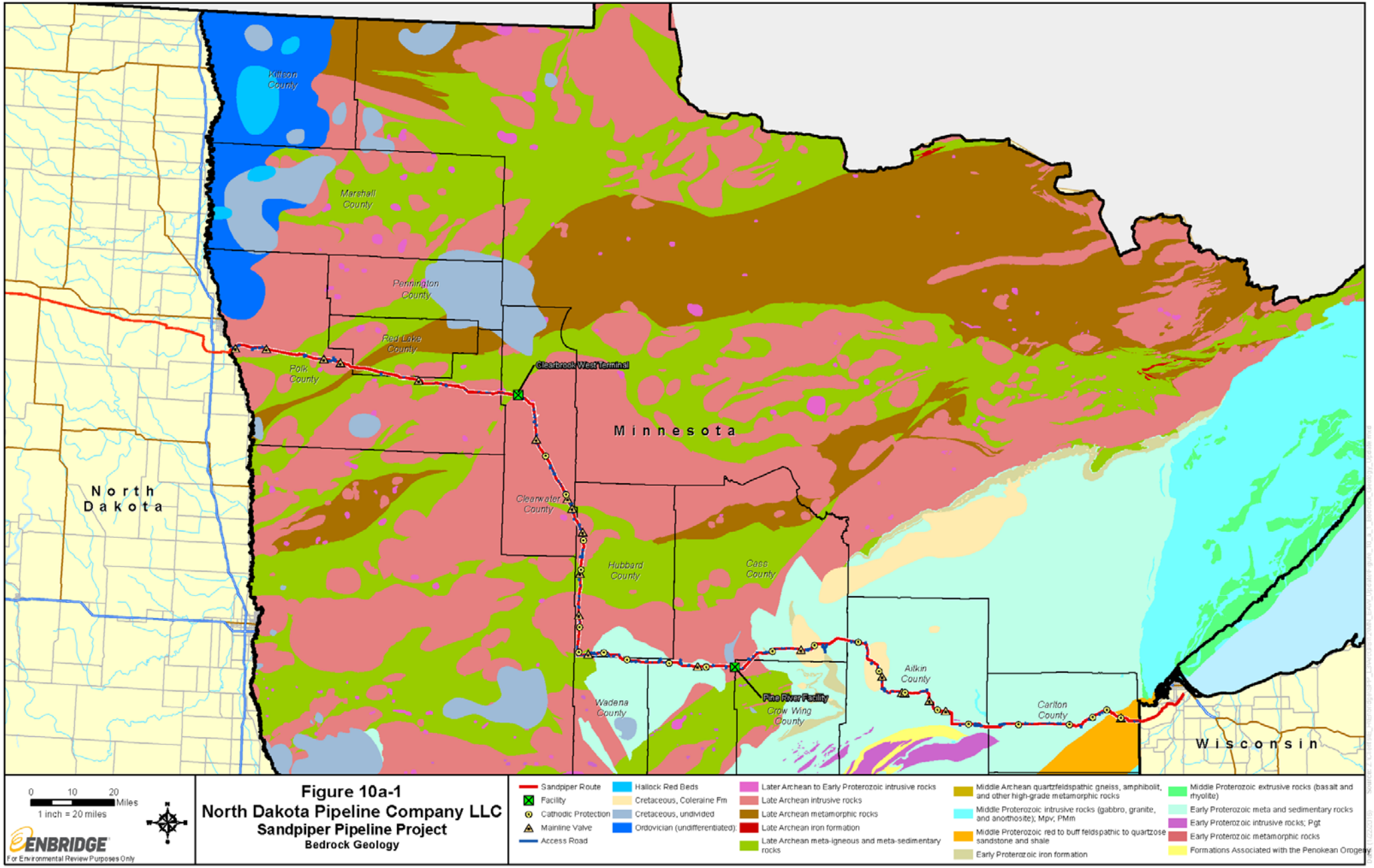
A description of geologic features impacted by SPP is provided in the following sections and was previously provided in Section 5.0 of NDPC's Supplemental EIR submitted to the MPUC on January 30, 2014.

BEDROCK AND SURFACE GEOLOGY

SPP primarily traverses the Interior Plain Physiographic Province, crossing into the Laurentian Upland Province – Superior Upland in the eastern portion of the SPP environmental survey area in Minnesota (USGS 2004). The geologic terrain of both of these provinces is characterized by ancient pre-Cambrian igneous and metamorphic rocks that have been uplifted and eroded to a relatively low-relief plain, forming the stable geologic core of the North American continent known as the craton. The North American craton has been tectonically stable for more than 500 million years. The Superior Upland is a southern extension of the Laurentian Upland Province. The basement rocks of this province are associated with the 2.5 billion-year-old Kenoran Orogeny, a mountain-building event, and are part of the Canadian Shield. Basement rocks of the Interior Plains Physiographic Province were generally formed from the tectonic collision of smaller continental plates over one billion years ago that resulted in continental accretion and expansion of the North American craton.

The bedrock geology underlying SPP is illustrated in Figure 10a-1 (Jirsa et al. 2011). Very limited occurrences of Paleozoic and Mesozoic sedimentary bedrock units lie randomly over the pre-Cambrian basement rocks across northern Minnesota. Ordovician sedimentary bedrock occurs in the northwestern portion of Polk County but lies to the north of SPP. However, two relatively short segments (less than 20 miles) of the SPP route cross Cretaceous sedimentary bedrock in both Aitkin and Cass counties. These sediments were deposited 65 to 136 million years ago and consist of sandstone lenses near the base of predominantly gray, soft, argillaceous shale (solidified mud and clay) sections.

Regional maps of depth-to-bedrock coverage generally lack sufficient resolution to identify areas where bedrock occurs at specific depths. Accordingly, the depth to bedrock in a specific location is difficult to determine. Generally, depth to bedrock in the SPP environmental survey area exceeds 30 feet and can exceed 450 feet. The only area with shallow or exposed bedrock is within a 20-mile segment of the SPP route in Carlton County, and the bedrock geology is dominated by graywackes, slates, and metasediments.


Kittson County
Marshall County
Pennington County
Red Lake County
Polk County
Clearbrook West Terminal
Minnesota
North Dakota
Clearwater County
Hubbard County
Cass County
Wadena County
Crow Wing County
Pine River Facility
Aitkin County
Carlton County
Wisconsin
0 10 20 Miles
1 inch = 20 miles
ENBRIDGE
For Environmental Review Purposes Only
Figure 10a-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
Bedrock Geology
Sandpiper Route
Facility
Cathodic Protection
Mainline Valve
Access Road
Hallock Red Beds
Cretaceous, Coleraine Fm
Cretaceous, undivided
Ordovician (undifferentiated)
Later Archean to Early Proterozoic intrusive rocks
Late Archean intrusive rocks
Late Archean metamorphic rocks
Late Archean iron formation
Late Archean meta-igneous and meta-sedimentary rocks
Middle Archean quartzfeldspathic gneiss, amphibolit, and other high-grade metamorphic rocks
Middle Proterozoic intrusive rocks (gabbro, granite, and anorthosite); Mpv; PMm
Middle Proterozoic red to buff feldspathic to quartzose sandstone and shale
Early Proterozoic iron formation
Middle Proterozoic extrusive rocks (basalt and rhyolite)
Early Proterozoic meta and sedimentary rocks
Early Proterozoic intrusive rocks; Pgt
Early Proterozoic metamorphic rocks
Formations Associated with the Penokean Orogeny

Surficial geology in the SPP environmental survey area is characterized by unconsolidated deposits from Pleistocene continental glaciation. These sediments were deposited primarily during four major episodes of glaciation. The sediments are comprised of both ground and end moraine, outwash deposits, ice-contact stratified drift (e.g., kames and eskers), and lacustrine sediments, including lake bottom and beach ridge deposits. Soils consist of deposits of clay, silt, sand, and gravel. Soil types are often mixed though some areas have stratified deposits. Additionally, there are more recent deposits of alluvium in river channels and peat in the pothole depressions that are characteristic of the interrupted drainage of glaciated terrain. These recent alluvial deposits overlie glacial sediments in the SPP environmental survey area. Figure 10a-2 is a simplified map of the surficial geology in relation to SPP (Hobbs and Goebel 1982).

Topography across the SPP environmental survey area varies widely given the variable nature of glacial deposition. The interrupted drainage of glacial terrain can be of low relief and include wetlands, lakes, and gently rolling to undulating hills and ridges, as well as hummocky areas of high relief with steep hills and ridges associated with glacial end moraine deposits. Additionally, glacial erosion can remove unconsolidated deposits and scour bedrock, and glacial meltwater can incise significant valleys into bedrock. Elevations in the SPP environmental survey area range from approximately 909 to 1,679 feet above mean sea level (Table 10a-1).

Table 10a-1
Elevation within the Sandpiper Pipeline Project and Line 3 Replacement Project Environmental Survey Areas [a]

County	Elevation Above Mean Sea Level (feet)		
	Lowest	Average	Highest
Polk	1,150	1,214	1,338
Red Lake	1,104	1,135	1,155
Clearwater	1,267	1,415	1,618
Hubbard	1,363	1,472	1,679
Wadena	1,360	1,389	1,401
Cass	1,274	1,385	1,518
Crow Wing	1,335	1,374	1,417
Aitkin	1,203	1,263	1,375
Carlton	909	1,197	1,321

[a] Elevation provided for L3R is for the co-located portion only.

The area crossed by SPP has been tectonically stable for over 500 million years. Therefore, there is a low probability of an earthquake of significant intensity or other seismic event (National Atlas of the United States 2014).

SPP does not cross portions of Minnesota with limestone formations, karst topography, or sinkholes, so no special design or mitigation measures are necessary to address these conditions.

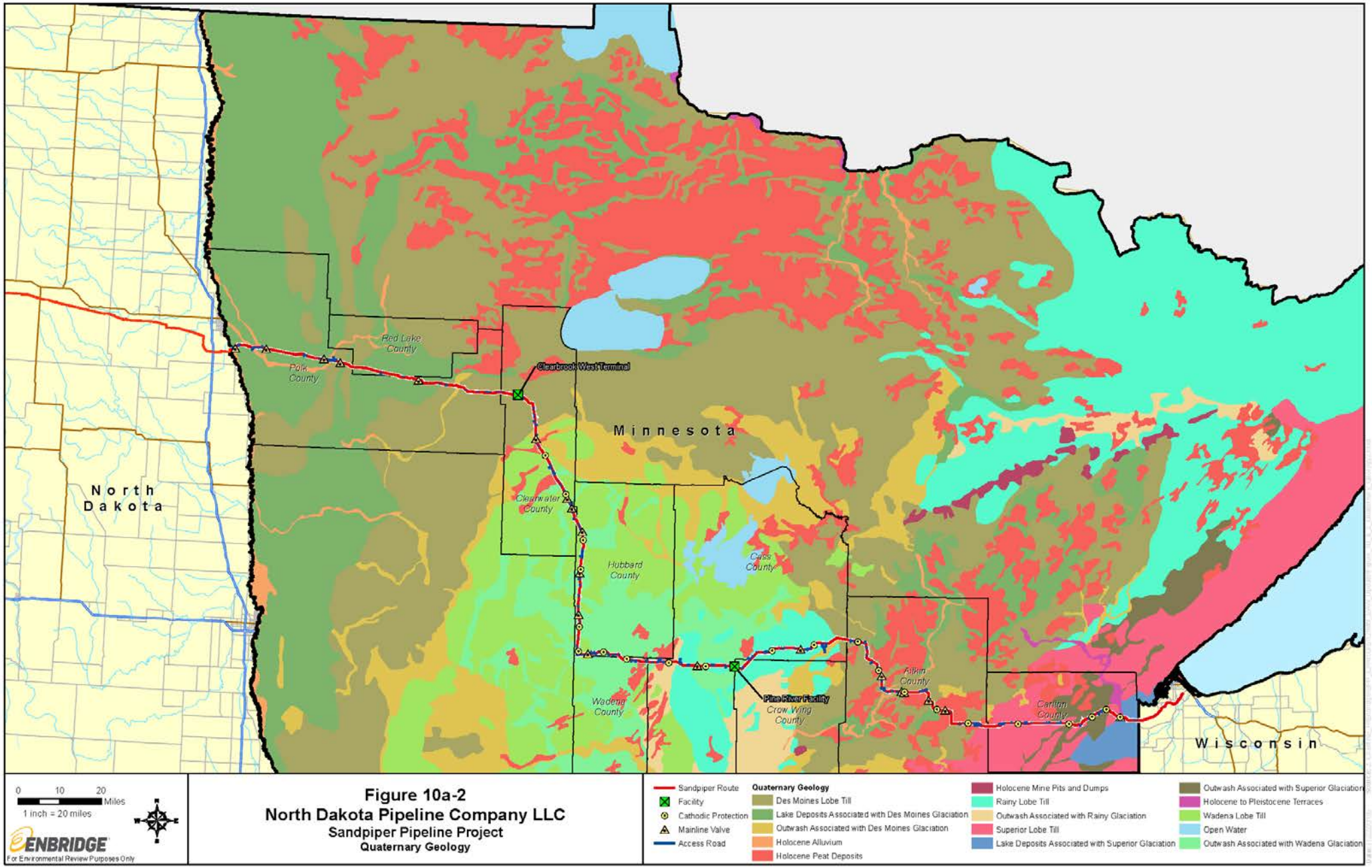

North Dakota
Minnesota
Wisconsin
Red Lake County
Polk County
Clearbrook West Terminal
Clearwater County
Hubbard County
Cass County
Wadena County
Pine River Facility
Crow Wing County
Aitkin County
Carlton County
0 10 20 Miles
1 inch = 20 miles
ENBRIDGE
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Figure 10a-2
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
Quaternary Geology
Sandpiper Route
Facility
Cathodic Protection
Mainline Valve
Access Road
Quaternary Geology
Des Moines Lobe Till
Lake Deposits Associated with Des Moines Glaciation
Outwash Associated with Des Moines Glaciation
Holocene Alluvium
Holocene Peat Deposits
Holocene Mine Pits and Dumps
Rainy Lobe Till
Outwash Associated with Rainy Glaciation
Superior Lobe Till
Lake Deposits Associated with Superior Glaciation
Outwash Associated with Superior Glaciation
Holocene to Pleistocene Terraces
Wadena Lobe Till
Open Water
Outwash Associated with Wadena Glaciation

MINERAL RESOURCES AND MINERAL RESOURCE POTENTIAL

Mineral resources in Minnesota include industrial (e.g., sand, gravel, peat, and crushed stone) and metallic (e.g., iron ore, copper, nickel, and titanium) minerals. USGS topographic maps, recent aerial photography, and MDNR spatial data was reviewed for mineral leases on state lands (as of January 2016) to identify surface features associated with mining or mineral resources.

Pipeline

Table 10a-2 identifies possible mining and mineral resource areas crossed by and within 1,500 feet of the SPP centerline.

Table 10a-2
Mineral Resources within 1,500 Feet of the Sandpiper Pipeline Project and Line 3 Replacement Project – Pipeline

County	SPP MP	L3R MP [a]	Operation	Distance from SPP Centerline (feet)	Distance from L3R Centerline (feet) [a]	Source
Polk	330.5	N/A	Gravel Pit	1,474	N/A	Aerial Photos & Topo Maps
Red Lake	333.4	N/A	Gravel Pit	1,314	N/A	Aerial Photos & Topo Maps
Clearwater	377.0	907.8	Gravel Pit	980	584	Topo Maps
	337.0	907.8	Gravel Pit	1,346	889	Aerial Photos & Topo Maps
	385.4	918.5	Gravel Pit	1,018	993	Aerial Photos & Topo Maps
	387.8	921.0	Gravel Pit	1,222	1,199	Aerial Photos & Topo Maps
Hubbard	413.5	946.7	Gravel Pit	689	664	Aerial Photos
Cass	482.1	1015.3	Gravel Pit	628	603	Aerial Photos & Topo Maps
	500.0	1033.1	Gravel Pit	212	237	Aerial Photos & Topo Maps
	503.1	1036.2	Gravel Pit	1,462	1,437	Topo Maps
Aitkin	518.3	1051.4	Gravel Pit	329	304	Aerial Photos
	526.7	1059.8	Gravel Pit	1,424	1,399	Topo Maps
	530.9	1064.0	Sand Pit	384	359	Topo Maps
	532.0	1065.1	Gravel Pit	253	278	Topo Maps
	534.4	1067.5	Gravel Pit	25 (Crossed)	0 (Crossed)	Topo Maps
	534.6	1067.7	Gravel Pit	750 (Crossed by ATWS)	725 (Crossed by ATWS)	Aerial Photos
	535.1	1068.2	Gravel Pit	1,209	1,184	Aerial Photos & Topo Maps
Carlton	564.9	1098.1	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009
	565.3	1098.4	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009
	565.5	1098.6	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009

Table 10a-2
Mineral Resources within 1,500 Feet of the Sandpiper Pipeline Project and Line 3 Replacement Project – Pipeline

County	SPP MP	L3R MP [a]	Operation	Distance from SPP Centerline (feet)	Distance from L3R Centerline (feet) [a]	Source
	565.8	1098.9	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009
	566.0	1099.1	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009
	566.3	1099.4	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009
	567.3	1100.4	Metallic Mineral Exploration Lease [b]	Crossed	Crossed	MDNR 2009
	568.6	1101.8	Gravel Pit	321	346	Aerial Photos
	584.8	1117.9	Gravel Pit	988	1,013	Topo Maps
	591.5	1124.7	Gravel Pit	1,025	1,050	Aerial Photos
	591.9	1125.0	Gravel Pit	94 (Crossed)	69 (Crossed)	Aerial Photos
	596.8	1129.9	Gravel Pit	730	755	Aerial Photos
	597.9	1131.0	Gravel Pit	866	841	Aerial Photos & Topo Maps

[a] Impacts provided for L3R are for the co-located portion only.

[b] Parcels with active county metallic mineral leases held by Kennecott Exploration Company.

The SPP route would cross some of the bedrock greenstone belt terrain in the western portion of Minnesota (MDNR 2013). Greenstone belt terrain is characterized by variably metamorphic rock that has undergone a change in existing rock structure or composition induced by location, chemicals, or temperature. Greenstone belt terrains have the potential to contain gold mineralization. The greenstone belt terrains crossed by the SPP route do not contain any known gold mineralization or high gold potential zones and are currently unexplored due to thick overlaying glacial materials.

Associated Facilities

The Clearbrook West Terminal, Pine River Facility, and mainline valves do not cross, nor are they located within 1,500 feet of potential mineral resources or active mineral lease lands.

Cathodic Protection

As presented in Table 10a-3, two cathodic protection systems that would be utilized by both SPP and L3R are located within 1,500 feet of two potential gravel pits. Cathodic protection systems are not located within 1,500 feet of active mineral lease lands.

Table 10a-3 Mineral Resources within 1,500 Feet of the Sandpiper Pipeline Project and Line 3 Replacement Project – Cathodic Protection						
County	**SPP MP**	**L3R MP [a]**	**Operation**	**Distance from SPP Centerline (feet)**	**Distance from L3R Centerline (feet) [a]**	**Source**
Carlton	584.7	1117.8	Gravel Pit	1,154	N/A	Topo Maps
Carlton	591.4	11124.5	Gravel Pit	557	N/A	Aerial Photos
[a] Cathodic protection systems located east of SPP MP 379.2 (L3R MP 912.3) would be utilized for both SPP and L3R.						
[b] Parcels with active county metallic mineral leases held by Kennecott Exploration Company.						

Access Roads

Permanent access roads to the mainline valve sites do not cross, nor are located within 1,500 feet of potential mineral resources or active mineral lease lands.

PALEONTOLOGY

Based on the thickness of the unconsolidated glacial material in the SPP environmental survey area, significant paleontological resources are not likely to be encountered during construction. Despite the fact that glacial deposits in Minnesota are of Pleistocene age, megafauna fossils tend to be scarce where glacial ice was present (Mather 2009, Sloan 2005).

UNCONFINED/SHALLOW AQUIFERS

Groundwater is present in surficial unconsolidated sediments. Unconfined aquifers are likely to exist in the SPP environmental survey area. While these aquifers may not be capable of producing sufficient quantities of water for municipal water supplies or irrigation wells, they are generally productive enough for domestic and farm (non-irrigation) supplies.

The EIS will further evaluate any effects the project could have on these features as well as identify any project design or mitigation measures to address effects to geologic features.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

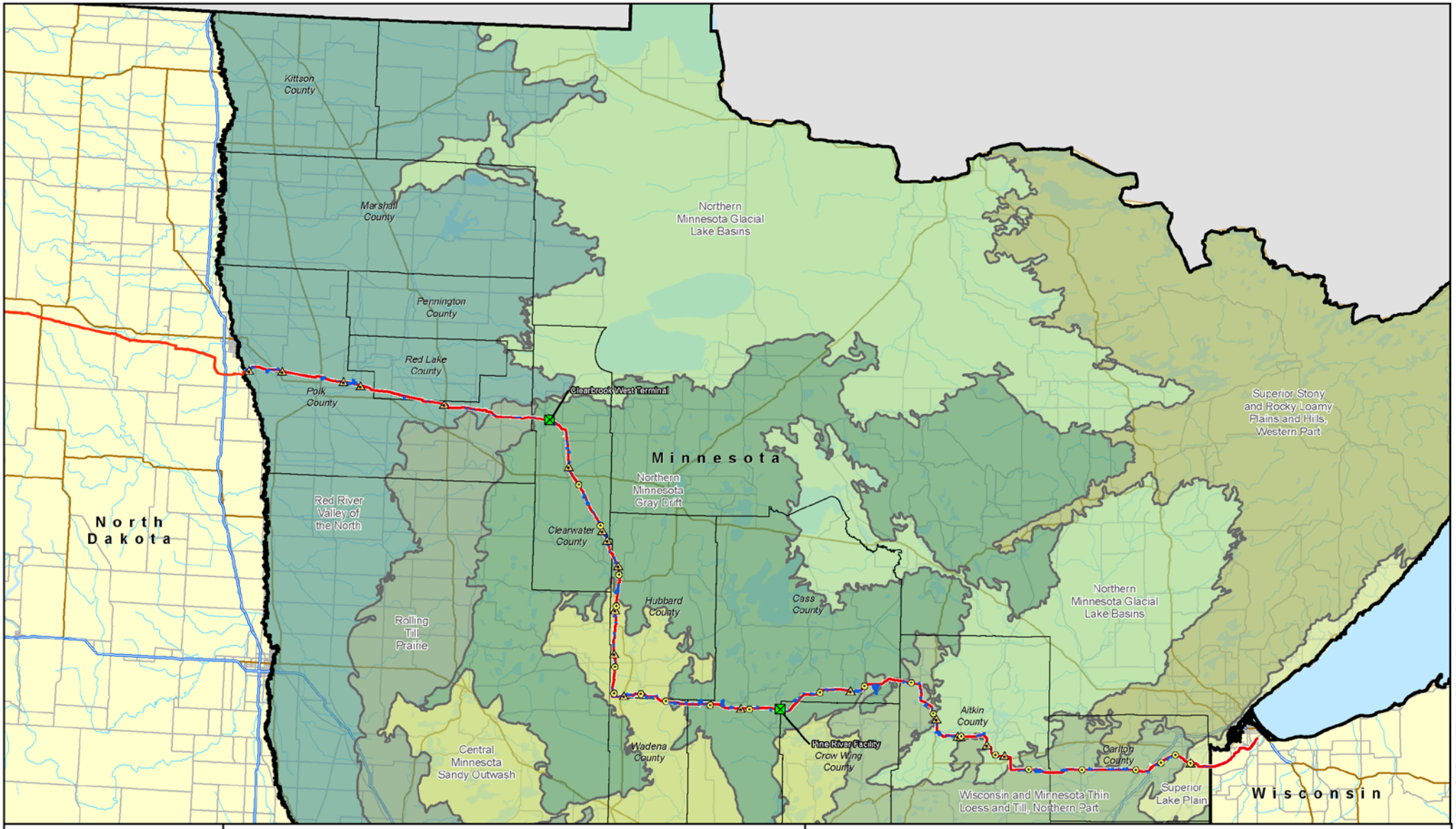
NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 10.

GENERAL SOIL COMPOSITION AND LANDFORMS

SPP would cross the following Major Land Resource Areas ("MLRA"): Red River Valley of the North; Northern Minnesota Gray Drift; Rolling Till Prairie; Northern Minnesota Glacial Lake Basins; Superior Lake Plain; Central Minnesota Sandy Outwash; and Wisconsin and Minnesota Thin Loess and Till, Northern part (refer to Figure 10b-1 and Table 10b-1). These MLRAs generally range from somewhat poorly drained soils with sandy to clayey textures to well or excessively drained soils, and have a frigid temperature regime; an aquic or udic soil moisture regime; and mixed, smectic, or isotic mineralogy (U.S. Department of Agriculture ["USDA"] Natural Resources Conservation Service ["NRCS"] 2006).

Table 10b-1
MLRAs Crossed by the Sandpiper Pipeline Project and Line 3 Replacement Project

MLRA Name	Landscape Description	Dominant Soil Types
Red River Valley of the North	A nearly level glacial lake plain that is bordered on the east by outwash plains, gravelly beaches, and dunes.	Mollisols and Vertisols
Northern Minnesota Gray Drift	A complex pattern of moraines, outwash plains, drumlins, lake plains, and drainages.	Alfisols, Entisols, and Histosols, with some Mollisols
Rolling Till Prairie	Stagnation moraines, end moraines, glacial outwash plains, terraces, and flood plains and is mostly dominated by till-covered moraines.	Mollisols
Northern Minnesota Glacial Lake Basins	Glacial lake plains with remnants of gravelly beaches, strandlines, deltas, and sandbars.	Alfisols, Entisols, and Histosols
Superior Lake Plain	Till plains mixed with lake plains, lake terraces, beaches, flood plains, swamps, and marshes. This MLRA is also characterized by some rocky knobs, hills, and low mountains.	Alfisols, Spodosols, Inceptisols, and Entisols
Central Minnesota Sandy Outwash	Large outwash plains and stream terraces.	Mollisols and Histosols
Wisconsin and Minnesota Thin Loess and Till, Northern part	Gently undulating to rolling, loess-mantled till plains, drumlin fields, and end moraines mixed with outwash plains associated with major glacial drainage ways, swamps, and bogs.	Alfisols, Entisols, Histosols, and Spodosols


Kittson County
Marshall County
Pennington County
Red Lake County
Polk County
Clearbrook West Terminal
Northern Minnesota Glacial Lake Basins
Superior Stony and Rocky Loamy Plains and Hills, Western Part
Minnesota
North Dakota
Red River Valley of the North
Northern Minnesota Gray Drift
Clearwater County
Hubbard County
Cass County
Rolling Till Prairie
Northern Minnesota Glacial Lake Basins
Aitkin County
Pine River Facility
Crow Wing County
Wadena County
Central Minnesota Sandy Outwash
Carlton County
Wisconsin and Minnesota Thin Loess and Till, Northern Part
Superior Lake Plain
Wisconsin
0 10 20 Miles
1 inch = 20 miles
ENBRIDGE
For Environmental Review Purposes Only
Figure 10b-1
North Dakota Pipeline Company LLC
Sandpiper Pipeline Project
Major Land Resource Area (MLRA)
Sandpiper Route
Facility
Cathodic Protection
Mainline Valve
Access Road
Central Minnesota Sandy Outwash
Northern Minnesota Glacial Lake Basins
Northern Minnesota Gray Drift
Red River Valley of the North
Rolling Till Prairie
Superior Lake Plain
Superior Stony and Rocky Loamy Plains and Hills, Western Part
Wisconsin and Minnesota Thin Loess and Till, Northern Part

Existing Soil Characteristics

Pipeline

Table 10b-2 provides a summary of significant soil characteristics by county, according to the SSURGO and STATSGO2 databases

Table 10b-2
Soil Characteristics for the Sandpiper Pipeline Project and Line 3 Replacement Project – Pipeline

County	Total Footprint Acreage	Prime Farmland	Hydric Soils	Compact Prone	Highly Erodible		Reveg. Concerns	Stony/ Rocky	Shallow to Bedrock [a]
					Water	Wind			
	Acres								
Polk									
SPP [b]	869.9	577.9	210.7	62.7	53.8	489.1	104.9	0.0	0.0
L3R [c]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cumulative [d]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Red Lake									
SPP [b]	164.9	107.9	97.7	4.6	10.4	113.4	36.3	0.0	0.0
L3R [c]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cumulative [d]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clearwater									
SPP [b]	574.1	343.2	132.2	55.8	102.4	259.9	92.7	0.0	0.0
L3R [c]	624.5	368.1	141.3	66.2	119.1	268.1	105.6	0.0	0.0
Cumulative [d]	486.4	254.8	80.7	50.9	106.3	263.6	90.7	0.0	0.0
Hubbard									
SPP [b]	661.3	44.7	60.9	43.9	210.3	641.1	321.5	0.0	0.0
L3R [c]	660.8	44.7	61.4	44.2	210.7	640.7	321.8	0.0	0.0
Cumulative [d]	729.2	48.6	71.3	52.2	231.1	706.9	357.2	0.0	0.0
Wadena									
SPP [b]	104.6	1.8	19.0	11.9	6.1	101.2	101.9	0.0	0.0
L3R [c]	105.8	1.7	18.7	11.3	6.0	102.9	103.2	0.0	0.0
Cumulative [d]	127.6	2.1	23.3	14.5	7.3	123.5	124.3	0.0	0.0
Cass									
SPP [b]	696.4	178.3	155.1	69.2	147.5	604.8	343.3	0.0	0.0
L3R [c]	695.5	178.3	152.8	67.6	148.2	604.5	342.0	0.0	0.0
Cumulative [d]	771.0	199.5	174.8	78.2	161.0	667.7	378.5	0.0	0.0
Crow Wing									
SPP [b]	71.3	16.7	20.1	0.8	4.1	50.3	37.4	9.2	0.0
L3R [c]	71.0	16.3	20.1	0.9	4.2	50.2	37.6	9.0	0.0
Cumulative [d]	76.9	17.8	21.9	1.0	4.5	54.2	40.5	9.9	0.0
Aitkin									
SPP [b]	678.3	266.5	390.2	244.2	48.3	509.0	314.7	0.0	0.0

Table 10b-2 Soil Characteristics for the Sandpiper Pipeline Project and Line 3 Replacement Project – Pipeline									
County	Total Footprint Acreage	Prime Farmland	Hydric Soils	Compact Prone	Highly Erodible		Reveg. Concerns	Stony/ Rocky	Shallow to Bedrock [a]
					Water	Wind			
		Acres							
L3R [c]	675.0	265.8	388.0	241.9	48.1	506.0	312.7	0.0	0.0
Cumulative [d]	802.8	312.3	470.5	294.4	53.7	600.1	378.5	0.0	0.0
Carlton									
SPP [b]	559.3	91.2	126.5	126.5	161.4	281.2	331.8	10.8	0.0
L3R [c]	552.4	89.9	127.2	127.2	158.9	277.2	327.9	10.7	0.0
Cumulative [d]	624.0	99.4	144.0	144.0	177.5	310.7	367.8	11.6	0.0
Total									
SPP [b]	**4380.1**	**1628.2**	**1212.3**	**619.6**	**744.3**	**3050.0**	**1684.6**	**20.0**	**0.0**
L3R [c]	**3384.9**	**964.9**	**909.5**	**559.3**	**695.1**	**2449.6**	**1550.7**	**19.7**	**0.0**
Cumulative [d]	**3617.9**	**934.4**	**986.5**	**635.2**	**741.5**	**2726.6**	**1737.5**	**21.5**	**0.0**

[a] There is potential for shallow bedrock along approximately 20 miles of the SPP route between MPs 575 and 595. This information was not reflected in NRCS soils data.

[b] Calculations based on the SPP 120-foot-wide construction workspace (uplands) and 95-foot-wide construction workspace (wetlands) and ATWS inclusive of the SPP 50-foot permanent ROW for permanent impacts.

[c] Where co-located with SPP, calculations based on the L3R 120-foot-wide construction workspace (uplands) and 95-foot-wide construction workspace (wetlands) and ATWS inclusive of the L3R 50-foot permanent ROW for permanent impacts.

[d] Calculations based on a combined SPP and L3R 130-foot-wide construction workspace (uplands) and 105-foot-wide construction workspace (wetlands) and ATWS inclusive of the combined SPP and L3R 75-foot-wide permanent ROW.

Associated Facilities

Clearbrook West Terminal & Pine River Facility

Table 10b-3 provides a summary of the significant soil characteristics identified within the permanent footprint associated with the Clearbrook West Terminal and Pine River Facility.

Table 10b-3 Soil Characteristics for the Sandpiper Pipeline Project – Facilities										
County	Facility	Total Footprint Acreage	Prime Farmland	Hydric Soils	Compact. Prone	Highly Erodible		Reveg. Concerns	Stony/ Rocky	Shallow to Bedrock
						Water	Wind			
			Permanent Impacts (Acres)							
Clearwater	Clearbrook West Terminal	26.3	26.0	5.4	0.2	0.0	0.2	0.2	0.0	0.0
Cass	Pine River Facility	3.9	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0
	Total	**30.2**	**26.0**	**5.4**	**0.2**	**0.0**	**4.1**	**0.2**	**0.0**	**0.0**

Mainline Valves and Cathodic Protection

Table 10b-4 provides a summary of the significant soil characteristics identified within the construction workspace of the cathodic protection systems and permanent footprint associated with the mainline valves.

Table 10b-4
Soil Characteristics for the Sandpiper Pipeline Project and Line 3 Replacement Project – Mainline Valves and Cathodic Protection [a]

County	Total Footprint Acreage	Prime Farmland	Hydric Soils	Compact. Prone	Highly Erodible		Reveg. Concerns	Stony/ Rocky	Shallow to Bedrock
					Water	Wind			
	Acres								
Polk									
Mainline Valves	0.3	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Clearwater									
Cathodic Protection	0.8	0.7	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Mainline Valves	0.3	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Hubbard									
Cathodic Protection	2.5	0.4	0.1	0.1	0.5	2.3	0.6	0.0	0.0
Mainline Valves	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Wadena									
Cathodic Protection	0.4	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0
Cass									
Cathodic Protection	1.5	0.0	0.3	0.0	0.0	1.5	0.8	0.0	0.0
Mainline Valves	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Aitkin									
Cathodic Protection	1.6	0.2	0.8	0.6	0.0	1.5	0.9	0.0	0.0
Mainline Valves	0.4	0.2	0.3	0.2	0.0	0.4	0.3	0.0	0.0
Carlton									
Cathodic Protection	2.6	0.4	0.0	0.0	0.9	2.4	1.6	0.0	0.0
Mainline Valves	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Total									
Cathodic Protection	**9.4**	**1.6**	**1.2**	**0.8**	**1.4**	**8.6**	**4.3**	**0.0**	**0.0**
Mainline Valves	**1.7**	**0.5**	**0.4**	**0.2**	**0.0**	**1.6**	**0.7**	**0.0**	**0.0**

[a] Mainline valves and cathodic protections systems located east of SPP MP 379.2 (L3R MP 912.3) would be utilized for both SPP and L3R.

Access Roads

Table 10b-5 provides a summary of the significant soil characteristics associated with temporary access roads that would be restored to pre-construction conditions after construction is complete and for permanent access roads to mainline valve sites.

Table 10b-5
Soil Characteristics for the Sandpiper Pipeline Project and Line 3 Replacement Project – Access Roads

County	Total Footprint Acreage [a]	Prime Farmland	Hydric Soils	Compact. Prone	Highly Erodible		Reveg. Concerns	Stony/ Rocky	Shallow to Bedrock
					Water	Wind			
		Acres [b]							
Polk [a]									
Temporary	35.4	27.3	4.9	1.0	4.3	14.9	5.4	0.0	0.0
Permanent	0.6	0.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Red Lake [a]									
Temporary	2.9	1.6	1.9	0.0	0.1	1.4	0.3	0.0	0.0
Clearwater									
Temporary	36.3	22.2	1.4	0.5	8.4	17.5	2.4	0.0	0.0
Permanent	0.4	0.2	0.1	0.0	0.0	0.3	0.0	0.0	0.0
Hubbard									
Temporary	37.4	0.3	1.8	1.4	15.0	37.0	19.5	0.0	0.0
Permanent	0.6	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
Wadena									
Temporary	9.7	0.0	0.4	0.4	0.4	9.7	9.7	0.0	0.0
Cass									
Temporary	57.5	12.6	12.9	2.7	9.0	48.8	29.0	0.0	0.0
Permanent	0.4	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0
Crow Wing									
Temporary	4.2	0.5	0.0	0.0	2.2	4.2	3.6	0.0	0.0
Aitkin									
Temporary	47.3	18.9	25.6	16.7	3.4	30.4	20.1	0.0	0.0
Permanent	0.8	0.1	0.7	0.3	0.0	0.6	0.5	0.0	0.0
Carlton									
Temporary	27.2	2.3	3.0	3.0	11.1	13.3	16.6	0.1	0.0
Permanent	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Total									
Temporary	**258.0**	**85.7**	**51.9**	**25.7**	**53.9**	**177.3**	**106.7**	**0.1**	**0.0**
Permanent	**2.8**	**0.8**	**0.8**	**0.3**	**0.0**	**2.3**	**1.1**	**0.0**	**0.0**

[a] Temporary access roads located east of SPP MP 379.2 (L3R MP 912.3) would be utilized for both SPP and L3R. Temporary access roads located in Polk, Red Lake, and Clearwater Counties west of these MPs would apply to SPP only.

[b] Acreage is based on a 30-foot-wide workspace along access roads.

The EIS will further discuss impacts from project activities related to soils and topography as noted below.

- Estimated Volume and Acreage of Soil Excavation and/or Grading
- Steep Slopes
- Hydrologic Soils
- Erosion by Wind and Water

- Soils with Revegetation Concerns
- Stony/Rocky Soils and Shallow Bedrock Soils

Measures to be used during and after project construction to address soil limitations, including stabilization, soil corrections or other measures will also be identified.

11. Water resources:

a. **Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.**

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

Watersheds

Minnesota is divided into 10 major drainage basins that are used by governing agencies to identify and assess water quality issues and develop water quality protection goals. Surface waters impacted by SPP are located within the Red River of the North, Mississippi Headwaters, St. Croix River, and Western Lake Superior Basins. Table 11a-1 and Figure 11a-1 present the major watersheds impacted by SPP.

Red River of the North Basin

The Red River of the North Basin encompasses a 39,270-square-mile surface drainage area to the main stem of the Red River of the North within the United States. The basin represents an important hydrologic region where good quality water is a valued resource vital to the region's economy. Additionally, the drainage flows northward into Manitoba, Canada and is of international concern. Annual runoff varies greatly, but most runoff occurs in spring and early summer from rains falling on saturated soils (Red River Basin Commission 2005).

Upper Mississippi River Basin

The Mississippi Headwaters Basin covers 20,162 square miles. The basin is a mixture of forest, prairie, agriculture, and urban land areas. From the headwaters, the Mississippi River flows south 2,340 miles to the Gulf of Mexico (USGS 1990).

St. Croix River Basin

The St. Croix River Basin covers 7,733 square miles in Minnesota and Wisconsin and extends from near Mille Lacs Lake in Minnesota on the west to near Cable, Wisconsin, on the east. Approximately 45 percent of the watershed is located in Minnesota (Niemela et al. 2004).

Table 11a-1 Major Watersheds Impacted by the Sandpiper Pipeline Project and Line 3 Replacement Project			
Basin / HUC 8 Watershed	HUC 8 Watershed ID Number	SPP (Y/N)	L3R (Y/N)
RED RIVER OF THE NORTH BASIN			
Tamarac River	69	N	Y
Snake River	68	N	Y
Sandhill River	61	Y	N
Grand Marais Creek	67	Y	Y
Red Lake River	63	Y	Y
Clearwater River	66	Y	Y
Wild Rice River	60	Y	Y
UPPER MISSISSIPPI RIVER BASIN			
Mississippi River – Headwaters	7	Y	Y
Crow Wing River	12	Y	Y
Pine River	11	Y	Y
Leech Lake River	8	Y	Y
Mississippi River – Grand Rapids	9	Y	Y
Mississippi River – Brainerd	10	Y	Y
ST. CROIX RIVER BASIN			
Kettle River	35	Y	Y
WESTERN LAKE SUPERIOR BASIN			
Nemadji River	5	Y	Y
St. Louis River	3	Y	Y