APPLICATION

Waiver of Procedures and Timelines
Certificate of Corridor Compatibility
Route Permit

BAKKENLINK PIPELINE LLC

Case # PU-10-218

Prepared for:

The North Dakota Public Service Commission

Prepared by:

McCain and Associates, Inc.
A Carlson Professional Services Company

June 21, 2011

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Acronyms and Abbreviations

ADT	Average Daily Traffic
API	American Petroleum Institute
ARO	Abrasion Resistant Overlay
Arrow	Arrow Midstream Holdings, LLC
AST	Aboveground Storage Tanks
Bakken	Crude oil-bearing intervals including middle Bakken and upper Three Forks
BakkenLink	BakkenLink Pipeline LLC
BMPs	Best Management Practices
BNSF	BNSF Railway Company
BPD	Barrels Per Day
Bridger	Bridger Pipeline Company
CFR	Code of Federal Regulations
CO2	Carbon Dioxide
USACE	United States Army Corps of Engineers
Commission	North Dakota Public Service Commission
dB	Decibels
dBA	A-Weighted Decibel
Enbridge	Enbridge Inc.
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
GAP	Gap Analysis Program
GIS	Geographic Information System
Guidelines	Commission's Guidelines for Energy Conversion and Transmission Facility Siting
HAZOPS	Hazard and Operability Studies
HDD	Horizontal Directional Drilling
Hess	Hess Corporation
HU	Hydrologic Unit
LACT	Lease Automatic Custody Transfer
LMNG	Little Missouri National Grasslands
LOI	Letter Of Intent
LOOP	Louisiana Offshore Oil Port
MBPD	Million Barrels Per Day
MHI	Median Household Income
mils	Milliliters
MP	Milepost
MU	Map Unit
NASS	National Agricultural Statistics Service
NDAC	North Dakota Administrative Code
NDAREC	North Dakota Association of Rural Electric Cooperatives
NDCC	North Dakota Century Code
NDDH	North Dakota Department of Health
NDDOT	North Dakota Department Of Transportation
NDGF	North Dakota Game and Fish
NDHI	North Dakota Heritage Inventory
NDIC	North Dakota Industrial Commission
NDPR	North Dakota Parks and Recreation Department
NDSWC	North Dakota State Water Commission
NETL	United States Department of Energy National Energy Technology Laboratory

NPDES	National Pollutant Discharge Elimination
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NYMEX	New York Mercantile Exchange
OOIP	Original Oil In Place
OSHA	Occupational Safety and Health Administration
PLOTS	Private Land Open to Sportsmen
Psig	Pound-Force per Square Inch Gauge
Quintana	Quintana Capital Group GP, Ltd
ROW	Right-Of-Way
SCADA	Supervisory Control and Data Acquisition
SG	Specific Gravity
SHPO	State Historic Preservation Officer
Siting Act	North Dakota Energy Conversion and Transmission Facility Siting Act
SPCC	Spill Prevention Control and Countermeasure
SSURGO	Soil Survey Geographic Database
STATSCO	State Soil Geographic Database
SWPPP	Storm Water Pollution Prevention Plan
TDML	Total Maximum Daily Load
TDS	Total Dissolved Solids
Tesoro	Tesoro Corporation
TransCanada	TransCanada Corporation
TSA	Transportation Services Agreement
USACE	United States Army Corps of Engineers
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WT	Wall Thickness

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF NORTH DAKOTA

IN THE MATTER OF THE APPLICATION OF BAKKENLINK LLC FOR A CERTIFICATE OF CORRIDOR CAMPATIBILITY AND ROUTE PERMIT FOR THE CONSTRUCTION OF AN APPROXIMATELY 144 MILE-LONG CRUDE OIL PIPELINE AND ASSOCIATED FACILITIES IN BILLINGS, DUNN, MCKENZIE, STARK AND WILLIAMS COUNTIES, NORTH DAKOTA	CASE NO. PU-10-218

Application of BakkenLink Pipeline LLC
for Waiver or Reduction of Procedures and Time Schedules

In connection with its submission of a consolidated application for a Certificate of Corridor Compatibility and Route Permit for approximately 144 miles of 8-inch and 12-inch steel crude oil pipeline extending from Beaver Lodge, North Dakota to a proposed crude oil rail loading facility located near Fryburg, North Dakota (Rail Facility), being developed by another entity, BakkenLink Pipeline LLC (BakkenLink) submits to the North Dakota Public Service Commission (Commission) this application for a waiver or reduction of procedures and time schedules set forth in North Dakota Century Code (NDCC) Ch. 49-22 and North Dakota Administrative Code (NDAC) Art. 69-06. In accordance with NDCC § 49-22-07.2 and NDAC Ch. 69-06-06, BakkenLink requests that the Commission waive the following requirements:

1. That the Commission hold a separate hearing on a waiver request, a Certificate of Corridor Compatibility application and a Route Permit application, as may be required by NDCC §§ 49-22-07.2, 49-22-08, 49-22-08.1 and 49-22-13 and NDAC § 69-06-01-02. BakkenLink requests that the Commission hold a single consolidated hearing on this waiver request and its consolidated application for a Certificate of Corridor Compatibility and a Route Permit. BakkenLink also requests that the Commission shorten the three-month period specified in NDCC

§ 49-22-08(5) and NDAC § 69-06-06-02(2), and the six-month period specified in NDCC § 49-22-08.1(5).

2. That the Commission waive the requirements of NDCC §§ 49-22-08 and 49-22-08.1 insofar as these sections may require the separate filing of applications for a Certificate of Corridor Compatibility and a Route Permit, and insofar as they require separate publication of notices of filing said applications.

3. That the Commission waive requirements for mylar maps and stereo-pair aerial photographs as set forth in the Commission's Energy Conversion and Transmission Facility Siting Guidelines for Certificate of Corridor Compatibility and Route Permit Applications. Geographic Information System (GIS) maps that meet the intent of the Commission's requirements are provided in the consolidated application for a Certificate of Corridor Compatibility and a Route Permit.

Consistent with the Commission's Energy and Transmission Facility Siting Guidelines (Guidelines), BakkenLink provides the following information in support of its waiver requests:

A. Description of Proposed Project.

1. **Type**: The proposed Project is a crude oil pipeline system consisting of approximately 144 miles of 8-inch and 12-inch steel crude oil pipeline extending from multiple receipt points in Billings, Dunn, McKenzie, Stark and Williams Counties, North Dakota, to an interconnect with a new Rail Facility at Fryburg, North Dakota. The trunkline will have bi-directional capability, and will be able to transport crude oil to/from the Rail Facility and Beaver Lodge. BakkenLink is developing and intends to construct, own and operate the Project. BakkenLink is not developing and does not intend to own and operate the Rail Facility.

2. **Product**: The proposed Project will provide much-needed pipeline capacity to transport the increasing supplies of crude oil produced in portions of Billings, Dunn, McKenzie,,

Stark and Williams Counties, North Dakota. The system will only accept for transport light sweet crude, typical of production from Bakken pools in North Dakota.

3. **Size and Design**: The Project will consist of the following assets:

- Approximately 122 miles of 12-inch steel trunkline for the transportation of crude oil originating from, initially, up to six proposed receipt points including existing and proposed crude oil truck receipt locations and pipeline gathering receipt stations. This trunkline will be bi-directional and will transport crude oil to/from the Rail Facility and Beaver Lodge.

- Approximately 18 miles of 8-inch steel lateral from the Dunn Receipt Point, which will deliver into the trunk line approximately 30 miles north of Belfield.

- Approximately 4 miles of 8-inch steel lateral from the Belfield Receipt Point, which will deliver into the trunk line just north of Belfield.

The proposed trunkline is designed to initially carry up to 65,000 barrels per day (BPD) and will have expansion capabilities of up to 100,000 BPD. The pipeline will be buried underground.

Initially, six receipt points will be constructed for input of product. The receipt points will be located at:

- Beaver Lodge Receipt Point, Williams County
- Keene Receipt Point, McKenzie County
- Arrow Midstream Receipt Point, McKenzie County
- Watford City Receipt Point, McKenzie County
- Dunn Receipt Point, Dunn County
- Belfield Receipt Point, Stark County

Other surface facilities will be limited to pipeline markers, pipeline inspection gauge (PIG) launchers and receivers, cathodic protection rectifiers and block valves. Fenced-in enclosures may be installed to house power, control systems, and communications equipment allowing valves to be operated remotely. Supervisory control and data acquisition (SCADA) system communications will be through satellite systems requiring only a small dish installed within the fenced main line valve areas.

The Project will be designed, constructed, and operated in compliance with applicable portions of the United States Department of Transportation (USDOT) regulations as set forth in 49 CFR Code of Federal Regulations (CFR) Part 195, Transportation of Hazardous Liquids by

Pipeline. These regulations encompass general requirements, accident reporting and safety related condition reporting, design requirements, construction, pressure testing, operation and maintenance, qualification of pipeline personnel, and corrosion control. Relevant industry standards are incorporated into these regulations by reference, including those of the American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), and the American Standard for Testing and Materials (ASTM) and others.

4. **Location**: The Project will be located in the following North Dakota counties: Billings, Dunn, McKenzie, Stark and Williams. A map depicting the Project location is provided as Figure 1 in the Application for a Certificate of Corridor Compatibility.

5. **Geographical Service Area**: As noted above, the Project will provide North Dakota Bakken oil producers in portions of Billings, Dunn, McKenzie, Stark and Williams Counties, North Dakota, with access to a number of potentially attractive markets across the United States.

6. **Time Schedule**: BakkenLink anticipates receiving necessary pre-construction permits and approvals, acquiring the necessary right-of-way (ROW), and finalizing other agreements no later than April 2012. The construction schedule is dependent upon permitting, ROW acquisition, and other development activities. The anticipated in-service date for the Arrow to Belfield portion of the Project is August 2012. The anticipated in-service date for the Beaver Lodge to Arrow portion of the Project is December 2012. BakkenLink proposes to develop the Project on the following schedule:

Project Milestone	Completion Date
Certificate of Corridor Compatibility and Route Permit	November 2011
Engineering and Design	November 2011
Construction/Environmental Permitting	March 2012
ROW Land Acquisition	April 2012
Start Construction	April 2012
Construction Complete (Arrow to Belfield)	September 2012
Commissioning (Arrow to Belfield)	September-October 2012
In Service (Arrow to Belfield)	October 2012
Construction Complete (Beaver Lodge to Belfield)	November 2013
Commissioning (Beaver Lodge to Arrow)	November-December 2013
In Service (Beaver Lodge to Arrow)	December 2013

7. **Future Plans**: In the future, additional receipt points may be developed, as well as outlet connections with third party pipelines, including potentially the Enbridge North Dakota pipeline system, the Tesoro High Plains Pipeline system, the Bridger Pipeline system, and if approved and it moves to construction, the Keystone XL Pipeline system. An extension of the Project to an interconnect with TransCanada's Marketlink and Keystone XL Pipeline system projects is currently being assessed by BakkenLink. If the extension is needed, BakkenLink will make the appropriate additional filings with the Commission.

B. Need for Facility.

The Project will address anticipated regional pipeline and outlet constraints as development of the Bakken continues. With the initial outlets via the Rail Facility and Beaver Lodge, BakkenLink will provide a number of producers in western North Dakota with a much needed alternative means of transporting their crude oil. Bakken producers will be able to access new markets via the Rail Facility. Additionally, the strategic position of the Project will encourage the development of pipeline gathering laterals and receipt points and outlet connections with third party pipelines. For additional information regarding the need for the Project, including the alternatives considered, *see* Section 4.0 of the Application for a Certificate of Corridor Compatibility.

BakkenLink will file its Ten Year Plan on or before July 1, 2011, and the proposed Project will be consistent with the Ten Year Plan.

C. Cost.

BakkenLink estimates that the total cost of constructing the Project will be approximately $126,460,000.

D. Waiver Request.

Waivers of time schedules and procedures are needed in order to prevent potentially significant delays in implementing an additional means of transporting Bakken crude oil from the Williston Basin. Construction of this Project will benefit landowners, municipalities and citizens of the State of North Dakota by significantly reducing traffic congestion and impacts on road infrastructure caused by truck transportation. It will also benefit oil producers and mineral owners by alleviating dependence upon existing pipeline capacity, which is currently constrained, and by providing access to new markets for Bakken crude oil product. Without the waivers of time schedules and procedures requested, BakkenLink will be unable to provide a needed means of transporting crude oil to new markets in a timely manner, which, in turn, will limit the ability of those producers to market their crude oil and will delay the reduction of truck traffic and the associated impacts.

NDCC § 49-22-07.2 provides that the Commission may waive procedures and time schedules upon a finding that "the proposed facility is of such length, design, location, or purpose that it will produce minimal adverse effects." Based upon the thorough investigation and analysis set forth in the Application for a Certificate of Corridor Compatibility and the Application for a Route Permit, granting the waivers requested is appropriate because the proposed Project will produce minimal adverse effects due to its design (an underground, small-diameter pipeline system with few above-ground appurtenances), its location (crossing primarily pasture and farmland, and avoiding Exclusion and Avoidance Areas in accordance with NDAC § 69-06-08-02), and its purpose (underground pipeline transportation of crude oil).

In determining whether the proposed facility will result in adverse impacts on the environment, BakkenLink evaluated the Project using the criteria set forth in the NDCC Ch. 49-22 (Siting Act), NDAC Art. 69-06 (Siting Rules), and the Commission's Guidelines. Specifically, BakkenLink evaluated the impacts of the Project considering the siting criteria found in NDAC § 69-06-08-02 (*see* Section 5.2 of the Application for a Certificate of Corridor Compatibility and Section 3.3 of the Application for a Route Permit) and the factors to be considered in NDCC § 49-22-09 (*see* Section 3.2 of the Application for a Route Permit). Impacts associated with the Project are summarized in Section 5.0 of the Application for a Certificate of Corridor Compatibility and Section 3.0 of the Application for a Route Permit. Based upon this evaluation and the factors set forth in the Siting Act, the Siting Rules and the Guidelines, the proposed Project will have minimal adverse effects.

The agencies and officers listed in NDAC § 69-06-01-05 were notified about the Corridor and Route in September 2010. Additionally, the United States Army Corps of Engineers, United States Fish and Wildlife Service, United States Department of Agriculture, United States Natural Resources Conservation Service, and other stakeholders not listed in NDAC § 69-06-01-05 were also notified of the proposed Project. BakkenLink has engaged in on-going correspondence with the agencies as the Corridor and Route have been refined, and comments received by these agencies and officers are summarized in Section 3.2.11 of the Application for a Route Permit and in Appendix J to this combined application. BakkenLink's discussions with these agencies, officers, and stakeholders further support its belief that the proposed Project will produce minimal adverse effects. BakkenLink will acquire any necessary permits from the applicable agencies and local governmental units prior to construction of the Project and copies of the permits will be submitted to the Commission prior to construction.

For the reasons set forth above, BakkenLink respectfully requests that the Commission grant the requested waivers and render an expeditious decision.

Dated this 21st day of June, 2011.

Fredrikson & Byron, P.A.

By_____
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STATE OF NORTH DAKOTA)
) ss.
COUNTY OF BURLEIGH)

LAWRENCE BENDER, of lawful age, being first duly sworn, on oath deposes and says:

That he is one of the attorneys for the Applicant in the foregoing application; that he executed the foregoing application for and on behalf of said Applicant; that he has read said application and knows the contents thereof; and that the statements made and contained therein are, to the best of his knowledge and belief, true and correct.

_____
LAWRENCE BENDER

Subscribed and sworn to before me this 21st day of June, 2011.

MELISSA KLOCKE
Notary Public
State of North Dakota
My Commission Expires May 6, 2014

Melissa Klocke
Notary Public
My Commission Expires:

Application For Certificate of Corridor Compatibility

1.0 Introduction

Quintana Capital Group GP, Ltd (Quintana) filed a Letter of Intent (LOI) with the North Dakota Public Service Commission (Commission) on June 9, 2010, for construction of a crude oil pipeline system. The proposed pipeline system (at that time) consisted of approximately 165 miles of 10-inch and 12-inch steel crude oil pipeline extending from multiple receipt points in McKenzie, Mountrail, and Williams Counties, North Dakota, to Watford City, North Dakota, and approximately 139 miles of 16-inch steel crude oil pipeline extending from Watford City, North Dakota, to an interconnect with the Keystone XL Pipeline System in Fallon County, Montana.

The LOI also contained a request for a waiver of procedures that the LOI be filed one year prior to filing an application. The Commission acknowledged the LOI and approved the request for a timeline waiver in its regular meeting on June 30, 2010. The LOI and additional correspondence with the Commission is provided in Appendix A.

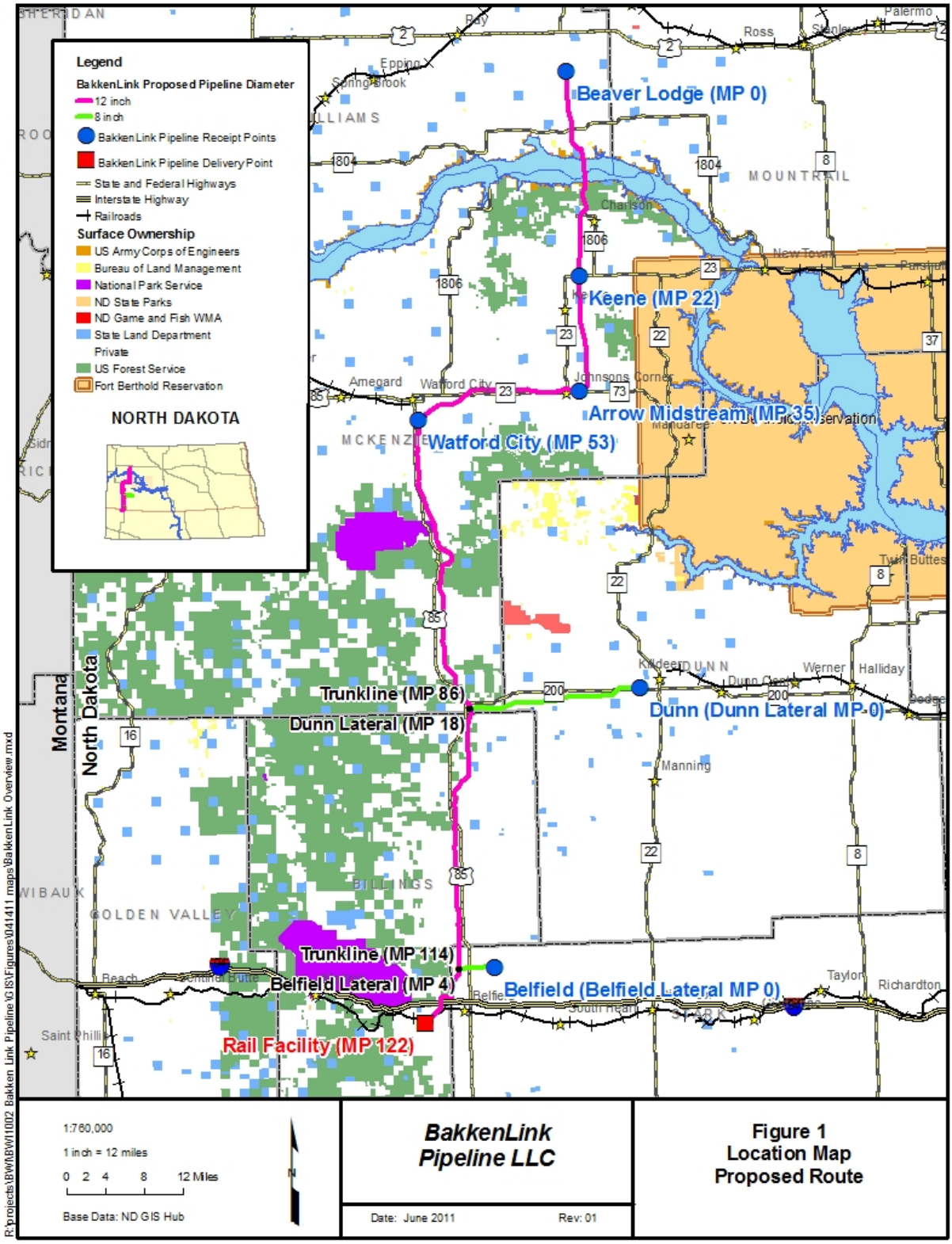
Since the time that the LOI was submitted, it has been determined that the Project entity will be BakkenLink Pipeline LLC, rather than Quintana. Therefore, pursuant to the North Dakota Energy Conversion and Transmission Facility Siting Act, North Dakota Century Code (NDCC) Ch. 49-22 (Siting Act), BakkenLink Pipeline LLC (BakkenLink) hereby submits this application for a Certificate of Corridor Compatibility and Route Permit (Application) to construct the BakkenLink Pipeline from Beaver Lodge to Belfield (Project).

As will be discussed further below, since the time that the LOI was filed, the Project has been modified in that an interconnect with the Keystone XL Pipeline system will not be constructed at this time. The current Project consists of approximately 144 miles of 8-inch and 12-inch steel crude oil pipeline extending from Beaver Lodge, North Dakota to a proposed crude oil rail loading facility located near Fryburg, North Dakota (Rail Facility) being developed by another entity. The Project will be located in the following North Dakota counties: Billings, Dunn, McKenzie, Stark and Williams. The system will transport light sweet crude, typical of middle Bakken and upper Three Forks formations ("Bakken") production. The initial capacity will be 65,000 barrels per day (BPD), beginning on the estimated in-service date of August 1, 2012. BakkenLink will transport crude oil from up to six proposed receipt points including existing and proposed crude oil truck receipt locations and pipeline gathering receipt stations. The trunkline will have bi-directional capability and, via the Rail Facility and Beaver Lodge, the crude oil collected by the Project will have improved access to key markets across the United States. BakkenLink will alleviate anticipated pipeline constraints in the Catchment Area of the Project (defined in Section 4.1) and reduce the amount of truck mileage for hauling crude from the lease to truck receipt point locations.

The footprint of the Project will encourage the development of pipeline gathering laterals and receipt points and outlet connections with third party pipelines, including potentially the Enbridge North Dakota Pipeline system, the Tesoro High Plains Pipeline system, the Bridger Pipeline system, and if approved and it moves to construction, the Keystone XL Pipeline system.

BakkenLink is developing and intends to build, own and operate the Project. BakkenLink is not developing and does not intend to own and operate the Rail Facility.

Figure 1. Location Map



2.0 Description

2.1 Project Type

The Project is a crude oil pipeline system consisting of approximately 144 miles of 8-inch and 12-inch steel crude oil pipeline extending from multiple receipt points in Billings, Dunn, McKenzie, Stark and Williams Counties, North Dakota.

2.2 Product

The proposed Project will provide much-needed pipeline capacity to transport the increasing supplies of crude oil produced in portions of Billings, Dunn, McKenzie, Stark and Williams Counties, North Dakota. The system will transport light sweet crude, typical of Bakken production.

2.3 Size and Design

The Project will consist of the following assets:

- Approximately 122 miles of 12-inch steel trunkline for the transportation of crude oil originating from, initially, up to six proposed receipt points including existing and proposed crude oil truck receipt locations and pipeline gathering receipt stations. This trunkline will have bi-directional capability and will deliver crude oil to/from the Rail Facility and Beaver Lodge.
- Approximately 18 miles of 8-inch steel lateral from Dunn Receipt Point, which will deliver into the trunk line approximately 30 miles north of Belfield.
- Approximately 4 miles of 8-inch steel lateral from Belfield Receipt Point, which will deliver into the trunk line just north of Belfield.

The proposed trunkline is designed to initially carry up to 65,000 BPD and will have expansion capabilities of up to 100,000 BPD. The pipeline will be buried underground.

Initially, six receipt points will be constructed for input of product. The receipt points will be located at:

- Beaver Lodge Receipt Point, Williams County
- Keene Receipt Point, McKenzie County
- Arrow Midstream Receipt Point, McKenzie County
- Watford City Receipt Point, McKenzie County
- Dunn Receipt Point, Dunn County
- Belfield Receipt Point, Stark County

Receipt points will consist of a tee installed in the pipeline to allow connection to a truck terminal or other third party facilities that are not a part of this Project and will be constructed by others. Additional pumping equipment can be added in the future to boost the Project's capacity to approximately 100,000 BPD. Other surface facilities will be limited to pipeline markers, pipeline inspection gauge (PIG) launchers and receivers, cathodic protection rectifiers and block valves. Fenced-in enclosures may be installed to house power, control systems, and communications equipment allowing valves to be operated remotely. Supervisory control and

data acquisition (SCADA) system communications will be through satellite systems requiring only a small dish installed within the fenced main line valve areas.

The Project will be designed, constructed, and operated in compliance with applicable portions of the United States Department of Transportation (USDOT) regulations as set forth in 49 CFR Code of Federal Regulations (CFR) Part 195, Transportation of Hazardous Liquids by Pipeline. These regulations encompass general requirements, accident reporting and safety related condition reporting, design requirements, construction, pressure testing, operation and maintenance, qualification of pipeline personnel, and corrosion control. Relevant industry standards are incorporated into these regulations by reference, including those of the American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), and the American Standard for Testing and Materials (ASTM) and others.

2.3.1 Width of Right-of-Way

The temporary construction right-of-way (ROW) will be generally 100 feet wide. Additional temporary workspace will be acquired at certain locations (e.g., road, railroad, and river crossings). The temporary construction ROW may be reduced in some areas as necessary to avoid impacts to environmentally sensitive areas.

The permanent ROW will generally be 50 feet wide. The location of the pipeline within the permanent ROW may vary, however, depending on terrain, the presence of other existing facilities, and landowner concerns. The Project will follow existing pipeline and utility easements where feasible. BakkenLink is in the process of acquiring easements and crossing permits.

2.3.2 Estimated Distance between Surface Structures

Six receipt points will be constructed for input of product (by others). Table 1 summarizes the milepost designations between receipt points and lateral connections of the trunkline.

Table 1. Pipeline Mileposts

Location	Milepost
Beaver Lodge	0
Keene	22
Arrow Midstream	35
Watford City	53
Dunn Lateral Interconnect	Trunkline MP – 86 Dunn Lateral MP – 18
Belfield Lateral Interconnect	Trunkline MP – 114 Belfield Lateral MP – 4
Rail Facility	144
Dunn Receipt Point	Dunn Lateral MP – 0
Belfield Receipt Point	Belfield Lateral MP – 0

Receipt points will consist of a tee installed in the pipeline to allow connection to a truck terminal or other producer related facilities that are not a part of this Project and will be constructed by others. A mid-route pumping station can be added in the future to boost the Project's capacity to approximately 100,000 BPD. Surface facilities will be limited to pipeline

markers, cathodic test stations, and block valves. The cathodic test stations and block valve sites will be secured, fenced facilities with enclosures that will house power, control and communications systems to allow the monitoring and remote operation of the pipeline.

Mainline Valve Assemblies

Mainline valve assemblies will be spaced along the pipeline to meet the requirements of 49 CFR, Part 195. A high consequence area location study will be conducted during the initial design phase of the project to determine appropriate placement of the valves to minimize environmental impact.

Pumping Stations

No pumping stations will be built as part of the initial project. The pressure provided by input at the receipt locations will be adequate for operation of the pipeline at the current projected flow rates. Truck unloading facilities, Lease Automatic Custody Transfer (LACT) units and delivery pumps will be provided by others. A mid-route pumping station can be added in the future to boost the Project's capacity to approximately 100,000 BPD. Aboveground storage tanks (AST) can also be installed in the future at strategic locations to allow for storage and other operational considerations. The location for a mid-route pumping station and future ASTs will be determined based on future demand and needs.

Receiving, Meter and Regulator Stations

Each receipt point will have a PIG launcher and send-out meter station. The pumping station sites will also include a PIG launcher and receiver area to allow more flexibility in pipeline pigging operations. The system includes one PIG receiving station at the terminus of the mainline, with measurement and instrumentation to allow for leak detection.

2.3.3 Pipe Size

The proposed origin, terminus, and pipe size of the proposed segments are summarized in Table 2.

Table 2. Summary of Pipeline Segments

Origination	Terminus	Pipe Specification
Beaver Lodge	Belfield	12.75" OD X 0.292" WT, API 5L-X65
Dunn	Trunkline	8.625" OD X 0.219" WT, API 5L-X65
Belfield	Trunkline	8.625" OD X 0.219" WT, API 5L-X65

2.3.4 Approximate Length of Facility

The Project will consist of the following assets:

- Approximately 122 miles of 12-inch steel trunkline for the transportation of crude oil originating from, initially, up to six proposed receipt points including existing and proposed crude oil truck receipt locations and pipeline gathering receipt stations. This trunkline will have bi-directional capability, and will deliver crude oil to/from the Rail Facility and Beaver Lodge.
- Approximately 18 miles of 8-inch steel lateral from Dunn, which will deliver into the trunkline approximately 30 miles north of Belfield.
- Approximately 4 miles of 8-inch steel lateral from Belfield, which will deliver into the trunkline just north of Belfield.

2.3.5 Maximum Design Operating Pressure and Temperature

The proposed Project is designed for a maximum temperature rating of 120 degrees Fahrenheit and a maximum operating pressure of 1,480 pound-force per square inch gauge (psig). The Project will typically operate at 60 degrees Fahrenheit and between 200 to 1,480 psig.

2.3.6 Maximum Design Flow Rate

The 12-inch trunkline is designed for an initial flow rate of 65,000 BPD; the 8-inch pipeline is designed for an initial flow rate of 15,000 BPD. The maximum design flow rate of the 12-inch trunkline is 85,000 BPD. The maximum design flow rate of the 8-inch laterals is 20,000.

2.3.7 Number and General Location of Compressor or Pumping Stations

The trunkline is fed via six receipt points: Beaver Lodge Receipt Point, Keene Receipt Point, Watford City Receipt Point, Arrow Midstream (east of Watford City) Receipt Point, Dunn Receipt Point and Belfield Receipt Point. Truck unloading tanks, LACT units and delivery pumps will be provided as needed by others.

2.4 Time Schedule

Table 3 presents Project milestones and expected completion dates. BakkenLink anticipates receiving necessary pre-construction permits and approvals, acquiring the necessary right-of-way (ROW), and finalizing other agreements no later than April 2012. The construction schedule is dependent upon permitting, ROW acquisition, and other development activities. The anticipated in-service date for the Arrow to Belfield portion of the Project is August 2012. The anticipated in-service date for the Beaver Lodge to Arrow portion of the Project is December 2012.

Table 3. Schedule

Project Milestone	Completion Date
Certificate of Corridor Compatibility and Route Permit	November 2011
Engineering and Design	November 2011
Construction/Environmental Permitting	March 2012
ROW Land Acquisition	April 2012
Start Construction	April 2012
Construction Complete (Arrow to Belfield)	September 2012
Commissioning (Arrow to Belfield)	September-October 2012
In Service (Arrow to Belfield)	October 2012
Construction Complete (Beaver Lodge to Belfield)	November 2013
Commissioning (Beaver Lodge to Arrow)	November-December 2013
In Service (Beaver Lodge to Arrow)	December 2013

3.0 Studies

Resource assessments are on-going and results available at the time of this filing are provided herein. BakkenLink will perform all of the required studies in a timely and professional manner including, but not limited to: a Class III Cultural Resource Inventory, a wetland delineation, consultation and assessments for threatened and endangered species, raptors, and prairie grouse, and botanical and tree surveys, as applicable.

3.1 Cultural Resources

Metcalf Archaeological Consultants, Inc. completed a Class I Cultural Resource Inventory of the proposed Corridor. The Class I Cultural Resource Inventory involved a search of both the site and manuscript files at the State Historical Society of North Dakota for the proposed Project Corridor.

The search had two objectives. One was to identify those cultural resources – buildings, structures, sites, objects, or districts, that are 50 years or older or properties of traditional religious and cultural importance to Native Americans – that have been recorded within and adjacent to the Project Corridor. Identification included, to the extent possible, establishing whether the resources have been determined eligible for inclusion or already included in the National Register of Historic Places (NRHP). Both determinations afford the same considerations/protections under the National Historic Preservation Act. Any resources that have been determined as eligible or are included in the NRHP will be avoided to the extant practical. If avoidance is not possible, appropriate mitigation measures will be implemented.

The second objective was to identify any cultural resource inventories that have been conducted within the search area. After the ROW has been selected, any cultural resource inventories that have been conducted within the ROW will need to be evaluated to determine whether the area(s) included in the inventories need to be re-inventoried.

The results of the site file search are documented in Table 4 and the manuscript file search in Table 5. Table 4 is organized by township, range, and section (T/R/S). In sections where a cultural resource has been identified, the resource is identified by the site number (SITS #), site type and description, who recorded it and when, eligibility evaluation, whether it has been tested, and the related manuscript number. Table 5 is organized by manuscript number (MS#) and the reference: author(s), year, and title.

Table 4. Site Files Search

T/R/S	SITS #	Site Type & Description	Recorder, Date	Eligibility	Tested	MS #
140/98-7	32SK127	Historic-foundation, cultural material scatter, masonry, metal, plastic, wood	Klinner, 1997	Not Eligible	None	6953
140/98-18	No Sites					6953
140/99-1	No Sites					124
140/99-2	No Sites					124, 5477
140/99-3	No Sites					124, 5477

T/R/S	SITS #	Site Type & Description	Recorder, Date	Eligibility	Tested	MS #
140/99-4	No Sites					124, 7633
140/99-9	No Sites					124, 7633
140/99-10	No Sites					124
140/99-11	No Sites					NA
140/99-12	No Sites					NA
140/99-13	No Sites					NA
140/99-14	No Sites					NA
140/99-15	No Sites					NA
140/99-16	No Sites					7633
140/99-21	No Sites					7633
140/99-22	No Sites					NA
140/99-23	No Sites					NA
140/99-24	No Sites					9212
141/99-20	32BI512	Archaeological-cultural material scatter, fire cracked rock, chipped stone	Williams/ Killam, 1987	Undetermined	None	4744
141/99-20	32BIx257	Archaeological- projectile point, chipped stone	Killam/ Williams, 1987	Not Eligible	None	
143/99-36	No Sites					2228, 5477
145/99-2	32MZ1018	Archaeological- cultural material scatter: projectile point, chipped stone	Christensen, 1989 Pollman, 2007	Undetermined	None	4846, 6051, 7318, 11276
145/99-11	32MZ1180	Archaeological- cultural material scatter: chipped stone	Borchert, 1993 Pollman, 2007	Undetermined	None	6051, 6769, 11276
145/99-14	32MZ1570	Architectural- Grassy Butte Methodist Church	Bentley, 1999	Undetermined	None	1826, 6769
145/99-25	32MZ1041	Archaeological- cultural material scatter: faunal remains, chipped stone	Floodman, 1990	Undetermined	None	1362, 3758, 5249, 5364, 5537, 5770
145/99-25	32MZx389	Archaeological- chipped stone	Floodman, 1990	Not Eligible	None	
146/99-35	32MZx908	Archaeological- chipped stone	Larson, 1998	Not Eligible	None	6146, 7318, 7427, 11276

T/R/S	SITS #	Site Type & Description	Recorder, Date	Eligibility	Tested	MS #
147/99-3	32MZ1560	Historic- US Highway 85	Fandrich, 2001	Eligible	None	542, 3749, 3758, 4347, 4980, 5494, 5833, 7141, 7684, 8884, 9938
147/99-3	32MZ1561	Historic- Linear WAPA Transmission Line	Fandrich, 2001	Not Eligible	None	
155/96-12	No Sites					NA
155/96-13	No Sites					NA
155/96-14	32WI341	Archaeological- grave, fire cracked rock, human remains, chipped stone	Swenson/ Snortland, 1992	Not Eligible	Mitigation	NA

[1]NA not applicable since a survey was not conducted

Table 5. Manuscript File Search

MS #	Reference
124	Lahren, L. 1977. Extensive Cultural Resource Evaluations on Selected Drill Site locations in the Nation Grasslands of North And South Dakota, Slope County, Billings County, and Stark County, North Dakota
542	Kuehn, D. 1979. Pasture 8 Allotment 1, Water Pipeline Survey, McKenzie County, North Dakota
1362	Simon, A. and L. Loendorf. 1980. McKenzie Rural Electric Cooperative 115KV Transmission Line Survey, McKenzie County, North Dakota
1826	Simon, A. 1981. McKenzie Electric Cooperative REC 1154 kV Bicentennial to Charlie Creek Line, McKenzie County, North Dakota
2228	Loendorf, L. and J. Borchert. 1980. Class III Intensive Inventory for All Cultural Resources for the Proposed Amoco Pipeline Company's Gathering Line Through Portions of Billings and Dunn Counties, North Dakota
3749	Thiessen, T. 1983. Archeological Reconnaissance of Boundary Fences at Theodore Roosevelt National Park, June 2-9, 1983, Billings County and McKenzie County, North Dakota
3758	Linnabery, M. 1984. A Class III Inventory of the Williston Gas Company Pipeline Right of Way Segments Northern Gathering System, McKenzie and Billings Counties, North Dakota, and Supplemental Survey No 3
4347	Taylor, J. 1979. Theodore Roosevelt National Park North Unit Underground Telephone and Power Line Project, McKenzie County, North Dakota
4744	Mortrano, M., D. Killam, and P. Friedman. 1990. Class I Literature Search and Class III Intensive Inventory Charlie Creek to Belfield 345-KC Transmission Line Project, Stark, McKenzie, Dunn, and Billings Counties, North Dakota
4846	Christensen, R. and K. Schweigert. 1990. Archaeological Inventory of McKenzie Electric Cooperative Pole Replacement in Dunn and McKenzie Counties, North Dakota
4980	Floodman, M. 1990. Civilian Conservation Corps Camp and Scoria Road Upgrade, McKenzie County, North Dakota

MS #	Reference
5249	Floodman, M. 1990. Pasture 15-1 Riparian Pipeline and Tank McKenzie District, Little Missouri National Grasslands Section 25 T145N R99W and Section 30 T145N R98W McKenzie County, North Dakota
5364	Floodman, M. 1990. Charlie Carson Dam #2 McKenzie District, Little Missouri National Grasslands Section 25, T145N, R99W McKenzie County, North Dakota
5477	Karsmizki, K. 1991. U308 Uranium Industry Context Statement. Adams, Slope, Golden Valley, Billings, Bowman, Dunn, and Stark Counties, North Dakota
5494	Floodman, M. 1991. Summit Trail Inventory McKenzie District Little Missouri National Grasslands Sections 3, 10, 11, 13, 14, 15, T147N R99W, McKenzie County, North Dakota
5537	Floodman, M. 1991. Pasture 15-2 Pipeline McKenzie District, Little Missouri National Grasslands Section 25, T145N, R99W McKenzie County, North Dakota
5770	Floodman, M. 1992. Pasture 15-1 Rangewater Project McKenzie District, Little Missouri National Grasslands Section 25 T145N R99W McKenzie County, North Dakota
5833	Floodman, M. 1992. Long X Trail Inventory McKenzie District, Little Missouri National Grasslands Section 3, 4, 8, 9, 10, 16, 17, 18 T147N R99W, McKenzie County, North Dakota
6051	Borchert, J. 1993. McKenzie Electric Cooperative, Inc. 1993-1994 Construction Routes in Dunn and McKenzie Counties, Class III Cultural Resource Inventory UW#1606
6146	Borchert, J. 1993. Consolidated Telephone Grassy Butte Exchange #1-10 Cable Routes. Class II Reconnaissance Inventory. McKenzie, Dunn, and Billings Counties.
6769	Kulevsky, A. 1996. KLJ/CTC Grassy Butte Telephone Exchange: A Class II and Class III Cultural Resource Inventory in Dunn and McKenzie Counties, North Dakota
6953	Klinner, D. 1997. ND533-Consolidated Telephone Cooperative, South Heart Exchange Cable Improvements in Stark, Billings, and Slope Counties, North Dakota UW#1954
7141	Floodman, M. 1997. 1977 USDA Forest Service, Custer National Forest Negative Survey Reports in Golden Valley, Billings, Slope, and McKenzie Counties in North Dakota
7318	Larson, T. 1998. Results of a Class III Cultural Resource Inventory for NDDOT Project Areas NH-7-085(031)112 and NH-7-085(032)120 McKenzie County, North Dakota
7427	Morrison, J. 1999. Grassy Butte Cable Route: A Class III Cultural Resource Inventory, Billings, Dunn and McKenzie Counties, North Dakota
7633	Borchert, J. 2000. NH-5-085(040)075. Class II Cultural Resource Inventory for a Hot Bituminous Surfacing Project on Highway 85, Stark and Billings Counties, North Dakota
7684	Bluemle, W. 2000. Grassy Butte: A Class III Cultural Resource Inventory, McKenzie County, North Dakota
8884	Fandrich, B. 2004. Williston to Charlie Creek: A Cultural Resource Inventory Along the Western Area Power Administration 115KV Transmission Line From the Williston Substation to the Charlie Creek Substation, Williams and McKenzie Counties, North Dakota
9212	Bleier, A. 2005. 2005 State Wide Forest land Enhancement Program Sites in Burleigh, Dunn, Emmons, Stark, Stutsman, and Walsh Counties, North Dakota: A Class III Cultural Resource Inventory
9938	Hiemstra, D. 2006. Grassy Butte Testing and Survey: A Cultural Resource Evaluation of 3 Sites and 1 Site Lead and a Cultural Resource Inventory of Access Roads and Realignment for the Proposed Rebuild of WAPA's Williston to Charlie Creek 115kv Transmission Line
11276	Leuchtmann, A. 2009. Highway 85 From North Dakota Highway 200 to North Dakota Highway 2: A Class III Cultural Resource Inventory, McKenzie and Williams Counties, North Dakota

Twelve cultural resources were identified in the Corridor. All but three of the resources consist of archaeological cultural material scatters. The remaining sites are historic and one is architectural. Site, 32MZ1560, US Highway 85, has been determined eligible for inclusion in the

National Register of Historic Places (NRHP). The eligibility of sites 32BI512, 32MZ1018, 32MZ1180, 32MZ1570, and 32MZ1041 has not been determined. These sites are not located in the Route. All other sites were determined as ***not eligible*** for inclusion in the NRHP.

The Class I cultural resource findings are discussed further in the report(s) titled *Option 7, The BakkenLink Pipeline Final Report, Class I Cultural Resource Inventory* and *Addendum 1: Dunn Lateral, The BakkenLink Pipeline: Final Report Class I Cultural Resources Inventory*, provided in Appendices B and C, respectively.

Constructing the Project to avoid cultural resources should negate any adverse effects. In the event that an adverse impact may occur, the nature of the impact will be determined and the North Dakota State Historic Preservation Office (SHPO) will be consulted to determine eligibility for listing on the NRHP. If the site is determined eligible, mitigation could include an effort to minimize Project impacts on the resource and/or collection of additional documentation.

BakkenLink will perform a Class III Cultural Resource Inventory to formulate a preliminary determination of the significance of cultural resources along the Project route and evaluate their eligibility for listing in the NRHP. The results of the Class III survey will be submitted to the SHPO. Concurrence with respect to the effects on known resources and appropriate mitigation measures will be obtained from the SHPO prior to construction. In addition, BakkenLink will develop an "Unanticipated Discovery Plan" to guide procedures if an unknown cultural resource or human remains are inadvertently encountered during construction. The discovery plan will outline the framework for handling such discoveries in an efficient and legally compliant manner.

3.2 Wetland Delineation

A field delineation of wetlands will be conducted prior to construction. The delineation will follow procedures outlined by the United States Army Corps of Engineers (USACE) Wetland Delineation Manual (USACE 1987) and Regional Supplement to the Manual: Great Plains Region (USACE 2008). Field findings will be summarized in a wetland delineation report filed as an addendum to this application.

3.3 Raptor and Prairie Grouse Survey

Historical nesting data obtained from the U.S. Fish and Wildlife Service, the North Dakota Parks and Recreation Department, and the North Dakota Game and Fish Department indicates there is suitable raptor nesting habitat and grouse lek sites within the proposed Corridor. BakkenLink initiated a survey for raptor species, including bald and golden eagles, and prairie grouse (sharp-tail and sage grouse) in April 2011. The results of this survey are discussed in the report titled *Raptor and Prairie Grouse 2011 Survey, BakkenLink Pipeline* provided in Appendix D.

4.0 Need for Facility

BakkenLink is proposing to construct the Project, which consists of a pipeline system that collects crude oil from existing or new crude oil truck receipt locations and pipeline gathering receipt stations and transports such collected crude oil to the Rail Facility, to be located near Fryburg, North Dakota, or to Beaver Lodge.

The Project will address anticipated regional pipeline and outlet constraints as development of the Bakken continues. With initial outlets via the Rail Facility and Beaver Lodge, BakkenLink will provide a number of producers in western North Dakota with a much needed alternative means of marketing and transporting their crude oil. BakkenLink will provide access to new markets via the Rail Facility. Additionally, the strategic position of the pipeline system will encourage the development of pipeline gathering laterals and receipt points and outlet connections with third party pipelines, including potentially the Enbridge North Dakota Pipeline system, the Tesoro High Plains Pipeline system, the Bridger Pipeline system, and if approved and it moves to construction, the Keystone XL Pipeline system.

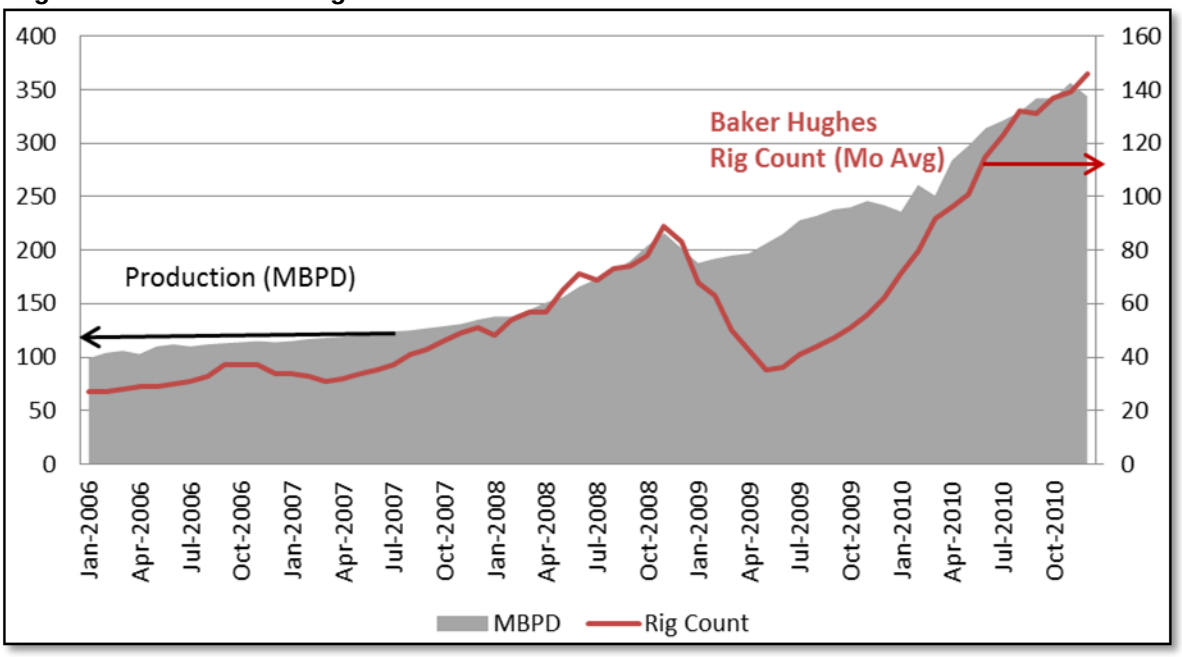
4.1 Needs Analysis

Over the last five years, development of the middle Bakken and upper Three Forks formations has steadily increased in North Dakota. Technological advancements in horizontal drilling and fracture stimulation have made recovering the oil in these formations economically feasible. Favorable oil prices have further accelerated this development.

An initial study by the United States Geological Survey (USGS) released in 2008 claimed that the middle Bakken had 4 billion barrels of recoverable oil in the Williston Basin. The latest official estimate from the North Dakota Industrial Commission (NDIC) is that up to 11 billion barrels may be recoverable from the middle Bakken and upper Three Forks formation in North Dakota. Continental Resources, Inc., a leading Bakken producer, has indicated that at current economics and with current technology the Bakken and Three Forks has 24 billion barrels of recoverable oil. As technological advances continue, even these higher estimates may be exceeded.

Production is forecasted to grow in North Dakota from a record 356,000 BPD in November 2010 to up to and in excess of 1,000,000 BPD over the next five years. During March 2011, there were approximately 170 rigs drilling for oil in North Dakota. According to the NDIC, over 95% of drilling is targeting the middle Bakken and upper Three Forks formations. It is expected that the rig count could approach 200 rigs during 2011 (Figure 2).

Figure 2. North Dakota Rig Count and Production

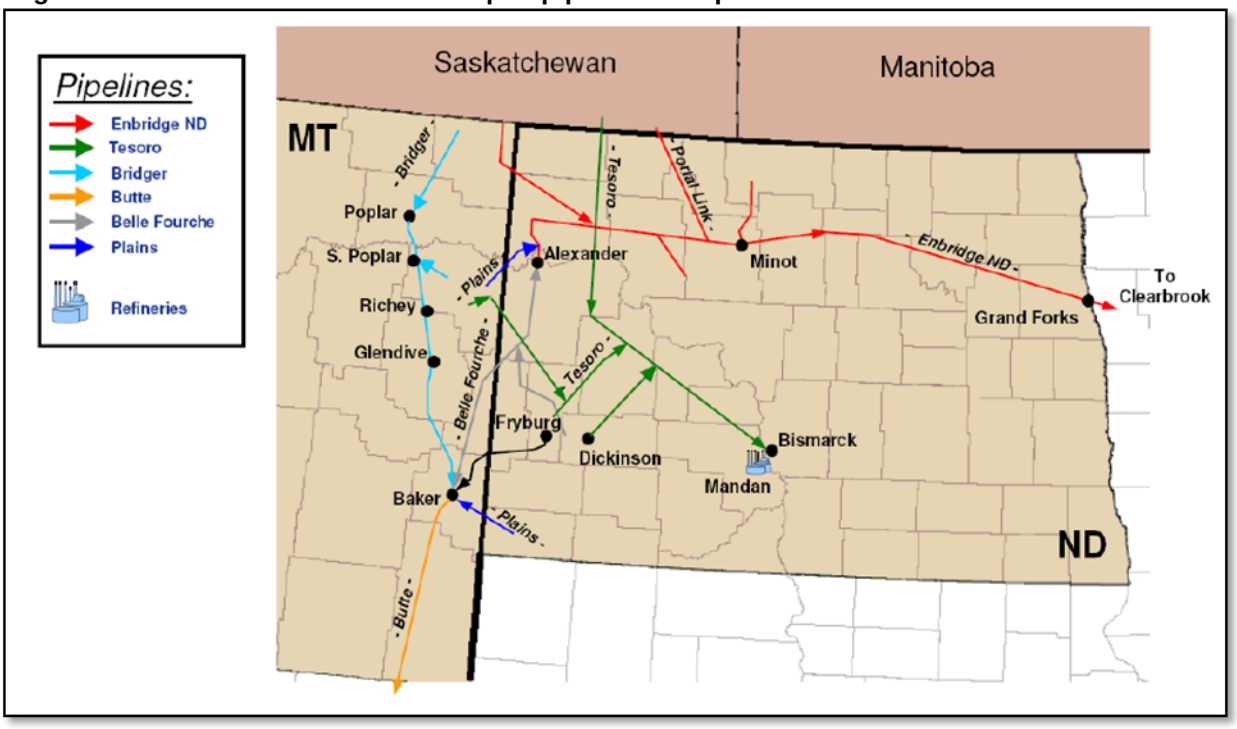


Crude oil produced in North Dakota can be consumed locally at the Tesoro refinery in Mandan or move out of the area in a number of different ways. Pipelines originating in North Dakota ship crude to several market hubs:

- Guernsey, Wyoming
  - Crude primarily moves through two existing pipelines (Bridger Poplar and Four Bears/Little Missouri) to Baker, Montana and further downstream to this trade center on Butte pipeline. From Guernsey, crude can move on Platte pipeline to Wood River, Illinois and ultimately to various downstream refinery locations. It can also move via third party pipelines from Guernsey to refineries located in Colorado, western Wyoming and Utah.
- Clearbrook, Minnesota
  - Crude moves through the Enbridge North Dakota pipeline system to this trade center or further downstream in the Enbridge "mainline" system (multiple pipelines) to markets at Chicago, Illinois, Sarnia, Ontario, and also Cushing, Oklahoma
- Crude can also move out of the region by trucks to Canada and by rail, directly to refineries or market centers such as Cushing (Stroud), Oklahoma or St. James, Louisiana.

In February 2011, Enbridge commenced its initial 25,000 BPD capacity pipeline Portal reversal project with access to Cromer, Saskatchewan or further downstream through the Enbridge "mainline" system (Figure 3).

Figure 3. Williston Basin Crude Oil Liquid pipeline transportation network



The combination of Canadian imports into the United States and increases in domestic production have served to generally constrain the take-away capacity for producers in North Dakota and in the Rocky Mountains. During the past three years, crude oil transporters in the Williston Basin have made tremendous progress expanding infrastructure to meet growing production; however, the region's existing pipeline infrastructure for the crude oil transportation is at or near capacity. The Williston Basin has take-away capacity of 501,000 BPD by pipeline and rail to refineries and markets around the country, not including additional capacity available in Canada.

Table 6. Williston Basin Crude Oil Take-away Capacity

Crude Oil Take-Away Capacity (March 2011)	Capacity (BPD)
Tesoro Refinery	58,000
Enbridge North Dakota Pipeline	161,500
Butte Pipeline	118,000
Enbridge Portal Reversal	25,000
Enbridge Sweet Expansion	23,500
EOG Stanley Rail Facility	65,000
Dakota Transport Solutions (New Town)	20,000
Other Rail	30,000
Total Take-Away capacity	501,000
Current Production (estimated as of Nov 2010)	420,000

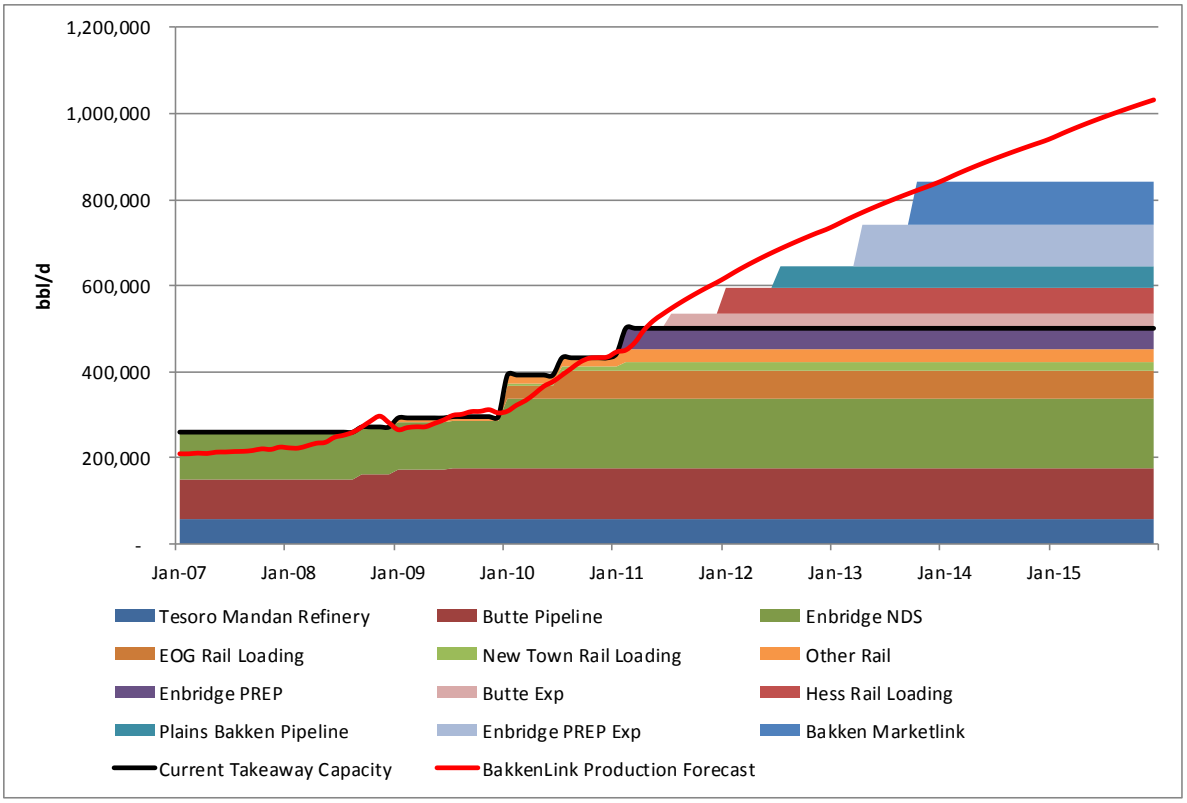
Production in the US Williston Basin is about 420,000 BPD and grew by 10,000-15,000 BPD per month in 2010 with a rig count lower than the current per month average of approximately 160-170 rigs.

To serve anticipated growth, additional take-away options are under consideration:

- Enbridge plans to expand their Portal reversal project with total capacity of 145,000 BPD with anticipated in-service in 2013.
- True plans to expand the Butte pipeline system downstream of Baker, Montana with expansion projects of 32,000 occurring in 2011.
- Plains Pipeline, L.P. filed a Letter of Intent in November, 2010 to construct a 12" pipeline from Trenton, North Dakota to the Canadian border. Initial capacity is stated to be 50 MBPD with completion in the fourth quarter 2011.
- TransCanada recently announced in January 2011 signed contracts to support the construction of the Bakken Marketlink project, offering 100,000 BPD capacity on Keystone XL with in-service in second quarter 2013.
- Tesoro Corporation announced on March 21, 2011 that it plans to increase daily capacity at its North Dakota refinery by 10,000 barrels, to 68,000 BPD. The expansion is scheduled to be completed in 2012. It will increase take-away capacity by 10,000 BPD.

BakkenLink's own forecasts conservatively predict crude oil production will begin to exceed current take-away capacity before year end 2011 and continue to do so including announced crude oil take-away pipeline projects in the Williston Basin through at least 2015.

Figure 4. Williston Basin Crude Oil Export Capacity[1]



[1] Data based on reported projects as well as internal BakkenLink estimates.

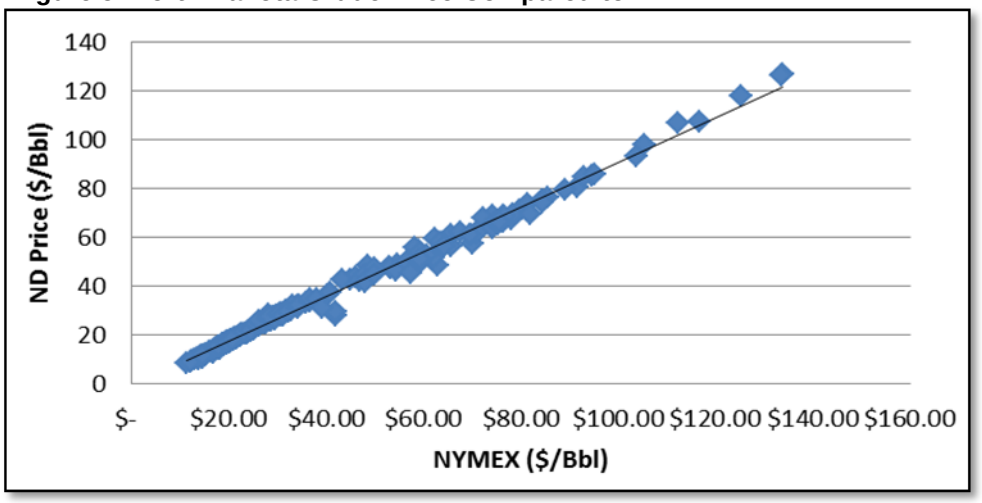
Due to the long lead time for pipeline export projects, there are a number of rail projects underway or proposed that would provide near-term swing capacity as there is growing use of trains to help balance the supply with the lack of pipeline take-away capacity:

- Hess is constructing a unit train facility near Tioga with capacity of at least 60,000 BPD.
- Rangeland has announced a manifest and unit train facility at Epping with capacity of 27,000 BPD and will include a 20-mile pipeline to provide access to pipelines at Beaver Lodge.
- Additional major crude export rail facilities are under consideration with one near Trenton and one near Dickinson.

In recent months, there is growing appetite by producers and marketers to access additional (i.e., higher-priced) markets via rail, such as St. James, Louisiana.

Due to the limited market delivery and shipping capacity of North Dakota infrastructure, the price North Dakota producers receive for their crude oil is generally about 10% less than a barrel of crude produced elsewhere and sold on the New York Mercantile Exchange (NYMEX). Figure 5 illustrates this linear relationship and is based on information obtained from the United States Energy Information Agency.

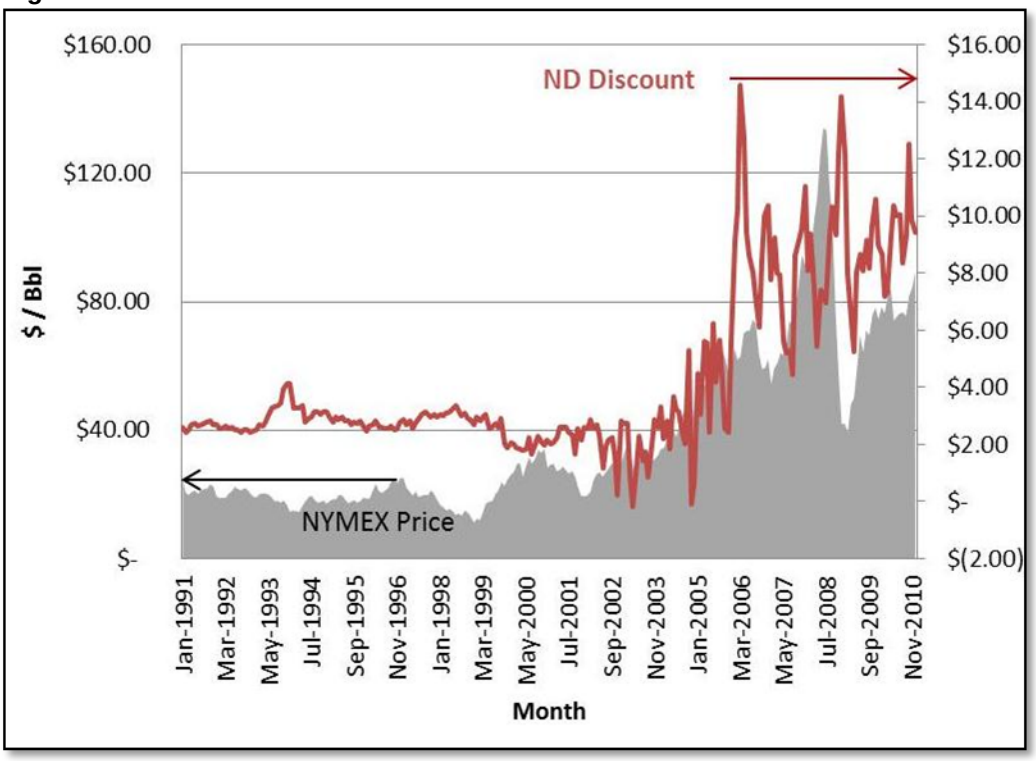
Figure 5. North Dakota Crude Price Compared to NYMEX[1]



[1]Energy Information Agency (EIA)

It is also informative to look at the variations in the absolute price differential between North Dakota first purchase price and NYMEX. Figure 6 illustrates that the differentials in recent years have tended to be volatile.

Figure 6. Price Differentials between North Dakota and NYMEX



North Dakota producers have realized lost revenue in the millions of dollars due to wide fluctuations in price differential. Constrained export capacity and lack of alternative markets make North Dakota crude vulnerable to varying price differentials.

The North Dakota Pipeline Authority completed a study in 2009 to investigate viable alternatives for large volume crude oil shipping. Part of that study investigated the construction of "on ramp" access to either or both TransCanada's Keystone pipeline (originating in Hardisty, Alberta, crossing eastern, North Dakota, and ending at refineries in Oklahoma and Illinois) or the Keystone XL Pipeline (originating in the same area, traversing western Montana, and ending in Cushing, Oklahoma). While the primary delivery points for BakkenLink are the Rail Facility and Beaver Lodge, an extension of the Project to an interconnect with the proposed Keystone XL Pipeline system via TranCanada's Marketlink project is currently being assessed by BakkenLink and its customers. If the extension is needed, BakkenLink will make the appropriate filings with the Commission. Further such extension of the pipeline to Baker, Montana will allow for other possible interconnects with crude oil pipelines in that area.

The Project will deliver Bakken crude through an outlet connection to the Rail Facility and Beaver Lodge, providing vital access to a variety of new destinations and markets for North Dakota producers. Through its direct connection to a crude unit train facility, Bakken producers will be able to have their crude transported by railways to refineries and market hub tank farms in Oklahoma, Louisiana, California and elsewhere in the United States.

Due to its strategic position, the Project will also be well situated to connect with several existing third party pipeline systems. Based on future need, BakkenLink will provide a means for adding outlet connections to access several existing third party pipelines at Beaver Lodge and other locations on its system. Since these third party pipelines already exist, these

connections could be accomplished with minimal impacts. For example, the Beaver Lodge receipt point, north of Lake Sakakawea, will provide producers north of the lake with an alternative to taking their production to markets other than Clearbrook. However, there are potential benefits to producers south of the lake as well. A substantial portion of the production growth in the Catchment Area will be south of the lake. Based on future need, the section of pipe crossing the lake will be bi-directional, allowing these producers access to the Clearbrook market via the Enbridge North Dakota pipeline system and alternative rail facilities at Tioga and Stanley (e.g., during Mandan refinery turnarounds).

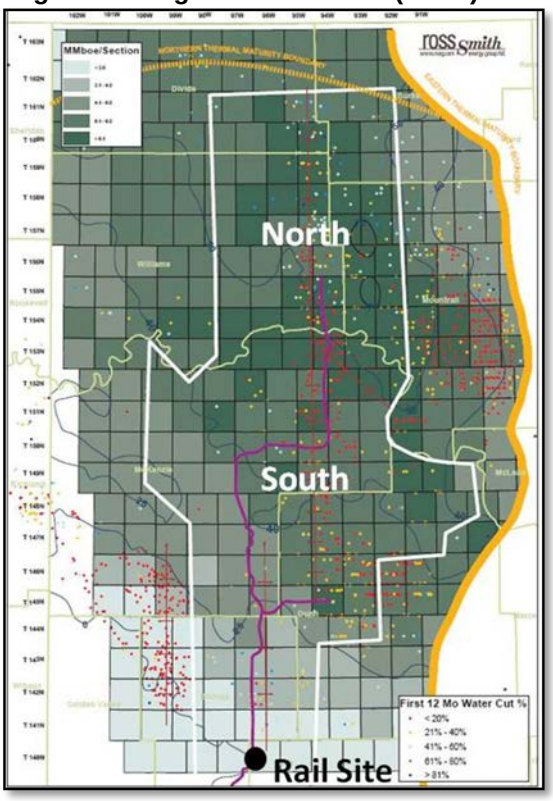
This Project will provide an environmentally sensitive method of transporting crude oil from the heart of the Bakken play, greatly benefiting producers, landowners, citizens in the State of North Dakota, local municipalities, and mineral interest owners. Expected Project benefits for stakeholders include:

- A new, competitive independent pipeline option for producers and marketers.
- Crude quality preservation for customers (BakkenLink will transport only Bakken quality sweet crude thereby eliminating commingling/interface downgrades).
- Increased flexibility to producers and marketers through additional connection points for truck unloading and new pipeline gathering systems.
- Additional tax revenue to state and local governments and school districts.
- Reduction on the impact on roads and public infrastructure.
- Additional employment by bringing new jobs to the region.

Based on current rig activity, BakkenLink estimates that oil production associated with Bakken and Three Forks development will increase beyond existing pipeline capacity in the geographic market area to be served by BakkenLink in the Catchment Area. Without additional pipeline capacity, the amount of oil transported by truck will have to increase significantly, further burdening already strained roads and related infrastructure

To confirm the need for the Project an internal study was undertaken with the assistance of Ross Smith Energy Group (RSEG), a leading North American oil and gas investment research firm, to estimate total recoverable Bakken crude oil resources and future production in the Catchment Area of the Project. Based on RSEG's geological analysis of the Middle Bakken, there are 2.4 – 4.2 billion barrels of oil recoverable in the Catchment Area. Results are summarized in Figure 7.

Figure 7. Original Oil in Place (OOIP) Estimates[1]

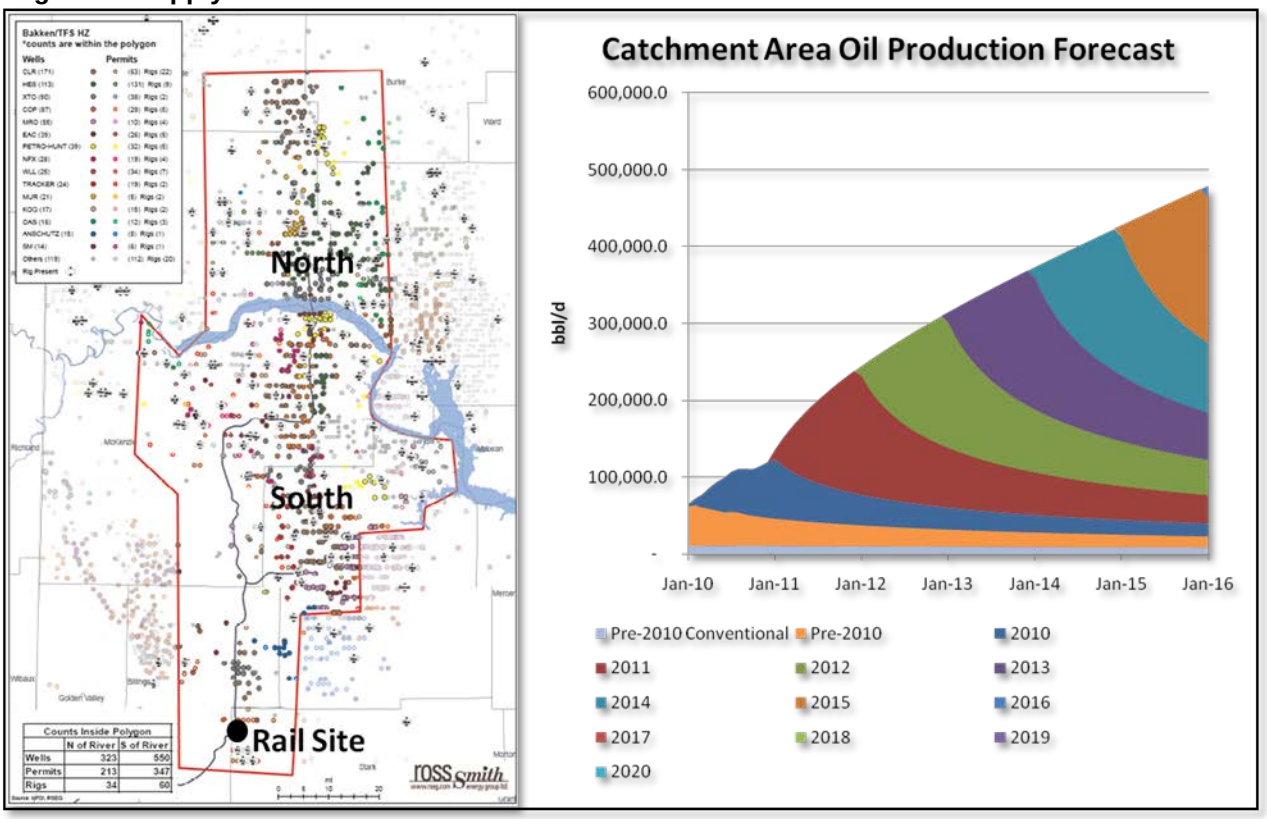


- Catchment Area, white polygon, catches all of the highest OOIP land
- Based on mapping, RSEG estimates 35 billion bbl in pipeline catchment area for the Middle Bakken
  - 46% north of the river
  - 54% south of the river
- 2.4 – 4.2 billion bbl recoverable (7-12% recovery factor)
- Higher OOIP will support more in-fill drilling
- Additionally, the Three Forks underlies much of the same land
  - Potentially 36 billion bbl OOIP assuming 40' average thickness
  - Higher percentage south of the river
  - RSEG expects similar recoveries (7-12% of OOIP) from the upper40' of Three Forks.

[1] Based on data provided to North Dakota Industrial Commission (NDIC) by operators.

Figure 8 provides an estimate of the future production in the Catchment Area of the Project. In 2015, the Project's initial capacity represents less than 25% of forecast production within its own Catchment Area. Furthermore, by 2020, initial capacity would be less than 15% of forecasted Catchment Area production.

Figure 8. Supply Forecast for BakkenLink Catchment Area



4.2 Alternatives

As part of Project development, BakkenLink analyzed alternatives to the proposed Project. The alternatives analysis considered a no action/no build alternative, alternative sites, alternative technologies, modified designs or layouts, modified scale or magnitude, and alternatives incorporating reasonable mitigation measures.

4.2.1 No Action Alternative

If this alternative were selected, the following options would be available:

- Trucking crude oil to receipt locations on existing pipelines. This is a temporary, short-lived solution as production will soon reach and eventually surpass the capacity of existing pipelines to move the required quantities of crude oil. No action will not alleviate the already long wait times at existing unloading locations. In some instances, rather than waiting, truckers travel long and excessive distances to access other existing pipeline receipt locations with less or no wait time. At some existing truck receipt locations, unloading capacity may not be available, and depending on the specific location of each lease relative to the unloading location, will force truckers to drive past them to unload at more distant locations where there is available capacity. The no action alternative will continue to restrict the number and frequency of truck receipt locations, putting additional trucks on the road and further increase the amount of truck mileage for hauling crude from the lease to available truck receipt point locations.

The no action alternative is not an acceptable long-term alternative to the proposed Project.

4.2.2 Market Alternatives

Bakken crude oil from the Williston Basin will serve markets in North Dakota as well as other refining centers.

Currently, there is one refinery in North Dakota, owned by Tesoro, and located near Mandan. Tesoro announced on March 21, 2011 that it plans to increase daily capacity at its North Dakota refinery by 10,000 barrels, to 68,000 BPD. The expansion is scheduled to be completed in 2012. It will increase take-away capacity by 10,000 BPD.

For some time, there have been efforts to increase refinery capacity locally which have been supported by private industry and the public sector including the state of North Dakota, the United States Department of Energy National Energy Technology Laboratory (NETL), and the North Dakota Association of Rural Electric Cooperatives (NDAREC). To date, studies to determine the feasibility of increasing oil refining capacity in North Dakota have been inconclusive. According to the Executive Summary of Pipelines and Refined Products Report presented to the NDIC in 2008, a new refinery with reasonable economy of scale would likely cost at least $3 billion dollars, excluding pipeline infrastructure and the permitting process for a new refinery could take at least 5 to 10 years. A 2010 North Dakota refining capacity study prepared for NETL by NDAREC concluded that a 34,000 BPD diesel and naphtha refinery costing about $700 million may be feasible except for having a less than acceptable project return to attract private industry investment.

Even with the Mandan expansion and a new refinery in North Dakota to access new local crude supplies, there will be excess crude that must be transported to other refining centers outside of the state as production from Williston Basin is expected to grow from 420,000 BPD to possibly 1,000,000 BPD over the next five years. There are no viable local market alternatives to the proposed Project. Pipeline construction must keep pace with this production growth.

4.2.3 North Dakota Pipeline Alternatives

Pipeline capacity within North Dakota is constrained as a result of rapidly increasing production. More importantly, the Bakken development is producing over a region rather than discrete, individual oil fields. This oil production is occurring in areas outside of the boundaries of existing oil producing fields in North Dakota. Therefore, there are and will be large portions of the Bakken play severely underserved or under-piped relative to where development historically occurred.

As fully detailed and discussed in Section 4.1 Needs Analysis, although additional pipeline projects are proposed in North Dakota, it is expected that the capacity of these projects will soon be reached and market options for North Dakota producers will once again be limited.

The Project will place new pipeline capacity in areas where traditionally there has not been significant oil production. Currently, producers with leases along and around Highway 85 and Highway 23 south and east of Watford City, respectively, have to truck crude long distances to access a pipeline receipt point. The Project will bring pipeline capacity closer to these leases

and shorten the trucking distance for these producers. Further, it will encourage the development of local lease level gathering systems. There are no pipeline alternatives in these areas.

Additionally, with the trunkline having bi-directional capability, able to transport crude oil to/from the Rail Facility and Beaver Lodge, the Project will provide producers in the Catchment Area of the pipeline on both sides of Lake Sakakawea greater diversification of market outlet access associated with this flexibility and will relieve possible temporal and/or local constraints on other pipeline systems.

There are no viable pipeline alternatives to the Project. Furthermore, the Project should enhance overall utilization of the existing pipeline capacity within North Dakota as well as adding needed capacity in new areas of the Bakken play.

4.2.4 Truck and Rail Alternatives

Approximately 20% of production is shipped by rail and another 10% is trucked.

The trucking alternative is deemed unacceptable as additional trucking will quite simply overburden the existing public road capacity.

The rail alternatives that have evolved at present offer very attractive transportation options due to the flexibility to serve key destinations in the United States and greater flexibility if production is rapidly increasing or decreasing. EOG Resources, Inc. began operating a unit train facility in Stanley, North Dakota with service to Cushing, Oklahoma in December 2009. Hess Corporation is constructing a new unit train facility in Tioga, North Dakota that will be operational in early 2012. EDOG Logistics LLC is constructing a new unit train rail facility in Dickinson, ND that is scheduled to start loading crude later this year. In August 2010, Dakota Transport Solutions began shipping crude oil from New Town, North Dakota. Since 2008, smaller rail facilities in North Dakota have continued to operate with an estimated combined capacity of 30,000 BPD and include locations in Minot, Dore, and Donnybrook, North Dakota and Stampede, Montana.

Rail transportation, especially when fed by local pipelines, can significantly supplement takeaway capacity. BakkenLink supports development of additional crude by rail facilities, especially on the south side of the Bakken play, along the BNSF Railway Company (BNSF) rail line that extends between Dickinson and Fryburg, and pipelines offer a safe, reliable and efficient means to transport crude to rail facilities. As noted previously, the Project will interconnect to a rail facility at Fryburg.

Bakken producers south of Lake Sakakawea have limited access to crude by rail facilities, especially the high capacity, high efficiency unit train design. These types of rail facilities will be more reliably and efficiently served by pipelines instead of solely by trucks.

4.2.5 Route Alternatives

BakkenLink evaluated several options for the proposed Project route. Each option was considered in light of study of underserved Bakken development areas, economics, engineering design, feasibility to construct, and environmental impacts. The location of the proposed route was selected to have minimal effects on resources and residents. Key routing considerations included:

- Location and number of receipt points in relation to existing and proposed oil field production facilities;
- The crossing of the Missouri River west of Williston;
- The crossing of the Missouri River north of Waterford City; and
- The pipeline route across the Little Missouri National Grasslands (LMNG).

The route design for the Project will provide frequent origination points (Receipt Points) in the most prolific and active parts of the middle Bakken and upper Three Forks development but also open up new areas that are not currently accessible to pipeline service, especially between Johnson's Corner and Watford City and between Watford City and Belfield. The 12-inch trunkline allows for economic expansion opportunities. This need for expansion in these areas is supported by the proprietary catchment study, including the original oil in place estimates.

The Missouri River crossing is a key logistical consideration. Several crossing locations were evaluated during preliminary design and planning of the Project. Crossing locations west of Williston, at New Town, and a location approximately 10 miles west of the proposed location, have been evaluated. BakkenLInk presented the different crossing location options for discussion at meetings with the USACE and USFS on November 2, and December 9, 2010, and on February 9, 2011. In these meetings, the USACE and USFS identified the current crossing location as their preferred route due to the presence of existing pipelines at that location. Other parties reportedly have also been exploring the same river crossing location and certain advantages exist for locating their pipeline adjacent to this route. This crossing is discussed further in Section 5.0

Two different routing options through/around the LMNG were explored. The first generally followed the proposed Bridger pipeline route around the east side of the grasslands. This route was not chosen primarily due to needs of the prospective customers and other operators and the increased length of larger diameter pipe needed to reach the end point which adds greater overall environmental impacts.

The second routing option was considered at the request of the USFS. Representatives of USFS initially indicated the preference for a route paralleling the Northern Border Pipeline Company natural gas pipeline, northeast of the proposed route, instead of the more direct route south of Watford City to Belfield. Again, this alternate route would result in increased mileage of larger diameter pipe and have greater environmental impacts. Recent discussions with the USFS about the more direct route and certain construction and mitigation techniques that may be used for crossing USFS administered grassland have been positive and they have not made recent requests to further consider this alternative.

The current proposed route is considered to be the most direct route from the proposed receipt points and market sectors to the proposed interconnect with the Rail Facility.

4.2.6 Deviations From Ten Year Plan

BakkenLink will file its Ten Year Plan on or before July 1, 2011, and the proposed Project will be consistent with the Ten year Plan.

5.0 Location

NDAC § 69-06-04-02(1)(b) states that the width of a corridor must be at least ten percent of its length, but not less than one mile or greater than six miles unless otherwise determined by the Commission. BakkenLink evaluated several options for the proposed Project location. Each option was considered in light of study of underserved Bakken development areas, economics, engineering design, feasibility to construct, and environmental impacts. As a result of these studies, BakkenLink selected the proposed one-mile wide Corridor because it satisfies the applicable design and feasibility criteria and will have minimal effects on resources and residents. BakkenLink proposes, and requests that the Commission approve, the one-mile wide Corridor because a narrower corridor will allow BakkenLink to provide more detailed, concise, and relevant siting information regarding the Project. Proposing a one-mile wide corridor is also consistent with the recommendations of Commission Staff, and will limit the ability of future projects to utilize the Corridor without obtaining Commission approval pursuant to NDCC § 49-22-03(3).

The proposed Corridor and Route are depicted on the maps and figures included in Appendices E and F.

5.1 Study Area

BakkenLink evaluated a study area to determine the best location for the placement of the corridor and route. Within the study area, a one-mile-wide corridor was selected. The selected location of the route within the corridor minimizes adverse impacts identified in NDAC § 69-06-08-02. The exclusion and avoidance area criteria were used to assess the proposed corridor and route in order to minimize any potential land use and environmental impacts, maximize public benefits, and take into consideration design and construction limitations and economics. The Corridor legal descriptions are provided in Table 7.

Table 7. Corridor Legal Description

County	Civil Township	TWP	RNG	Section(s)
Billings	Unorganized Territory	139	100	2, 10, 11
Billings	Unorganized Territory	140	100	35, 36
Billings	Unorganized Territory	141	99	3, 10, 15, 22, 27, 34
Billings	Unorganized Territory	142	99	3, 10, 15, 22, 27, 34
Billings	Unorganized Territory	143	99	1, 2, 10, 11, 15, 22, 27, 34
Billings	Unorganized Territory	144	99	1, 2, 11, 14, 23, 24, 25, 26, 35
Dunn	Unorganized Territory	145	95	19, 20, 21
Dunn	Unorganized Territory	145	96	24, 25, 26, 27, 28, 29, 30
Dunn	Unorganized Territory	145	97	25, 31, 32, 33, 34, 35, 36
McKenzie	Unorganized Territory	145	98	7, 18, 19, 20, 28, 29, 33, 34, 35, 36
McKenzie	Unorganized Territory	146	99	1, 12, 13, 24, 25, 36
McKenzie	Unorganized Territory	147	98	7, 18
McKenzie	Unorganized Territory	147	99	1, 12, 13, 24, 25, 36
McKenzie	Unorganized Territory	148	99	3, 10, 11, 14, 23, 24, 25, 36
McKenzie	Unorganized Territory	149	98	6, 7, 18, 19, 30, 31

County	Civil Township	TWP	RNG	Section(s)
McKenzie	Grail	150	95	6, 7, 18
McKenzie	Unorganized Territory	150	96	13, 14, 15, 16, 17, 18
McKenzie	Unorganized Territory	150	97	13, 14, 15, 16, 17, 18
McKenzie	Unorganized Territory	150	98	13, 21, 22, 23, 24, 27, 28, 29, 31, 32
McKenzie	Unorganized Territory	151	95	30, 31
McKenzie	Blue Butte	151	96	1, 12, 13, 24, 25
McKenzie	Keene	152	96	1, 12, 13, 24, 25, 36
McKenzie	Elm Tree	153	95	3, 4, 9, 10, 15, 16, 21, 28, 33
McKenzie	Elm Tree	154	95	34
Stark	Unorganized Territory	140	99	6, 7, 14, 15, 16, 17, 18, 19, 30, 31
Williams	Unorganized Territory	154	95	5, 8, 9, 16, 21, 27, 28
Williams	Dry Fork	155	95	5, 8, 17, 20, 29, 32

5.2 Criteria to be Evaluated

The exclusion and avoidance area criteria set forth in NDAC § 69-06-08-02(1) and (2) were taken into consideration when establishing the location of the proposed corridor. Any exclusion and avoidance areas located within the corridor are depicted on the figures in Appendix E. Further discussion of these areas, the selection criteria, the policy criteria and other criteria considered is provided in the following Sections. The criteria set forth in NDCC § 49-22-09 were also evaluated, as discussed in the following Sections.

5.2.1 Exclusion Areas

Pursuant to NDAC § 69-06-08-02(1), specific geographical areas shall be excluded in the consideration of a route for a transmission facility, and shall include a buffer zone of a reasonable width to protect the integrity of the area. Natural screening may be considered in determining the width of the buffer zone. Exclusion areas may be located within a corridor, but may not encompass more than fifty percent of the corridor width at any given point, unless there is no reasonable alternative. There are no exclusion areas present within the Corridor.

Table 8. Exclusion Areas - Corridor

Geographic Area	Present within Corridor	>50% of Corridor Width
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; monuments; and wilderness areas.	No	No
Designated or registered state: parks; historic sites; monuments; historical markers; archaeological sites; and nature preserves.	No	No
County parks and recreational areas; municipal parks; and parks owned or administered by other governmental subdivisions.	No	No
Areas critical to the life stages of threatened or endangered animal or plant species.	No	No

Geographic Area	Present within Corridor	>50% of Corridor Width
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	No	No

5.2.2 Avoidance Areas

NDAC § 69-06-08-02(2) requires that specific geographical areas not be considered in routing a transmission facility unless the applicant shows that under the circumstances there is no reasonable alternative. Avoidance areas may be located within a corridor, but may not encompass more than fifty percent of the corridor width at any given point, unless there is no reasonable alternative. Avoidance areas within the corridor are shown in Table 9, and depicted on the Figures in Appendix E.

Table 9. Avoidance Areas - Corridor

Avoidance Area	Present within Corridor	>50% of Corridor Width
Designated or registered national: historic districts; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	Yes, BakkenLink is coordinating with the USFS regarding routing on federal grasslands.	No
Designated or registered state: wild, scenic, or recreational rivers; game refuges; game management areas; management areas; forests; forest management lands; and grasslands.	No	No
Historical resources which are not specifically designated as exclusion or avoidance areas.	Yes, BakkenLink has performed a Class I Cultural Resource survey which identified cultural resource sites within the proposed Corridor. A Class III Cultural Resource inventory is currently being conducted. BakkenLink will coordinate with the SHPO to determine site significance and avoidance/mitigation measures	No
Areas that are geologically unstable.	No	No
Within five hundred feet of a residence, school, or place of business.	Yes, BakkenLink is in the process of refining the pipeline route and will maintain a 500' distance from any residence, school, or place of business.	No
Reservoirs and municipal water supplies	Yes, Lake Sakakawea	Yes. Discussed in Section 5.3.17.6
Water sources for organized rural water districts.	No	No
Irrigated land. This criterion shall not apply to an underground transmission facility.	NA	NA
Areas of recreational significance which are not designated as exclusion areas	No	No

5.2.3 Selection Criteria

Pursuant to NDAC § 69-06-08-02(3), a corridor or route shall be approved only when it is been demonstrated that any significant adverse effects resulting from the location, construction, and maintenance of the facility as they relate to the criteria shown in Table 10, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum.

Table 10. Selection Criteria - Corridor

Selection Criteria	Anticipated Impact
Agricultural production	No permanent impacts are anticipated.
Family farms and ranches	No permanent impacts are anticipated. No farms or ranches will be displaced due to construction and operation.
Land which the owner can demonstrate has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation.	No permanent impacts are anticipated.
Surface drainage patterns and ground water flow patterns	No permanent impacts are anticipated.
Noise-sensitive land uses	Noise-sensitive areas include residences near the Project. Increased noise may be experienced at these locations during construction of the project, but no long-term noise impacts are anticipated.
The visual effect on the adjacent area	No permanent impacts are anticipated.
Extractive and storage resources	No permanent impacts are anticipated.
Wetlands, woodlands, and wooded areas	Temporary impacts may occur. Mitigation measures are discussed in Sections 5.3.18 and 5.3.19.
Radio and television reception, and other communication or electronic control facilities	No permanent impacts are anticipated.
Human health and safety	No permanent impacts are anticipated. Mitigation measures will be implemented as discussed in Section 5.3.7
Animal health and safety	No permanent impacts are anticipated. No impacts to domestic livestock are anticipated. Mitigation and avoidance measures with respect to wildlife will be implemented as discussed in Section 5.3.12
Plant life	No permanent impacts are anticipated. Mitigation and avoidance measures will be implemented as discussed in Section 5.3.13

5.2.4 Policy Criteria

Pursuant to NDAC §69-06-08-02(4), the Commission may give preference to an applicant that will maximize benefits that result from the adoption of the policies and practices shown in Table 11.

Table 11. Policy Criteria - Corridor

Policy Criteria	Suitable Policy or Practice of Applicant
Location and design	Corridor selection took into consideration the criteria set forth in the Siting Act and the Siting Rules.
Training and utilization of available labor in this state for the general and specialized skills required.	Local labor will be used to the extent practical.
Economies of construction and operation	BakkenLink will explore all economic efficiencies for construction and operations. Efficiencies may include: starting pipeline construction with completion of similar pipeline projects in order to minimize mobilization/demobilization costs, timing pipe acquisition and delivery with other projects in the area, and constructing the pipeline using multiple spreads in order to minimize overall construction time. BakkenLink may use a combined workforce with other pipeline operators in the service area for control room monitoring and other operation and maintenance services to avoid duplication of efforts, share office/warehouse space, and inventory.
Use of citizen coordinating committees	BakkenLink will continue to coordinate with landowners, townships, and other local committees in siting the Project.
A commitment of a portion of the transmitted product for use in ND	The only oil refinery in the state (Tesoro, Mandan) is currently operating at capacity and has no need for additional crude oil.
Labor relations	No labor relations will be affected.
The coordination of facilities	BakkenLink will transport crude oil from up to six proposed receipt points including existing and proposed crude oil loading terminals.
Monitoring of impacts	BakkenLink is committed to ensuring that BMPs are utilized during construction to minimize environmental impacts and will monitor construction compliance with the commitments made in this application and applicable permit conditions.
Utilization of existing and proposed rights of way and corridors	The majority of the proposed route is along existing highway and transmission corridors
Other existing or proposed transmission facilities	The footprint of the Project will encourage the development of receipt points and interconnects with third party pipelines, including potentially the Enbridge North Dakota pipeline system, the Tesoro High Plains pipeline system, and the Bridger pipeline system.

5.2.5 Design and Construction Limitations

Design and construction limitations are primarily associated with the location of the pipeline and receipt points.

5.2.6 Economic Considerations

The objective is to provide an economical route while reducing impacts to the environment and landowners to the extent practicable. The length of the route has the most influence on the final cost of the Project. Minimizing the routing distance between receipt and endpoints decreases the cost to construct the Project and reduces environmental impacts. The Project will supplement the capacity needed within North Dakota to export increasing volumes of crude oil and encourage development of additional export capacity.

5.3 Discussion of the Relative Value of Each Criteria and Corridor Selection

The following sections provide a description of the affected environment within the proposed Corridor as it exists at this time. Anticipated impacts and mitigation measures for each criteria are discussed in the following paragraphs.

5.3.1 Demographics

Data in this section was obtained from the United States Census Bureau (USCB), years 2000 and 2009 population census (USCB 2000 and 2009). Generally, the population along the proposed Project Route has been declining in past years. Due to increases in oil and gas exploration and production, that trend has been reversing. The Median Household Income (MHI) in the counties crossed by the Project ranges from 25% below to 8% over the state average MHI.

Table 12 summarizes the population and economic characteristics for North Dakota, and Project Area counties.

Table 12. Population and Economic Characteristics

Location	Population 2000	Population 2009	MHI 2008	% Population Below Poverty Level 2008
North Dakota	642,195	646,844	$45,996	11.5%
Billings County	888	827	$44,715	11.4%
Dunn County	3,600	3,365	$40,801	12.2%
McKenzie County	5,737	5,799	$44,704	14.4%
Stark County	22,635	22,847	$47,189	10.2%
Williams County	19,761	20,451	$50,303	9.9%

The 2009 USCB data records indicate the majority of the people in each county reside in the county seat with the exception of Dunn County (Table 13). USCB data records indicate approximately 77 percent of the population in the Project Area counties is “white” and five percent is American Indian or Alaska Native (Table 14).

Table 13. County Seat Population

Location	County Seat	2009 County Seat Population
Billings County	Medora	95
Dunn County[1]	Manning	49
McKenzie County	Watford City	1,435
Stark County	Dickinson	16,265
Williams County	Williston	20,451

[1] Killdeer is the largest city in Dunn County with a population of 681 (USCB 2009). Manning is unincorporated and data is not available through USCB; population is from North Dakota Department of Transportation (NDDOT) 2009.

Table 14. US Census Racial Characteristics

County	Total Population	White	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Other	Two or More Races
Billings	827	815	0	1	1	1	1	8
	100%	98.5%	0%	0.1%	0.1%	0.1%	0.1%	1.1%
Dunn	3,365	2870	458	0	0	3	3	303
	100%	85.3%	0.1%	0%	0%	<0.1%	<0.1%	0.9%
McKenzie	5,799	4,448	13	1,246	6	0	6	80
	100%	76.7%	0.2%	21.5%	0.1%	0	0.1%	1.4%
Stark	22,847	22,161	114	297	68	1	1	205
	100%	97%	0.5%	1.3%	0.3%	<0.1%	<0.1%	0.9%
Williams	20,451	18,794	61	981	143	1	1	470
	100	91.9	0.3	4.8	0.7	0.1	0.1	2.3

Between 2006 and September of 2010, an average of 98 new home construction permits were issued annually in Dickinson, Stark County (North Dakota Association of Builders 2011). During the same period, Williston averaged 65 per year, with a peak of 102 new home permits issued in 2010. During several site visits in the general area during 2010, several motor homes, temporary housing units and building conversions were being constructed and/or utilized to house employees associated with the development of the Bakken oil fields. The area within the proposed Project Corridor is rural with no significant plans for residential developments or other construction; however, it is not unreasonable to expect that new developments will continue in the area.

Self-employed farming and ranching have been the historic businesses within the Project Area counties. The majority of land in all Project Area counties is used for farming and ranching (National Agricultural Statistics Service (NASS) 2009). Farming practices include annual crops, perennial hay fields, and livestock (i.e., cattle and sheep).

5.3.1.1 Impacts

There is no indication that any minority or low-income population is concentrated in any one area of the Corridor. McKenzie County has the largest population of Native Americans

(21%). The native population is most likely to reside on the Fort Berthold Indian Reservation, which will not be crossed by the Route or Corridor.

The Project will avoid residences and will temporarily impact agricultural lands. Permanent agricultural impacts are not expected from the construction of the Project. Compensations for temporary crop damages will be negotiated with the landowners as part of the easement agreements. There is no indication that any minority or low-income population is concentrated along any particular segment of the Route, and the Project is not located in an area occupied primarily by a minority group.

5.3.1.2 Mitigation

Socioeconomic impacts associated with the Project will be primarily positive due to an influx of wages and expenditures made to local businesses during the Project construction and an increase in the county tax base from the operation of the line. BakkenLink will use local labor and contractors when practicable. Negotiating easements with landowners will minimize impacts by offering above or equal market rates to landowners. BakkenLink will maintain communications with landowners throughout the Project.

5.3.2 Public Services

The Project Area is located in rural western North Dakota. Established transportation and utility networks provide access and necessary services to industry, cities, and farmsteads. The nearest populated areas are Watford City and Grassy Butte in McKenzie County, Fairfield in Billings County, Killdeer in Dunn County, and Belfield in Stark County.

5.3.2.1 Electrical Service

The majority of the proposed Project is along existing roads. Electrical services are typically associated with the ROW corridors of the public transportation system. Overhead transmission lines and underground cables are anticipated in the Project Area. Negative impacts to these services are not anticipated. The pipeline will be installed beneath transmission line systems.

5.3.2.2 Roads

Existing road infrastructure within the project area is comprised of a mixture of U.S. and State highways and locally administered improved and unimproved roads. A portion of the Project “parallels” U.S. Highway 85 through McKenzie, Billings, and Stark Counties. In Dunn County, the Corridor is near ND State Highway 200. The Project will cross Interstate 94 near Belfield.

5.3.3 Traffic

Major Highways in the project area include US Highway 85, the main north-south corridor in the area, Highway 200 from Highway 85 to Killdeer, Highway 23 North and east of Watford City, and North Dakota 1806, in northern McKenzie County. The amount of traffic on roads varies, but in general, the majority of the traffic is near towns, farmsteads or other gathering places (oil and gas facilities). Traffic volumes along the Route are variable and have increased dramatically in response to the increased production and exploration in the Bakken oil field(s). Traffic along the Project Route will temporarily increase during construction; however,

this increase is expected to be negligible when considered in the scope of the increased oil and gas development. The proposed Project is expected to help reduce overall truck traffic after it is in service.

Rural county roads in North Dakota generally traverse east/west and north/south along section lines in farmed areas. In areas with steeper terrain, road development is dictated by topography and access needs.

Paved roadways will be crossed using the horizontal directional drilling (HDD) or boring methods. Un-paved roads will be open cut, subject to approval of local road authorities. Where roads are open cut, traffic will be temporarily directed around the site. Most road crossings will typically be completed within a matter of days, which will limit any disturbance to the traffic flow. Project construction is expected to have temporary and limited impact on normal traffic operations.

5.3.4 Railroads

The BNSF operates the railroad line in Section 10, T139N, R100W, near the terminus of the Project. No other railroad lines are located within the Corridor.

5.3.5 Water Supply

The Corridor includes several segments of the Southwest Water Pipeline. These crossings will be bored during construction; therefore, there are no anticipated impacts to this facility. Other rural water pipeline crossings are anticipated but have not yet been identified at the time of this application. BakkenLink will coordinate with the operators of these facilities to obtain crossing permits. Known rural water pipeline crossings are identified in Table 15.

Table 15. Rural Water Pipeline Locations

County	QQ	SEC	TWP	RNG
Billings	SESE	26	144	99
Billings	SESW	10	143	99
Billings	NESW	22	143	99
Billings	SENW	34	143	99
Billings	SESW	34	143	99
Billings	SESW	3	142	99
Billings	NENW	15	142	99
Billings	SWSE	27	142	99
Billings	NWNE	3	141	99
Billings	NENW	10	141	99
Billings	SWSE	22	141	99
Billings	SESE	35	140	100
Billings	NWNW	15	139	100
Billings	NENE	16	139	100
Billings	SESE	16	139	100
Billings	SENE	33	138	104
Billings	NWNW	15	137	105

County	QQ	SEC	TWP	RNG
McKenzie	SESE	1	146	99
McKenzie	SESE	13	146	99
McKenzie	NENE	24	146	99
McKenzie	NENE	31	146	98
McKenzie	SESE	6	145	98
McKenzie	SESE	7	145	98
McKenzie	SESW	27	145	98
McKenzie	NWNE	33	145	98
McKenzie	SWSW	15	145	97
McKenzie	SESE	18	145	97
McKenzie	NWSW	18	145	96
Stark	NENE	7	140	99
Stark	NWSW	19	140	99
Stark	NWSW	19	140	99

5.3.6 Telephone, Fiber Optic, Microwave, Television and Radio Communications

Communication facilities are located along the proposed Project, typically associated with the ROW corridors of the public transportation system. BakkenLink will coordinate with communication providers within the Project Corridor to locate existing infrastructure.

5.3.6.1 Impacts

Negative impacts to local services are not anticipated.

Electrical Service

The pipeline will be installed below existing transmission line systems. Local service providers will be contacted prior to construction to locate underground facilities. Overhead transmission lines in the Corridor will be avoided and will not be impacted by the Project.

Roads

Existing public and private roads will be used for Project access as much as possible. Construction of the Project will require temporary access roads along the Route. Permanent roads will not be constructed. Landowners will be contacted in advance to obtain approval if temporary access on private roads is necessary. Placement of temporary accesses will be designed to avoid sensitive features such as wetlands. Areas used for temporary roads or working areas during construction will be restored to their original condition to the extent practicable.

Traffic

Increased truck traffic on adjacent roadways can temporarily be expected and has a documented negative, but manageable, impact on road conditions. The total traffic load on these roadways is expected to be negligible as transportation of oil from wells adjacent to the Project will continue using heavy trucks and truck traffic will increase over time as more wells are installed. Construction of the proposed Project is expected to help decrease overall truck traffic in the area by providing an outlet for oil producers.

Railroads

There will be no railroad line crossings. Impact to these facilities is not anticipated.

Water Supply

Construction and operation of the Project is not expected to significantly impact rural water supplies. Water used for hydrostatic testing, dust control during construction, etc. will be obtained from municipal or other permitted water supply wells. The installation or abandonment of any wells is not anticipated. Surface water or groundwater appropriation is not anticipated.

Telephone, Fiber Optic, Microwave, Television and Radio Communications

Communication facilities will be located prior to construction. Impacts to these facilities are not anticipated.

5.3.6.2 Mitigation

Construction and operation of the Project will comply with all applicable federal, state, and local permits and laws, and all industry construction standards and requirements. Impacts to existing infrastructure will be minimal; therefore, extensive mitigation measures are not anticipated. Impacts on local services will be temporary and minimized as much as possible.

Electrical Service

Impacts on electric services will be temporary and minimized as much as possible.

Roads

Use of public and private roads will be necessary for delivery of equipment and materials, and construction personnel. The use of these roads is not expected to significantly alter the current road conditions. Equipment used for the Project will be similar to that currently used by farming and ranching operations and that used for current oil development.

Use of temporary roads across agricultural lands may result in some compaction and seasonal loss of crops. When necessary, compacted soils will be disked following Project completion and landowners will be compensated for any crop loss.

Traffic

Permanent impacts are not anticipated and mitigation is not necessary. Construction of the proposed Project is expected to help decrease overall truck traffic in the area by providing an outlet for oil transportation other than by truck.

Water Supply

In the event water wells are abandoned, they will be sealed pursuant to North Dakota laws and regulations.

Telephone, Fiber Optic, Microwave, Television and Radio Communications

Local service providers will be notified prior to construction and existing infrastructure will be located and avoided to the extent practical. BakkenLink will negotiate agreements with the service providers to avoid interference with their facilities.

5.3.7 Human Health and Safety

Oil and natural gas provide energy for industrial processes, electricity generation, transportation, and residential use. Hazardous liquid and natural gas transmission pipelines play a crucial role by safely and efficiently transporting almost 100 percent of the natural gas and about 66 percent of the ton-miles of oil and refined petroleum products consumed in the United States.

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is the primary federal regulatory agency responsible for ensuring that pipelines are safe, reliable, and environmentally sound. From the federal level, they oversee the development and implementation of regulations concerning pipeline construction, maintenance and operation. The PHMSA regulations incorporate consensus standards and practices that address pipe and component manufacture, shipping practices, construction techniques, operating procedures, operator training, emergency response, oversight, enforcement and, at the end of the life cycle, abandonment. PHMSA enforces these regulations by utilizing various inspection and enforcement processes. PHMSA works cooperatively with other agencies that also have responsibilities in regulating pipelines. The safety regulations implement the laws found in the U. S. Code Title 49, Part 195. Other regulatory and safety requirements include those administered by the state, National Electrical Safety Code, and the Rural Utilities Service.

During pipeline construction, appropriate medical and security services, temporary accommodations and transportation will minimize the impacts on citizens, local services, and infrastructures. Use of such facilities will help restrict hazards to localized pipeline construction areas. Adverse impacts to human safety are not anticipated. The pipeline construction contractor shall provide equipment to handle any possible fire emergency. This shall include, but not be limited to, water trucks, portable water pumps, chemical fire extinguishers, hand tools and heavy equipment adequate for the construction of fire breaks when needed.

Additionally the pipeline construction contractor will develop emergency response procedures for all incidents (e.g., spills, leaks, fires) involving hazardous materials which could pose a threat to human health or the environment. The procedures shall address activities in all work areas, as well as during transport to and from the construction right of way and to any disposal or recycling facility.

An Emergency Response Plan (ERP) will be developed with the assistance of local authorities and first responders, as part of the pipeline commissioning activities. The ERP will include procedures for pipeline operator preparedness, emergency notification and incident reporting, safety precautions, public relations and general emergency procedures. The plan will also address site specific response plans, emergency equipment availability and location, emergency contacts both within the pipeline operator organizations and with local municipal emergency first responders. Technical data, control points and environmentally sensitive areas will also be included in the ERP. The ERP, equipment and resources, training and public official awareness must all be in place prior to line fill.

5.3.7.1 Impacts

One of the single greatest challenges to safe pipeline operations is accidental damage from excavation, drilling, or blasting activities. Should a leak occur causing a release of product into the environment, surface water (wetlands, streams, etc.), soil and groundwater may be

impacted if the leak is not properly contained and remediated. If impacted water is used for drinking or recreation, human health could be negatively impacted.

Potential fire hazards could occur with any flammable liquids or gasses. A fire would have the potential to become relatively large if the fuel source is not quickly removed. Smoke from a large fire may cause human health impacts within or beyond the corridor. Additional health issues may be associated with dust emissions during construction in the immediate vicinity of the construction equipment. The Project will be located a minimum distance of 500 feet from residences to minimize hazards to human health and safety. Also, isolation valves will be installed along the Project in accordance with federal regulations to isolate the pipeline during a leak to minimize the release.

During Project construction, appropriate medical and security services, temporary accommodations and transportation will minimize the impacts on citizens, local services and infrastructures. Use of such facilities will help restrict hazards to localized Project construction areas. Adverse impacts to human safety are not anticipated.

5.3.7.2 Mitigation

In order to minimize the risk of accidental damage from excavation, drilling, or blasting activities, BakkenLink will be a subscriber to the state One Call system. Since pipelines are normally buried underground, markers are used to show the approximate – not exact – location of the pipeline. The markers also display the name of the pipeline operator, the product transported in the line, and a telephone number where the operator can be reached in an emergency. Appropriate markers and security fencing will be installed, as necessary.

Specialized coating for underground pipelines and a cathodic protection system will be utilized to prevent external corrosion. Leak detection and monitoring systems will be employed utilizing the measuring equipment at the inlet and outlet to the pipeline, which will be interconnected with a SCADA system connected to a central operations center.

The following measures will be implemented to prevent or mitigate any adverse effects resulting from the Project operations:

1. BakkenLink will follow a written manual of procedures for conducting normal operations and maintenance activities and for handling abnormal operations and emergencies. The manual will delineate the responsibilities of both management and operating personnel and will be reviewed each calendar year to insure it remains effective. The manual will include provisions that address the following:
    a. Retention of important construction, operation and maintenance records, including records of pipeline and equipment inspections.
    b. Procedures for reporting spills, accidents, and safety related conditions.
    c. Identification of sensitive areas along the Project route that would require an immediate response to prevent hazards to the public if the facilities failed or malfunctioned.
    d. Procedures for receiving, identifying and classifying notices of events which need immediate response by Project personnel or notice to fire, police or other appropriate public officials.
    e. Establishing and maintaining liaison with fire, police and other appropriate public officials. Procedures will be included for notifying these officials of pipeline

emergencies and coordinating with them pre-planned and actual responses during such emergency.

f. Maintaining a list and contact information of area contractors that may be used to respond to a spill or emergency.

2. A SCADA system will be installed on the pipeline system. Pressures and flow rates will be monitored at a central location 24 hours a day and 7 days a week. The SCADA system will allow abnormal operating conditions to be discussed immediately and addressed promptly, including shutdown of the system in the event of a leak or other appropriate circumstance.
3. A continuing training program will be implemented to instruct personnel in safely carrying out the operations, maintenance and emergency procedures related to their assignments. This will include instruction on the characteristics and hazards of the crude oil being transported, the recognition of conditions that are likely to cause emergencies, and the steps necessary to control or minimize the impacts of an accidental release.
4. In addition to observation by operating personnel, aerial patrols will be used to inspect the surface conditions on or adjacent to the Project right of way. The frequency of inspection will be approximately every two weeks (26 times per year).
5. A damage prevention program will be established to prevent damage to the pipeline from excavation activities or other encroachments on the right of way. The damage prevention program will include membership in one or more "One-Call" systems in North Dakota that provide prior notification when excavation by third parties is to occur near the Project.

The pipeline operator will also develop a Pipeline Integrity Management Plan which together with the ERP outlines the preventative maintenance, inspection, line patrol, leak detection systems, SCADA and other pipeline integrity management procedures to be implemented during the operation of the Project.

The Project location was selected to limit human exposure to crude oil to the extent possible. With proper safeguards and protective measures as described, additional mitigation is not proposed.

5.3.8 Noise

Noise is defined as "any unwanted sound"; however, OSHA has identified sound levels that have been deemed acceptable for employees in places of employment. Permissible Exposure Limits are these acceptable exposure limits that are published and enforced by OSHA as a legal standard.

Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing.

Experts agree that continued exposure to noise above 85 dBA over time, will cause hearing loss. To know if a sound is loud enough to damage ears, it is important to know both the sound level (measured in dBA) and the length of exposure to the sound. In general, the louder the noise, the less time required before hearing loss will occur.

The following are decibel levels of common noise sources around us. These are typical levels; however, actual noise levels may vary depending on the particular item. Noise levels above 140dBA can cause damage to hearing after just one exposure. Table 16 presents noise levels associated with common everyday sources and places. Table 17 presents the OSHA permissible time limits at different sound levels.

Table 16. Noise levels associated with common sources

Sound Source	dBA
Breathing	11
Typical Living Room	40
Background Music	50
Air Conditioner	50-75
Bathroom Exhaust Fan	54-55
Normal Conversation	55-65
Alarm Clock	60-80
Freeway Traffic	70
Noisy Restaurant	85
Lawn Mower	88-94
Tractor	90
Garbage Truck	100
Snowmobile	100
Snow Blower	105
Baby Crying	110
Car Horn	110
Ambulance Siren	120
Jet Engine Taking Off	150

Table 17. Exposure Time Limits

dB	Exposure Time
85dB	8 hours
88dB	4 hours
91dB	2 hours
94dB	1 hour
97dB	30 minutes
100dB	15 minutes

The ambient sound level of a region is defined by the total noise generated within the specific environment and usually consists of sound generated by natural and artificial sources. The magnitude and frequency of noise may vary considerably over the course of a day and throughout the week. Variation can be caused by different weather conditions and seasonal vegetative cover.

Generally, background noise levels in rural areas vary between 40 and 50 dBA. Most of the Project Area has background levels consistent with rural areas. Natural noise sources in rural areas include insects, birds, wind and weather. Existing ambient noise levels near most of

the Project route are low. Other sources of noise in rural and agricultural areas are roadway traffic and farm equipment on a seasonal basis.

Higher noise levels exist near roads and other areas of human activity. Portions of the Project Area are located along major highways and truck routes. Railroads can also be a significant source of noise near the terminus of the Project Area.

5.3.8.1 Impacts

During construction, work crews may conduct separate but sequential activities, each generally proceeding intermittently throughout the corridor. Construction activities in any one area will be temporary. Post-construction noise would include repair and maintenance, and periodic inspections of the Project ROW from either walking, driving or flying.

The Project crosses through mostly rural and agricultural areas, thus limiting the number of people near the Project Corridor. Individuals living within the Project Corridor may experience an increase in noise levels near the Project ROW during construction.

5.3.8.2 Mitigation

Occupied houses and structures will be at least 500 feet from the proposed Route. At this distance, noise created during construction should be below ambient background levels, especially near highways and railroad lines.

During construction, noise will be minimized by using construction equipment with mufflers. Construction activities will generally be limited to the hours of 7 a.m. to 7 p.m. Additional mitigation measures are not deemed necessary.

While individuals in the immediate vicinity of the route may experience an increase in noise during construction, this will be temporary and local. Nighttime noise is not expected to increase. The buried pipeline will not contribute to noise levels after completion of the Project, and mitigation measures are not necessary. No pumping stations will be constructed as part of this Project. Oil loading and unloading facilities will be constructed and operated by others.

Post-construction activities would be periodic and noise associated with them would be temporary. Additionally, these activities are similar in nature to operation activities that take place for any existing facilities in the area.

5.3.9 Visual Impacts

The landscape character of the Project Area varies from nearly level cropland areas to steep badlands. Vegetation in the Corridor is highly variable and includes annual cropland, hay fields, gently rolling grasslands, badland areas, woody draws, and riparian areas with a mix of broadleaf/hardwood/herbaceous species. The description of the resources that follows begins at the north end of the Corridor.

In Williams County, the Corridor crosses a mixture of cropland, hayland, and grasslands through active oil fields. Surfaced roads interconnect well sites and facilities. In T154N, R95W, the Corridor crosses a ridge of steep breaks above Lake Sakakawea. The majority of this Township/Range is open water of Lake Sakakawea.

South of the Lake, the Corridor enters McKenzie County in the Charlson Oil Field. Topography varies from the nearly level grassland areas adjacent to the Lake, to steep breaks with numerous wooded draws, and barren clay slopes. Further south, the terrain is more level to gently rolling grasslands and includes a variety of vegetation species. Numerous existing pipelines dissect the area and are reclaimed with aggressive, introduced grasses. Native areas are often limited to the shallow hills, steep slopes, and rocky knolls.

From the south portion of T154N, R95W, southerly through T150N, R96W, the Corridor is in a relatively level area. Annual croplands and hay fields dominate the landscape. Numerous oil and gas wells are scattered through the area. As the Corridor turns west towards Watford City, rolling grasslands are interspersed in the area.

From Watford City, and south approximately twelve miles, the Corridor crosses rolling terrain, generally paralleling U.S. Highway 85. Annual cereal grains and alfalfa hayfields are prevalent, with some rangeland intermixed in rockier and steeper inclusions. Rock piles are common in the tilled areas. Stream crossings are lined with deciduous shrubs and trees. Two overhead power lines parallel the majority of this portion of the Route.

In T148N, the terrain becomes more rugged. The North Unit of Theodore Roosevelt National Park is west of the Corridor. The Corridor crosses the Little Missouri River in Section 35, T148N, R99W. At this point, the Little Missouri River terrace includes a large level area of silver sage and a variety of willow species dominate the banks along the river. South of the Missouri River, the Route crosses a segment of the LMNG across steep terrain with barren badland areas. Steep north facing slopes have large areas of Rocky Mountain juniper. Dense deciduous woodlands, primarily green ash and American elm, are common in upland drainages and north facing slopes.

South of the badland breaks above the Little Missouri River to Belfield, and east along Highway 200, the terrain is more level. Vegetation in the area is primarily annual crops and perennial hayfields, with interspersed grasslands. Small intermittent drainages, ponds, and dugouts dot the landscape. Numerous oil wells are scattered across the landscape in Dunn County, and become more common along Highway 85. South of Interstate 94, the Route continues through a relatively level area dominated by crop fields, perennial hay fields, and interspersed grasslands through T138N.

5.3.9.1 Impacts

Temporary impacts to the visual resources will be highest during the construction phase of the Project. During the construction phase, the ROW and work areas will be cleared and graded. These areas, as well as the construction equipment will be temporarily visible. This may include exposed soils, grading scars, trenching, rock removal, and machinery and tool storage. Airborne dust can be anticipated from the proposed work area.

Additional visual impacts may include the removal of existing vegetation, the exposure of bare soils, and earthwork and grading scars associated with the heavy equipment tracks. Other visual effects could result from landform changes.

The majority of the construction will be visible to travelers along the highways, as well as local residents. These impacts will be temporary. Impacts to aesthetics are minimized by the placement of the pipeline along existing road and transmission line corridors. Visual impacts in the reclaimed area will be dependent on the land use in the area. Areas across croplands and

hay fields will be rapid in re-establishment, whereas areas on native grasslands will be visible longer following reclamation.

5.3.9.2 Mitigation

The Corridor includes crossings of highways, railroads, utility facilities, rivers, woodlands, and wetlands. BakkenLink will implement trenchless technology methods in these areas to minimize visible impacts. Cropland areas, hay fields and native grasslands will be temporarily disturbed but permanent impacts to the Corridor are not anticipated.

Initially, visual impacts will be high. Over 100 miles of the Project is adjacent to existing road and/or utility corridors. Visual impacts will diminish in time. Impacts to annual cropland and perennial hay fields are anticipated to have little visibility after the first year. Impacts to native grassland areas will be slower, and will be dependent on the reclamation and seasonal conditions following reclamation. Native grassland areas disturbed by construction will be reseeded with a native seed mix, developed in coordination with the USFS and county NRCS offices. Seeding will occur as soon as possible following construction, within seeding time windows recommended by those offices.

Significant long-term visual impacts are not anticipated. Mitigation practices will continue through pipeline maintenance and repairs.

5.3.10 Cultural Resources

Metcalf Archaeological Consultants, Inc. has completed a Class I Cultural Resource Inventory of the proposed Corridor. Data from the Survey is discussed in Section 3.1.

5.3.10.1 Impacts

Twelve cultural resources were identified in the Corridor. One site, 32MZ1560, US Highway 85, has been determined eligible for inclusion in the National Register of Historic Places (NRHP). The eligibility of sites 32BI512, 32MZ1018, 32MZ1180, 32MZ1570, and 32MZ1041 has not been determined. These sites are not located in the construction area.

5.3.10.2 Mitigation

A Class III Cultural Resource Inventory will be performed prior to construction. Cultural resource sites will be avoided to the extent practical and construction will be modified to avoid impacts. If potential NRHP-eligible sites may be impacted, a professional archaeologist, in coordination with SHPO, will establish appropriate buffers around the potentially eligible site or will develop other necessary treatment to protect site integrity.

BakkenLink will develop an “Unanticipated Discovery Plan” to guide procedures if an unknown cultural resource or human remains are inadvertently encountered during construction. The discovery plan will outline the framework for handling such discoveries in an efficient and legally compliant manner.

5.3.11 Recreational Resources

Recreational opportunities in the Corridor include hunting, hiking, camping, snowmobiling, swimming, boating, fishing, biking, bird watching and other nature observations.

West Dixon Campground in Section 6, T147N, R98W, is listed as a point of interest (ND GIS Hub 2011). Based on recent aerial photography, it is part of a private farmstead.

Several areas in the Corridor have public access. Public lands include: State Land, LMNG, USACE, and Private Land Open to Sportsmen (PLOTS). PLOTS is a program administered by the North Dakota Game and Fish Department that rewards private landowners for public walk-in access for the purpose of hunting within legal hunting seasons.

The USFS has identified one tract of land that is designated as a "roadless area". The proposed route crosses the roadless area in Section 24, T147N, R99W.

Lake Sakakawea, a reservoir in the Missouri River basin, provides unique recreational opportunities for the area. The Little Missouri River provides seasonal canoeing.

5.3.11.1 Impacts

In general, recreational impacts will be visual and limited to individuals using public or private property for hiking, hunting, fishing or nature observation. Hunting access may be restricted in certain areas during the season due to construction. These impacts are expected to be temporary.

Public access to the temporary ROW will be restricted during construction. Significant impacts to recreational activities are not anticipated.

5.3.11.2 Mitigation

Adjacent land will not be removed from public or private access by implementation of the project. Mitigation is not anticipated to be necessary within the Corridor. After installation, recreational activities will resume on private and public properties. No designated recreational areas will be converted to non-recreational properties. Mitigation is not anticipated to be necessary.

The USFS designated roadless area will be crossed using the HDD method. No construction traffic will be allowed to access this property. Surface disturbance of this land tract is not anticipated.

5.3.12 Land Based Economics

Agriculture is the primary economic base of lands in the Corridor. Timber is not grown or harvested for production in the area. The area varies from nearly level cropland areas to rugged badlands. Farming and ranching have been the primary use of the area for decades. Farming practices include annual crops, perennial hay fields, and livestock (i.e., cattle and sheep). Based on NASS 2010 data, the majority of land area in all Corridor counties is farms and ranches (Table 18). McKenzie County has the smallest percentage; however, the figures reflect private lands, and do take into account acreages of LMNG that are included as part of ranching/grazing practices.

Table 18. County Farm and Ranch Operations[1]

County	Farm and Ranch Acres	% of County[2]	Total Number Livestock	Annual Crops seeded (acres)	Perennial Hay Crops Harvested (acres)
Billings	724,500	98%	38,000	13,900	64,000
Dunn	1,043,900	78%	67,200	223,200	152,000
McKenzie	1,074,700	59%	58,000	174,700	89,000
Stark	837,100	98%	62,400	257,900	104,000
Williams	1,144,900	83%	30,000	642,300	58,000

[1]Land acreages from 2007 inventory, crop and livestock numbers based on 2009 reports.
2 Values derived from reported farm and ranch acres and county acreages

Annual crops planted and harvested are diverse, but wheat is the most common crop in the Corridor. Spring wheat comprised 91% of the cropland in Stark County, 72% in Dunn County, and 53% in McKenzie County. Durum was the most common crop in Williams County (61% of the cropland). Other crops planted in 2009 included barley, corn, oats, canola, lentils, dry edible peas, dry edible beans, sugar beets, and sunflowers (NASS 2010).

Agricultural assets include home and livestock watering facilities to support farming and ranching. The North Dakota State Water Commission (NDSWC) has identified twelve domestic wells, seven stock wells and one dual-purpose domestic well within the Corridor (Table 19). Of these, one stock water well is in close proximity of the Route. BakkenLink will contact the landowner and determine the location of this well in relation to the Project location.

The NDSWC has also issued five irrigation permits in McKenzie and Williams Counties that are within the Corridor. The Route crosses one irrigated land unit that is designated as a sprinkler permit on private land.

Table 19. Water Wells

LOCATION					PURPOSE
County	QQ	Section	TWP	RNG	
Billings	NWNW	14	144	99	Domestic Well
Billings	SESE	10	142	99	Domestic Well
Billings	NWSE	10	143	99	Stock Well
Billings	SWSW	3	142	99	Stock Well
McKenzie	NWSE	32	146	98	Domestic and Stock Well
McKenzie	SWNE	12	150	96	Domestic Well
McKenzie	NENE	36	148	99	Domestic Well
McKenzie	SWSW	15	150	97	Domestic Well
McKenzie	NWNW	30	150	98	Domestic Well
McKenzie	NENW	18	150	97	Domestic Well
McKenzie	NWNW	24	150	98	Domestic Well
McKenzie	SENE	12	149	99	Domestic Well
McKenzie	NESW	14	144	99	Stock Well
McKenzie	SESE	18	150	97	Stock Well
McKenzie	NWNE	17	150	97	Stock Well
McKenzie	SESW	19	146	98	Stock Well
McKenzie	NWNW	16	150	97	Stock Well

LOCATION					PURPOSE
County	QQ	Section	TWP	RNG	
McKenzie	SESE	18	150	97	Stock Well
Williams	NWSE	5	155	95	Domestic Well
Williams	SESW	32	155	95	Domestic Well
Williams	SESW	32	155	95	Domestic Well
McKenzie	NENW	24	151	96	Irrigation Permit
Williams	SWSW	33	155	95	Irrigation Permit
Williams	NESE	21	154	95	Irrigation Permit
Williams	NWNE	22	154	95	Irrigation Permit
Williams	SWSW	33	155	95	Irrigation Permit

Approximately 150 occupied farm residences are located within the Corridor. The Route centerline will be located at least 500 feet from all occupied residences.

5.3.12.1 Impacts

Agricultural land will not be permanently impacted by the Project. The Corridor may have temporary impacts from work crews and transportation to the Route. Short-term impacts may include soil disturbance, potential compaction of soils, and loss of standing crops in work areas. These may be expected during the construction phase. Adverse impacts to animal health and safety from the construction and operation are not anticipated. Grazing lands may be temporarily impacted by removing vegetation, fences, or temporarily cutting water supplies to watering sources.

Short-term impacts to farmland may include soil disturbance, potential compaction of soils, and loss of standing crops in work areas. Construction of the Project could affect grazing land by removing vegetation, reducing the carrying capacity, damaging or removing fences, or cutting water supply lines.

The use of heavy equipment may cause some soil compaction. If necessary, compacted soils will be disked following construction. Project construction will have limited impact on the annual production of crops. Family farms may be temporarily impacted by loss of use to a minor acreage during the construction phase. Permanent impacts are not anticipated.

5.3.12.2 Mitigation

BakkenLink will coordinate with landowners to minimize impacts to their lands. Lands will be restored to cropland and farming use following the construction phase of the Project. Construction staging areas and temporary access roads will be disked as necessary to avoid impacts from any compaction that may result. Landowners will be compensated for any damages that may occur.

5.3.13 Land Use

The Corridor varies from nearly level cropland areas to rugged badlands. Farming and ranching are the primary use of the area. Farmsteads and small towns are scattered throughout the region. Oil development began in the area in the early 1950's. Although not quantified, the majority of the area is multi-use and includes recreational activities such as hunting, fishing and boating. Land use data for the Corridor and Route are based on a review of the USFWS 2010

Land Cover database information. Estimated acreages for the land uses found in the Corridor and Route are shown in Table 20. The Land Cover database information is depicted on the Figures in Appendix G.

Table 20. Current Land Uses - Corridor

Habitat	Pipeline Corridor	
	Acres	Percent of Corridor
Grassland	56,056	49
Badlands	1,355	1
Cultivated Cropland	33,180	29
Developed	3,857	3
Pasture and Hayland	10,102	9
Shrubland	1,235	1
Stream and Water Body Crossings	2,565	2
Wetlands	2,375	2
Woodland	4,329	4
TOTAL	115,053	100

Grasslands comprise approximately half of the land use in the Corridor. Grasslands include the mixed grass prairie area. The primary use of this system is grazing.

Other grazing lands include the Badlands land use. These are mostly barren areas with dry and easily eroded, consolidated clay soils with bands of sandstone and little to no cover of vegetation. The varied geology, diverse soil types, and topographic dynamics in these areas create a mosaic of barren clays with inclusions of grasslands, shrublands and woodlands.

Approximately 29% of the land in the corridor is cultivated cropland. These areas are used for the production of annual crops such as wheat, barley, oats and corn. This land use also includes fallow areas. Pasture and hayland include areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops. These comprise approximately 9% of the Corridor.

Developed land includes commercial areas, family housing units, parks, golf courses, and facilities. Approximately 3% of the Corridor has been developed.

Shrubland areas are also grazed in western North Dakota. In the south portion of the Corridor, habitats of mixed grassland with scattered shrubs and sagebrush are common. In the north part of the corridor, shrublands grow in areas that are moister than most of the surrounding area. This system is composed largely of tall, deciduous shrubs occurring along upper terraces, gentle slopes near breaks, toe slopes, and seeps. Native wooded or forested areas in the Corridor are small to large patches on buttes, escarpments, and on northerly-facing slopes. These include deciduous forest, evergreen forest and mixed forest.

Wetlands include pothole wetlands, fringe wetlands along riverine systems, and stock ponds with edges of wetland species. Pothole wetlands are primarily located in the north

portion of the Corridor. Fringe wetlands are along streams and channels. Stock ponds are scattered throughout the Corridor.

Woodlands in the Corridor are limited, occurring either naturally or as planted shelterbelts. Natural woodlands include deciduous woodlands, mixed deciduous and coniferous woodlands. These are in localized areas on mesic slopes or in drainages. Natural woodlands also include riparian woodlands, or those associated with rivers, creeks, and streams. Planted shelterbelts in the Corridor include multi-row shelterbelts around farmsteads and structures, and field windbreaks, generally varying from one to three rows in farmed areas.

5.3.13.1 Impacts

The proposed Project will not have a significant impact on land use. The majority of the area will be returned to its existing use. The proposed Project will not result in any displacement of residences, commercial areas, or other facilities. The majority of the area is used for agriculture, i.e., grazing lands, cultivated crops, or hayland. The installation of the pipeline will not impact the use of the area for these purposes. Impacts along the route will be temporary removal of crops or cover.

5.3.13.2 Mitigation

Disturbed areas will be returned to a similar contour as the original condition. Disturbed areas will be seeded with species similar to those prior to disturbance, e.g., native species will be seeded on grassland areas, and grass and/or legume mixture on pasture and hayland areas.

5.3.14 Soils

General soil map units (MUs) for the Project Area were identified using the NRCS State Soil Geographic Database (STATSCO), and the Soil Survey Geographic Database (SSURGO). The STATSCO data consists of a generalized inventory of soils and non-soil areas that occur in a repeatable pattern on the landscape. The STATSCO data is depicted on the figures in Appendix H. Table 21 provides a summary of the STATSCO data within the Corridor and Route.

Table 21. General Soil Types (STATSCO) - Corridor

Cabba-Badland	4810	2,755	3
Fleak-Cherry-Cabbart-Badland	4836	2,559	3
Rhoades-Cabba-Amor	4809	5,519	6
Rhoades-Daglum-Cabba-Amor	6782	349	<1
Rhoades-Moreau-Belfield	4830	18,948	21
Rhoades-Reeder-Cabba-Amor	6783	7,454	8
Sen-Cabba-Brandenburg	4807	2,910	3
Shambo-Savage-Regent-Belfield-Amor	4805	9,453	10
Straw	4822	254	<1
Toby-Havre-Badland-Absher	4840	524	1
Vebar-Grail-Daglum-Belfield-Amor	4832	12,634	14
Vebar-Parshall-Flasher	4815	2,260	2

Vebar-Parshall-Flasher-Amor	4828	2,794	3
Water	8369	1,503	2
Williams-Savage-Regent-Morton-Cabba	4833	7,274	8
Williams-Tansem-Makoti	4799	452	<1
Zahl-Williams	4792	1,448	2
Zahl-Williams-Harriet-Cabba	4793	5,611	6
Zahl-Williams-Vida-Bowbells	4787	5,880	6
Zahl-Zahill-Williams-Cabbart-Cabba	4811	860	1

Rhoades-Moreau-Belfield is the most common soil complex within the Corridor. Approximately 21% of the soils in the Corridor are of the Rhoades-Moreau-Belfield Association, and dominant soil complex in Billings and Stark Counties. Soil components include 21% Rhoades, 19% Belfield, 15% Moreau, 8% Savage, and 5% Farland and map units that occupy 5% or less of the complex. These soil areas consist of level to very steep topography with strongly dissected slopes bordering stream valleys and drainage ways. Rhoades and Belfield soils occur on flats, fans and foot-slopes of ridges. They have dense, sodium-affected subsoil that restricts root growth. Moreau soils occur on convex rises on uplands.

The Vebar-Grail-Daglum-Belfield-Amor soil complex is common in the southern portion of McKenzie County, and occupies 14% of the Corridor. This complex is comprised of 16% Belfield, 14% Daglum, 12% Vebar, 12% Amor, 11% Grail and eight MUs that individually comprise less than 10% of the soil complex. Belfield and Daglum soils have dense, sodium-affected subsoil that restricts root growth. These are on fans, flats, and foot-slopes of ridges. Amor loams and Vebar fine sandy loams are on strongly sloping side slopes and summits. Grail soils are heavy soils that occupy swales and foot slopes.

The Shambo-Savage-Regent-Belfield-Amor complex is more common in the north portion of McKenzie County. Belfield soils are the predominant soil series in this complex, comprising 23% of the complex. The Shambo-Savage-Regent-Belfield-Amor complex also includes 12% Savage, 12% Shambo, 9% Regent, 9% Amor soils, and eight series that individually occupy 7% or less of the complex. Savage and Regent soils are silty clay loams, with Savage soils on broad, slightly depressed flats, and Regent soils on convex rises. Shambo silty loam soils occur on broad, slightly elevated flats. The Rhoades-Reeder-Cabba-Amor soil complex is also common in the north portion of McKenzie County. It is comprised of 23% Amor, 13% Reeder, 17% Rhoades, and 12% Cabba soils. This also includes rock outcrops and miscellaneous areas. Rhoades have dense, sodium-affected subsoil that restricts root growth. Reeder loams are on convex back slopes, and Cabba loams are on shoulders. The Rhoades-Cabba-Amor complex is similar to the Rhoades-Reeder-Cabba-Amor complex but includes a much larger percentage of Cabba soils (36%) and lacks the Reeder soils series.

The Williams-Savage-Regent-Morton-Cabba complex includes 15% Regent, 14% Savage, 12% Cabba, 11% Morton, and 10% Williams's soils. It is in Billings and Stark Counties, and the majority of this complex is cropland. Relatively level areas south of Watford City in McKenzie County include the Zahl-Williams-Vida-Bowbells soils complex. This complex is primarily the Williams soil series (47%), with 10% Bowbells and 9% Zahl soils. These soil areas consist of level to gently rolling topography with irregularly shaped knolls separated by concave swales, drainage ways, and broad flats. These are moderately fine textured soils in glacial till. Most areas within this complex are cultivated for crops. William's soils are on gentle, convex side slopes and broad, convex crests of knolls and on ridges. Zahl soils occur on steeper, prominent knolls and ridges. Bowbells soils occur on concave side slopes, foot slopes, and flats.

Zahl soils have a prominent “high lime” layer within plow depth. This light colored, limy material often is exposed and mixed with dark surface soil by cultivation. This soil complex is also in the north part of the Corridor in Williams County. Two similar complexes, the Zahl-Williams and the Zahl-Williams-Harriet-Cabba are the predominant soil complexes in the corridor in Williams County. The Zahl-Williams complex is comprised of 40% Williams soils and 36% Zahl soils, while the Zahl-Williams-Harriet-Cabba soil complex has 13% Williams, 25% Zahl, 18% Harriet and 10% Cabba.

5.3.15 Prime Farmland

Prime farmland is an important factor of crop production in North Dakota. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The NRCS includes two classifications for prime farmland (7 CFR Agriculture, Part 657). The first classification includes all areas of the soil series and the second includes only the drained areas of the soils series.

The NRCS also identifies farmland of statewide and local importance. Farmland of statewide or local importance also includes those that are considered nearly prime soils and produce high yields of crops when treated and managed according to acceptable farming methods. Some of these soils may produce as high a yield as prime farmland soils, if conditions are favorable.

SSURGO data for each county was used to identify prime farmland and soils of statewide importance. Prime farmland and soils of statewide importance that are within the Corridor and Route are designated on the figures in Appendix H. Table 22 summarizes the amounts of prime farmland located within the Corridor in each County, and Table 23 identifies MUs within the Counties designated as prime farmland.

Table 22. County acreages of prime farmland - Corridor

Area	County	All Prime Farmland (acres)	Prime Farmland if Drained (acres)	Farmland of Statewide Importance (acres)	% Prime Farmland and Prime Farmland if Drained
Corridor	Billings	581	-	3,606	3
	Dunn	164	-	3,534	2
	McKenzie	154	19	10,845	0
	Stark	40	-	690	1
	Williams	-	8	1,264	-
	TOTAL	939	27	19,938	6

Table 23. Prime farmland map unit acres

County	Map Unit Symbol	Map Unit	Farmland Classification	Acres
				Corridor
Billings	3	Peta loam, 0-2% slopes	All prime farmland	74.5
Billings	7	Arnegard loam, 0-2% slopes	All prime farmland	98.9
Billings	9F	Cabba-Sen-Chama silt loams, 15-70% slopes	All prime farmland	407.9
Dunn	4B	Arnegard loam, 2-6% slopes	All prime farmland	82.6
Dunn	33	Grail silt loam, 0-2% slopes	All prime farmland	7.7
Dunn	33B	Grail silt loam, 2-6% slopes	All prime farmland	74.1
McKenzie	5	Tonka-Hamerly complex, 0-3% slopes	Prime if drained	19.0
McKenzie	7	Harriet silt loam, 0-2% slopes	All prime farmland	153.7
Stark	E2107A	Arnegard loam, 0-2% slopes	All prime farmland	11.0
Stark	E2107B	Arnegard loam, 2-6% slopes	All a prime farmland	28.7
Williams	1835	Tonka silt loam, 0-1% slopes	Prime if drained	7.7

5.3.15.1 Impacts

No permanent impacts to the soils in the Corridor are anticipated. The majority of the soil disturbance in the Corridor will be limited to the Route but temporary access, staging areas, and temporary workspaces may be needed at select locations. Wind and water erosion may be possible on areas that are disturbed during construction. Soils crossed by the Route will be susceptible to contamination from spills or leaks of liquids used during construction. BakkenLink will develop a Spill Prevention Control and Countermeasure Plan that will outline methods to reduce this potential. Any contaminated soils will be excavated and removed from the project area.

Other impacts may include the mixing of topsoil and subsoil, the potential loss of topsoil due to wind and/or water erosion, and compaction/rutting. The impacts would primarily result from trench excavation and backfilling, and equipment and vehicle traffic along the ROW. Grading may be required in some places to ensure safe working platforms for equipment. Generally, these areas would be on steep slopes which are not agriculturally productive.

Potential hazards for the soil may be wind and water erosion. Wind erosion will be more of a hazard in those portions with coarse-textured soils, such as the Vebar-Parshall-Flasher soil complex. Erosion potential can be influenced by the size of area being disturbed at any given time. Since the length of the Project will be disturbed in segments during the construction phase, erosion potential will be minimized. Significant adverse impacts are not anticipated.

5.3.15.2 Mitigation

Topsoil will be segregated from subsoil prior to construction of the Project. Following the construction phase, soils will be replaced and disturbed portions of the Corridor will be seeded or returned to annual cropland, stabilizing the soil to its condition prior to the construction phase. Impacts during the operation phase would be limited largely to soil erosion impacts caused by vehicular traffic and machinery operation during maintenance activities. Any excavations required for pipeline maintenance would cause impacts similar to those from construction, but to a lesser extent. BMP's will be implemented to control erosion and sedimentation during the construction phase to reduce impacts.

5.3.16 Geologic and Groundwater Resources

5.3.16.1 Geology

The area west of the Missouri River in North Dakota is a portion of the Missouri Plateau Physiographic Region. It exhibits gently rolling topography representing advanced stages of erosion. Buttes commonly dot the landscape where more erosion resistant materials occur. Dendritic drainage patterns are well developed. The Missouri River and its tributaries, which include the Yellowstone River on the western edge of McKenzie County, the Little Missouri River, which drains the badlands and uplands, and the Knife, Heart and Cannonball Rivers, which flow east to the Missouri River, drain the area. Near the Little Missouri River, the terrain is rugged. Glacial diversion caused the Little Missouri River to flow south from its previous north route, into a shorter and steeper course, which caused extensive erosion and created an intricate landscape known as the badlands. The badlands are picturesque, exhibiting layers of sandstone, shale, lignite and scoria exposed on the sides of the steep ravines.

Elevation of western North Dakota varies between approximately 1900 to nearly 3500 feet (Lemke et al. 1965).

Seawaters originally inundated a large portion of North Dakota in the Cretaceous and earlier periods. Sediments accumulated on the sea floor in an area now known as the Williston Basin. The Fox Hills, Hell Creek and Pierre Formations were deposited in Cretaceous times near the periphery of the various seas. Sediments of these formations were primarily silt and clay and were later transformed to shale (Bluemle 1980).

Cannonball and Ludlow Formations were formed in early Tertiary times when seawaters deposited silt, sand and clay. The non-marine Bullion Creek, Slope and Sentinel Butte Formations, (originally classified as the Tongue River Formation) were deposited during the Paleocene Epoch. Sandbars were deposited in east flowing rivers, later to be cemented into sandstone by groundwater calcium carbonate. Silts and clays settled out of backwaters and lignite formed in swamps where plant debris accumulated (Bluemle 1980). Bullion Creek and Sentinel Butte Formations covered portions of the Cannonball and Ludlow formations. The Golden Valley Formation was deposited in late Paleocene and early Eocene Epochs. Clays and silts were deposited on river floodplains while sandbars were formed in riverbeds. Weathered ash was blown in from volcanoes farther west. Volcanic ash is the source of bentonite beds now found in the area (Bluemle 1977). The White River Formation was deposited in the Oligocene Epoch in lakes and streambeds.

Throughout the depositional processes, erosion processes were also active, forming rolling uplands with a variety of parent materials exposed. Cooler climate led to the

advancement of glacial ices. The Missouri River Valley formed at the southern edge of the ice when flow of northerly and easterly streams was blocked by ice. The greatest effect was on the Little Missouri River, which was diverted to a much steeper course causing rapid down-cutting and severe erosion (Bluemle 1977). As a result of deposition and erosion, a diverse landscape was created. Parent material varies with the geological formation and the degree of erosion creating much variation in the soils.

5.3.16.2 Groundwater

Ground water is a valuable resource in North Dakota. It is considered essential for the maintenance of sensitive aquatic ecosystems, such as rivers, lakes, and wetlands, industry and agriculture, and small communities and private homes. Sixty percent of the state's population utilizes ground water to meet their domestic water supply needs. Ninety-four percent of the state's 365 incorporated communities rely on ground water, either from municipal systems, rural water systems, or private wells. In addition, ground water is the only source of water supply for nearly all farm families and their livestock, and residents of small communities that are not served by public water systems. In addition, emphasis on value-added agriculture has resulted in increased demand for ground water used for irrigation in recent years. No sole-source aquifers have been designated in North Dakota.

Ground water resources in North Dakota occur in two principal aquifer types: (1) unconsolidated glacial deposits and (2) sedimentary bedrock. There are four major bedrock aquifer units within the Williston Basin. Water quality varies considerably within the aquifer units, with the deeper units generally considered highly saline and the shallower units exhibiting saline to brackish to moderately low total dissolved solids (TDS). The best quality water in the bedrock aquifer units almost always occurs in the shallowest unit at any given location. In some near-surface bedrock aquifers in southwestern North Dakota, TDS may occasionally be as low as 1,000 mg/L. The majority of high quality ground water (less than 2,000 mg/L TDS) in North Dakota is contained within glacial drift aquifers. These aquifers are generally composed of sand and/or gravel deposited by glacial activity. Most of the glacial drift aquifers are located at or near the surface, though some are buried by till deposits from subsequent glacial advances. Ground water quality in the glacial drift aquifers generally ranges from as low as 200 mg/L TDS to several thousand mg/L TDS. Some areas that discharge ground water mainly through evapotranspiration processes may have TDS in excess of 10,000 mg/L.

5.3.16.3 Impacts

Geology

Construction and operation of the Project will not materially alter the geologic conditions of the Project Area. Effects from construction could include disturbances to the natural topography along the ROW, due to trenching and grading activities. Alteration of topographic contours would consist of grading the construction ROW to provide a safe, level working surface for construction equipment. Steep topographic areas may be directionally drilled in order to avoid the need for grading.

Known mineral resources within the Corridor are limited to gravel/scoria mining and oil and gas wells. Twenty one active gravel/scoria pits were identified within the Corridor but not within 500 feet of the pipeline centerline (NDDOT Landmark dataset, 2011). This number is expected to increase due to increased demand for gravel/scoria needed for road and well pad development. Impacts resulting from operations of the pipeline facilities are not anticipated.

Approximately 286 oil wells are located within the Corridor. This number is expected to increase due to the current rate of drilling and explorations. No impacts resulting from operations of the pipeline facilities are anticipated.

Construction and operation of the Project is not anticipated to have any effect on future mining production, including loss of revenue or diminished mineral land values. No geological hazards are expected to be created.

Groundwater

Construction and operation of the proposed Project is not expected to adversely affect groundwater resources in the Project area or its vicinity. Blasting is not anticipated as a means for trench excavation. No measurable alteration of aquifer recharge should occur.

There is a risk for small spills of liquids during construction, but these will be contained to small, isolated areas centered along the construction ROW. The greatest risk for impacts to groundwater would result from accidental release from the pipeline.

Construction activities could temporarily alter overland flow and groundwater recharge. Surface soil compaction caused by the operation of heavy equipment could reduce the soil's ability to absorb water, which could increase surface runoff and the potential for erosion. These impacts would be temporary and localized.

Some dewatering of construction areas and the pipeline trench may occur; however, relatively small volumes are expected and effects on the overall groundwater system will be small and temporary. Potential impacts on the groundwater would include minor fluctuations in groundwater levels and/or increased turbidity with the aquifer adjacent to the activity. Because of the relatively small amount of water removed, the short duration of the activity, and the local discharge of the water, groundwater levels would quickly recover after pumping stops.

The greatest risk for impacts to groundwater would result from the accidental release of a hazardous substance during construction or from a release during operations of the pipeline.

5.3.16.4 Mitigation

BakkenLink will develop a SPCC and SWPPP Plan to address preventive and mitigation measures that will be used to avoid or minimize the potential impact of hazardous material spills during construction. BakkenLink will also develop an emergency management plan to address the potential for contamination from a pipeline release. The Project will be monitored through a SCADA system, which will alert operations personnel to any potential leaks. Additionally the communications equipment will be installed allowing valves to be operated remotely to minimize any potential impacts of a spill.

5.3.17 Surface Water and Floodplain Resources

5.3.17.1 Surface Water

The Project Area traverses five watersheds including Lake Sakakawea (HUC 10110101), the Lower Little Missouri (HUC 10110205), the Knife River (HUC 10130201), the Upper Heart River (HUC 10130202), and the Middle Little Missouri River (HUC 10110203). The topography of the Corridor varies from level agricultural fields to rolling pasturelands and rugged

badlands terrain. Wetlands and perennial lakes are within the Project Area and are discussed in Section 5.3.18.

Most of the stream flow in the Project Area is as a result of patterns in precipitation, evapotranspiration, soils, and topography. Although these flows can vary, the highest stream flows generally occur in spring and early summer as a result of snowmelt, rainfall on melting snow, or heavy rainfall on saturated soils.

The NDDH, along with other state and federal agencies, has programs that monitor ambient water quality at fixed sites on major bodies of water. Water quality is evaluated on a periodic basis under Sections 305(b) and 3-3(d) of the U.S. Environmental Protection Agency's (EPA) Clean Water Act, 33. U.S.C. §§ 1251-1376. The 305(b) report provides an inventory of surface water quality throughout the state to determine if established water quality meets the required standards. Every two years, the NDDH develops and the EPA reviews a list of North Dakota water bodies that do not meet water quality standards for designated uses. Water bodies in noncompliance are placed on the 303(d) list and are referred to as "impaired". Once placed on this list, "impaired" waters plans are developed to conduct a total maximum daily load study to set goals needed to improve water quality. Within the Corridor, impaired waters include Lake Sakakawea due to methyl-mercury and the Little Missouri River from Highway 85 downstream to its confluence with Cherry Creek in McKenzie and Dunn Counties due to fecal coliform.

5.3.17.2 Lake Sakakawea

The proposed Project will cross Lake Sakakawea. BakkenLink has been discussing a preferred crossing location and methods with the USACE. An easement will be required by the USACE for any lake crossing. BakkenLink will continue to coordinate with the USACE to obtain the necessary permit(s) and approvals.

5.3.17.3 Floodplains

Floodplains are low-lying areas subject to periodic inundation due to heavy rains or snow melt. These areas are generally adjacent to lakes, rivers, and streams. In their natural state, floodplains provide necessary temporary water storage during flooding events. The periodic flooding and drying of the floodplain areas creates a unique habitat that supports a variety of plant and animals species. The Federal Emergency Management Agency (FEMA) conducts engineering studies to delineate the extent of flood zone areas and boundaries in flood prone communities. The Project is not located in an identified floodplain and it is believed that the Project will not affect an identified floodplain (FEMA 2010).

5.3.17.4 Impacts

Adverse impacts to surface waters within the Corridor are not anticipated. Perennial streams will be crossed using HDD to the extent practical. This will minimize the disruptive effects that are generally associated with open-cut trench pipeline construction, which will be used in the overland portions of the Route. Selection of an appropriate crossing method depends on site conditions and Project priorities. Feasible construction methods will be evaluated during preliminary design. Recommended construction methods will be provided during the final design to confirm the alignments, crossing length, and anticipated geotechnical conditions.

Construction of the Project could affect surface water in several ways. Clearing, grading, trenching and soil stockpiling activities could temporarily alter overland flow. Surface soil compaction caused by the operation of heavy equipment could reduce the soil's ability to absorb water, which could increase surface runoff and the potential for ponding. These impacts would be localized and temporary.

Environmentally sensitive areas such as wetlands and water bodies can be by-passed underground with trenchless methods. Selection of an appropriate crossing method depends on site conditions and Project priorities. Feasible construction methods will be evaluated during preliminary design. Recommended construction methods will be provide during the final design to confirm the alignments, crossing length, and anticipated geotechnical conditions. Additional temporary work areas may be required in areas of rough or steep terrain, water body and drainage crossings, and wetlands. If HDD is employed, inadvertent releases of drilling fluids and lubricants through seepage may occur, which sometimes can reach surface water(s).

Possible impacts to Lake Sakakawea include temporary increased turbidity during construction and disturbance of sediments containing certain potentially hazardous substances.

5.3.17.5 Mitigation

Impacts within the Corridor which would require mitigation are not anticipated. BakkenLink will avoid impacts to perennial streams by using the HDD crossing method to the extent practical. Construction will occur over a limited period of time with the minimum equipment required for safe and efficient operations. Direct access of vehicles and heavy machinery to water bodies will be minimized.

A SPCC and SWPPP will be developed for the Project and an National Pollutant Discharge Elimination (NPDES) permit will be obtained. If required, remedial action will be taken to prevent contamination from hazardous materials during construction. Hazardous materials will not be stored, and refueling will not be carried out within 100 feet of a water body or wetland.

Access roads, if adjacent to water bodies or drainage ways, can be designed in a manner to facilitate unrestricted runoff from the upper portion of the watershed, and to control runoff from disturbed areas.

The proposed Project will be designed and constructed so it will not impede the flow of any waterway. The pipeline will be installed below the bed of the waterway, at a level so the channel bed gradient does not change.

Pipeline crossings will be scheduled at times when there is as little rainfall as possible. This will minimize the risks of debris, stockpiled soil, and other sources of sediment from being washed into water bodies or wetlands. Temporary erosion and sediment control BMPs will be installed across the entire width of the construction ROW after clearing and before ground surface disturbance. No silt/turbid discharge water from the trench dewatering operations will be allowed to enter any water body or wetland.

If temporary dewatering of groundwater is required during construction activities, dewatering will be discharged in compliance with a NPDES permit and SWPPP. The SWPPP will provide guidance on the location of dewatering structures, resulting in no deposition of sediments into wetlands and water bodies, and no impacts on cultural resource or habitat for

sensitive species. The discharge of water from dewatering and hydrostatic testing operations will comply with relevant state discharge guidelines. Effects from dewatering will be localized, temporary, and generally insignificant.

5.3.17.6 Lake Sakakawea

The proposed Lake Sakakawea crossing is in a USACE designated utility corridor where the Route will parallel three existing pipelines. BakkenLink has evaluated alternative routes and lake crossing locations; however, the USACE has indicated a preference for the proposed location due to the existing pipelines.

BakkenLink has explored the possibility of completing this crossing using the HDD method. However, both the subsurface geology and distance of the crossing indicate that an HDD crossing is not feasible. BakkenLink is evaluating alternative crossing methods and is discussing these methods with the USACE. Any construction method will be approved and permitted by the USACE prior to construction.

The NDDH is a cooperating agency with the USACE through the state-run 401 Water Quality certification program. The NDDH has indicated that sediment sampling of the lake sediments at the crossing location will need to be performed and analytical testing completed to determine the chemical composition of these sediments. The NDDH will review the results of these tests prior to approval and permitting by the USACE.

5.3.18 Wetlands

Wetland resources for the Corridor and Route were identified by reviewing USFWS National Wetland Inventory (NWI) data, topographic maps (USGS 2011), and recent aerial photography (USDA Farm Service Agency 2009). The NWI records approximately six hundred acres of wetlands in the Corridor and approximately six acres of wetlands in the Route. Pothole wetlands, fringe wetlands along riverine systems, and stock ponds are the primary types of wetlands. Pothole wetlands are primarily located in the northern reaches of the Corridor. Fringe wetlands of riverine systems and stock ponds are scattered throughout the Corridor. Wetlands in the Corridor range in size from less than one hundred square feet to approximately 15 acres, with the typical wetland being less than one acre in size. Wetlands located in the Route average less than two tenths of an acre in size. Fringe wetlands located in the riparian areas of the riverine systems vary in width from five to 500 feet.

Table 24 summarizes wetland types and acreages identified within the Corridor. Wetlands for this Application were identified using the NWI database. These wetland areas are depicted on the Figures in Appendices E and F. A field delineation of wetlands crossed by the Project will be conducted prior to construction.

Table 24. NWI Wetland Types and Acres[1] - Corridor

Wetland Area Classification Type[2]	Corridor	
	Count	Acres
Palustrine Aquatic Bed Semi-permanently Flooded	3	2.49
Palustrine Aquatic Bed Semi-permanently Flooded *Diked/Impounded*	179	148.99
Palustrine Aquatic Bed Semi-permanently Flooded *Excavated*	2	0.95

Wetland Area Classification Type[2]	Corridor	
	Count	Acres
Palustrine Aquatic Bed Intermittently Exposed	1	0.36
Palustrine Emergent / Aquatic Bed Semi-permanently Flooded	2	1.24
Palustrine Emergent / Aquatic Bed Semi-permanently Flooded *Diked/Impounded*	4	9.16
Palustrine Emergent Temporarily Flooded	147	100.02
Palustrine Emergent Temporarily Flooded *Partially Drained/Ditched*	19	78.31
Palustrine Emergent Temporarily Flooded *Diked/Impounded*	14	7.56
Palustrine Emergent Temporarily Flooded *Excavated*	1	0.1
Palustrine Emergent Saturated	3	2.33
Palustrine Emergent Seasonally Flooded	179	90.15
Palustrine Emergent Seasonally Flooded *Partially Drained/Ditched*	3	2.87
Palustrine Emergent Seasonally Flooded *Diked/Impounded*	54	26.63
Palustrine Emergent Seasonally Flooded *Excavated*	4	0.43
Palustrine Emergent Semi-permanently Flooded	2	3.27
Palustrine Emergent Semi-permanently Flooded *Diked/Impounded*	14	11.53
Palustrine Forested /Emergent Temporarily Flooded	1	0.4
Palustrine Forested Temporarily Flooded	1	0.21
Palustrine Forested Temporarily Flooded *Diked/Impounded*	1	0.21
Palustrine Scrub-Shrub Temporarily Flooded	1	9.09
Palustrine Scrub-Shrub Seasonally Flooded *Diked/Impounded*	1	0.37
Palustrine Unconsolidated Bottom Semi-permanently Flooded *Excavated*	22	7.71
Palustrine Unconsolidated Bottom Intermittently Exposed *Excavated*	3	0.95
Palustrine Unconsolidated Shore Temporarily Flooded	1	0.09
Palustrine Unconsolidated Shore Temporarily Flooded *Diked/Impounded*	3	0.49
Palustrine Unconsolidated Shore Seasonally Flooded *Diked/Impounded*	7	1.00
Palustrine Unconsolidated Shore Seasonally Flooded *Excavated*	4	3.31

[1] Wetland acreage does not include the entire wetland acreage, i.e., the wetland boundaries are outside of the proposed corridor

[2] NWI designation. This does not include Riparian Wetlands as classified by the NWI, which are included herein as river and stream crossings

5.3.18.1 USFWS Wetland Easements

Wetland easements are legal agreements signed with the United States of America, through the USFWS, whereby landowners are paid to protect wetlands indefinitely. Wetlands covered by an easement cannot be drained, filled, leveled, or burned, but farming, grazing, or cutting hay is allowed. Wetland easements are applied to a specific tract of land but only the wetland basins are protected, not the adjacent uplands. USFWS personnel were contacted during the Project scoping to determine easement areas and no wetland easements are located within the Corridor.

5.3.18.2 Impacts

Wetland areas within the Corridor will be avoided whenever feasible. Construction activities will be conducted in a manner to avoid or minimize impacts to existing wetland area habitats. Areas that will be disturbed by excavation, grading, and construction traffic may increase sedimentation into a wetland area. Reasonable efforts will be employed to limit any sediment movement within the Corridor. Following completion of pipeline installation, it is anticipated that there will be no additional impacts on surface wetlands or water quality. Permanent impacts are not anticipated.

5.3.18.3 Mitigation

A field delineation of wetlands will be conducted prior to construction, as needed. The delineation will follow procedures outlined by the USACE Wetland Delineation Manual (USACE 1987) and Regional Supplement to the Manual: Great Plains Region (USACE 2008). The field findings will be summarized in a wetland delineation report filed as an addendum to this application.

The Project will be routed to avoid most wetland crossings. Wetlands that cannot be avoided will be crossed using HDD, to the extent practical. Where HDD is not used, standard wetland construction mitigation measures will include limiting equipment working in wetlands to that essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where access to the ROW is only available through the wetland area, non-essential equipment will be allowed to travel through wetlands only if the ground is firm enough, or has been stabilized, to avoid rutting. If rutting is anticipated, non-essential equipment will be allowed to travel through the wetlands only once, and essential equipment will need to be stabilized with prefabricated mats or terra mats.

Erosion and sediment control BMPs will be used during construction, operation, and maintenance of the pipeline to protect topsoil and minimize soil erosion into adjacent wetlands.

Vegetation clearing will be limited to trees and shrubs, and disruption of the area will be restricted to the area immediately over the route. During clearing activities, sediment barriers will be installed and maintained adjacent to wetland areas and within temporary extra workspaces, as necessary to minimize the potential for sediment runoff.

5.3.19 Vegetation

Specific land cover types found within the Project Corridor and temporary construction ROW acreages were determined using the Gap Analysis Program (GAP) 2010 National Land Cover dataset (USGS 2010). Cover types in the Corridor are detailed in Table 25.

Table 25. GAP 2010 National Land Cover Dataset, Level 3 Ecological Systems - Corridor

GAP Cover Type	Description	Corridor	
		Acres	%
Bluff and badland	This system is typified by extremely dry and easily eroded, consolidated clay soils with bands of sandstone or isolated consolidates and little to no cover of vegetation (usually <10% but as high as 20%). In those areas with vegetation, plants can include scattered individuals of many dryland shrubs or herbaceous species. This system can occur where the land lies well above its local base level or below and created by several factors, including elevation, rainfall, carving action of streams, and parent material. This system contains highly erodible soils that can be strongly influenced by infrequent, but often torrential, rains.	39	<1
Central Mixed grass Prairie	Mixed-grass prairie is in areas not converted to agriculture. Western wheatgrass and little bluestem are widespread. Other common grasses include side-oats grama, little bluestem, big bluestem, needle-and-thread, prairie dropseed, and blue grama. Numerous forb and sedge species can also occur within the mixed-grass prairie. Some dominant forb species include perennial ragweed, purple coneflower, and skeleton-plant. Bur oak can occur in areas protected from fire due to topographic position. Grazing and fire are important to maintaining the character of this prairie. Fire, especially, prevents trees and shrubs from dominating the grasses.	4	<1
Cultivated Cropland	Areas used for the production of annual crops, such as wheat, corn, soybeans, sugar beets, and peas. Crop vegetation accounts for greater than 20% of total vegetation. This class includes all land that is actively tilled.	27,555	24
Developed, Low Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49% of total cover. These areas most commonly include single-family housing units.	654	<1
Developed, Medium Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79% of the total cover. These areas most commonly include single-family housing units.	5	<1
Developed, Open Space	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.	3,106	3
Disturbed, Non-specific	Areas that are barren or have relatively low vegetation cover that is associated with some form of generic human alteration or management regime. Typically associated with heavy grazing.	527	<1

GAP Cover Type	Description	Corridor	
		Acres	%
Big Sagebrush Shrubland / Steppe	Big sagebrush shrublands have soils that are deep, well-drained and not salty. Big sagebrush dominates and other common shrubs include bitterbrush, rabbitbrush, or snowberry. Shrubs are the dominant vegetation, with grasses making up less than 25% of the cover. Big sagebrush steppe vegetation has >25% grass cover. In recent years this systems has been invaded by non-native annual grasses or weeds, in particular annual brome, which changes the patterns of fire. Pronghorn antelope, sage grouse, pygmy rabbit, sage sparrow, and many plant and animal species utilize sagebrush steppe as their primary habitat.	46	<1
Introduced Upland Vegetation	Areas that are dominated by introduced perennial forb or grassland species such as Canada thistle, bull thistle, star thistle, leafy spurge, mustards, sweetclover, scotch thistle, crested wheatgrass, smooth brome, Kentucky bluegrass, intermediate wheatgrass.	1441	1
NW Great Plains Mixed grass Prairie	Grasses typically comprising the greatest canopy cover include western wheatgrass, green needlegrass, and fescue. Fire and grazing constitute the primary dynamics affecting this system. Drought can also impact this system, in general favoring the shortgrass component at the expense of the mid-grasses. With intensive grazing, cool-season exotics such as Kentucky bluegrass and brome can increase in dominance. Shrub species such as can also increase in dominance with fire suppression.	44,125	38
NW Great Plains Shrubland	This ecological system is found on shallow to deep, fine to sandy loam soils. These sites are typically moister than most of the surrounding area. This system is composed largely of tall, deciduous shrubs occurring along upper terraces, gentle slopes near breaks, and toeslopes, often in upper terraces or near rivers and streams. It usually is composed of one or more shrubs with grasses such as junegrass, bluebunch wheatgrass, thread-leaf sedge and fescue. It is similar to midgrass prairie systems, but can be easily distinguished by the presence of at least 10% cover of shrubs assuming that little to no fire suppression has occurred. Fire and grazing constitute the primary dynamics affecting this system. Drought can also impact this system.	651	<1
Open Water	All areas of open water, generally less than 25% cover of vegetation or soil. Specifically, inland waters of streams, rivers, ponds and lakes.	1,677	3
Pasture / Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.	5,299	5

GAP Cover Type	Description	Corridor	
		Acres	%
W Great Plains Depression Wetland Systems	This systems group includes wetlands that form in upland and lowland depressions. Isolated depression wetlands form in small basins within upland landscapes that are rarely linked to outside groundwater sources and do not have an extensive watershed. Open depression wetlands form in lowlands, including lake borders and stream margins, that have more open basins, usually have a larger watershed, and a permanent water source throughout most of the year (except during exceptional drought years). The isolated depressions are typified by the presence of an impermeable layer such as dense clay, hydric soil and are usually recharged by rainwater and nearby runoff. Isolated ponds and lakes can experience periodic draw-downs during drier seasons and years and are often replenished by spring rains. Spike rush, foxtail barley, and common forbs such as beggars ticks, marsh aster, and smartweed are common vegetation in the wetter and deeper depressions, while western wheatgrass and buffalo grass are more common in shallow depressions in rangeland. Open depression wetlands include submergent and emergent marshes with cattails and bulrush and associated wet meadows and wet prairies. In areas of saline soils, both isolated and open depressions will be more brackish, with associated vegetation differences. Salt encrustations can occur on the surface in some depressions, and the soils are severely affected and have poor structure. Species that typify these systems are salt-tolerant and halophytic species such as saltgrass, alkali grass, and foxtail barley. Other commonly occurring taxa include seep weed, prairie cordgrass, and shrubs such as greasewood and winterfat.	2,052	2
W Great Plains Dry Bur Oak Forest and Woodland	This system is in small to large patches on buttes, escarpments, and in foothill zones, usually on north facing slopes. It is dominated by bur oak with a sparse to moderate cover of prairie grasses or woodland sedges. Shrubs such as chokecherry, beaked hazelnut, snowberry, or serviceberry can occur. Historically, higher cover of grass species occurred as these stands were more open due to more frequent fires. Grazing, conversion to agriculture, and past timber harvesting also can impact this system. Overgrazing can also lead to a decrease in understory species, and timber harvesting can completely eliminate examples of this system.	158	<1

GAP Cover Type	Description	Corridor	
		Acres	%
W Great Plains Floodplain Systems	This riparian system group is found in the floodplains of medium and large rivers. Alluvial soils and periodic, intermediate flooding (every 5-25 years) typify this system. Dominant communities range from floodplain forests to wet meadows to gravel/sand flats; however, they are linked by underlying soils and the flooding regime. Stands are also on alluvial soils in highly variable landscape settings, from deep cut ravines to wide, braided streambeds. Dominant species include big bluestem, silver sagebrush, hairy sedge, cottonwood, ryegrass, green ash, switch grass, western wheatgrass, bur oak, willows, little bluestem, sand dropseed, and American elm. In addition, exotic species such as salt cedar, Siberian elm, and Russian olive can invade these systems.	220	<1
W Great Plains Sand Prairie	Sandhills have coarse-textured soils predominate and the dominant grasses are well-adapted to this condition. Another important feature is their susceptibility to wind erosion. Grasses dominate the sand prairies, although relative dominance can change due to impacts of wind disturbance. Sand bluestem and prairie sandreed are the most common species. The primary use of this system has been grazing. The fragility of the soils and the cautions used by ranchers to avoid poor grazing practices have allowed for fewer significant changes in the vegetation of sand prairies compared to other grassland systems. Fire also can influence this system.	257	<1
W Great Plains Wooded Draw and Ravine	This system is typically associated with permanent or ephemeral streams. It may occur on steep northern slopes or within canyon bottoms that do not experience periodic flooding, although soil moisture and topography allow greater than normal moisture conditions compared to the surrounding areas. Occurrences can be either tree-dominated or predominantly shrub land. Ash and elm trees typically characterize this system. Fire can influence this system; however, grazing is the most prevalent dynamic process influencing this system. This system can be heavily degraded in some areas. In addition, exotic species such as Siberian elm and Russian olive can invade this system.	3,620	3

Grasslands comprise approximately one-half of the land use in the Corridor. Grasslands include the mixed grass prairie area. Western wheatgrass, needle-and-thread, blue grama and little bluestem are widespread in this prairie. Other common grasses include green needlegrass, side-oats grama, big bluestem, and prairie dropseed. Numerous forb and sedge species can also occur within the mixed grass prairie. Threadleaf sedge is the most common upland sedge on the grasslands in western North Dakota. The primary use of this system is grazing.

Forb species are diverse. Common early spring flowers include Hood's phlox, Pasque flower, wild onion, milk vetches, locoweed, and beard-tongue. Later season species include

fringed sage, many-flowered aster, blue aster, purple coneflower, Missouri goldenrod, dotted gayfeather and hairy gold aster.

Badland areas vary from barren clay areas with salt tolerant species including saltbush, winterfat, rabbit brush and grease wood to dense wooded areas. Rocky Mountain juniper is most common on north facing steep slopes. Green ash and American elm dominate shallow drainages. Large areas of big sagebrush flats are found in the south part of the Corridor. Terraces along streams and creeks are commonly dominated by silver sagebrush. Tall, deciduous shrubs are on upper terraces, and along the fringes of the green ash and American elm draws. Common shrubs include chokecherry, plum, buffaloberry, juneberry and buckbrush.

Annual crops planted and harvested are diverse, but wheat is the most common crop in the project area. Spring wheat comprised 91% of the cropland in Stark County, 72% in Dunn County, and 53% in McKenzie County. Durum was the most common crop in Williams County (61% of the cropland). Other crops planted in 2009 included barley, corn, oats, canola, lentils, dry edible peas, dry edible beans, sugar beets, and sunflowers (NASS 2010).

Alfalfa is the primary component of hayland, and is often grown with smooth brome. Crested wheatgrass has been seeded in pastures and is common near Lake Sakakawea.

5.3.19.1 Noxious Weeds

NDCC § 4.1-47-01(6) defines noxious weed as any plant propagated by either seed or vegetative parts which is determined by the commissioner, a county weed board or a city weed board, after consulting with the North Dakota State University Extension Service, to be injurious to public health, crops, livestock, land, or other property. Currently, there are eleven species or species groups (some include more than one species and/or cultivars) in North Dakota (NDAC § 7-06-01-02). Billings, McKenzie and Stark Counties include some additional invasive species (ND Department of Agriculture 2010). Pursuant to NDCC 4.1-47 the control of the spread of noxious and invasive weeds is mandatory, and dissemination of noxious weeds must be prevented. Table 26 lists the species and county acreages listed within the Corridor as reported to the Department of Agriculture in 2009, for McKenzie County, and 2010 for Billings, Dunn, Stark and Williams Counties.

Table 26. North Dakota Noxious Weeds and County Listed Weeds

Common Name	Scientific Name	Reported County Acres				
		Billings County	Dunn County	McKenzie County	Stark County	Williams County
Absinth wormwood	*Artemisia absinthium*	625	43,800	15	66,000	0
Canada thistle	*Cirsium arvense*	5,600	5,100	32,100	50,000	8,500
Dalmatian toadflax	*Linaria genistifolia* ssp. *dalmatica*		1	1		
Diffuse knapweed	*Centaurea diffusa*			1		
Leafy spurge	*Euphorbia esula*	800	6,200	25,000	9,000	9,150
Musk thistle	*Carduus nutans*	0	0	0	61,000	0
Purple loosestrife	*Lythrum salicaria, Lythrum virgatum* and all cultivars	0	0	0	0	1
Russian knapweed	*Acroptilon repens*	3	0	0	0	0

Saltcedar	*Tamarix ramosissima,* including *T. chinensis* and *T. parviflora*	1	0	1,500	1	650
Spotted knapweed	*Centaurea maculosa*	8	0	5	0	10
Yellow toadflax[1]	*Linaria vulgaris*	0	0	0	0	0

[1] Total affected acreage of yellow toad flax was not reported 2009 or 2010, but has been observed in McKenzie and Dunn Counties (USDA 2011).

5.3.19.2 Impacts

Permanent adverse impacts to vegetation are not expected to occur within the Corridor. Temporary impacts may occur within the Route and where access is needed for Project construction activities. Wooded or forest areas within the Corridor are uncommon and are primarily associated with streams and wind breaks found near current or former homesteads.

Existing agricultural and grazing practices along the Route have substantially altered the original vegetative landscape. Minimal impacts are expected to occur to native plant communities. Permanent vegetative impacts from Project construction are not anticipated.

Temporarily disturbed areas that are normally cultivated will be available after Project construction. Areas not currently in agricultural use will be seeded with native seed mixes per USFS, USFWS, and NRCS recommendations.

Any trees along the route will be protected to the extent practicable and in a manner compatible with safe operation, maintenance, and inspection of the pipeline. Impacts on wooded areas due to construction activity are anticipated to be temporary. It may be necessary to clear some mature trees during construction.

Prior to construction, BakkenLink will provide its contractors with information and training regarding noxious weed management, weed identification, and the impacts of such weeds on agriculture, livestock, and wildlife. The contractors will be informed of the importance of preventing the spread of noxious weeds in areas not infested and of controlling the proliferation of weeds already present.

5.3.19.3 Mitigation

BakkenLink will work closely with landowners to minimize adverse impacts to vegetation associated with construction of the pipeline. Impacts to wooded areas are anticipated to be minimal. A survey will be conducted to document tree species and numbers that will be impacted by Project construction. Trees and shrubs will be replaced in accordance with the PSC's tree and shrub mitigation specifications. BakkenLink will coordinate with the appropriate agencies to identify efficient restoration and mitigation measures following construction.

BakkenLink will record areas of noxious weed populations during pre-construction surveys. BakkenLink will a plan to control the spread of noxious weeds with the local NRCS offices. The plan may include management practices such as:

- Herbicide application prior to construction;
- Equipment cleaning requirements;
- Use of weed-free straw and hay for erosion control, mulching, etc.;
- Monitoring and control during operation of the pipeline.

5.3.20 Wildlife

Wildlife habitat types in the Corridor generally coincide with the major vegetation types described in Section 5.14. Wildlife in the Corridor includes resident and migratory birds, mammals, fish, reptiles, amphibians, and insects. Several species utilize habitats in the Corridor for forage, migratory stopover, breeding, and/or shelter. Valuable wildlife habitat in the Corridor includes agricultural fields, badlands, native and tame grasslands, sagebrush areas, wooded drainages, riparian areas, lakes, and wetlands. Some of the common wildlife species include sharp-tail grouse, Hungarian partridge, mourning dove, ducks, geese, sandhill crane, ring-necked pheasant, songbirds, raptors, rabbits and other small mammals. Large mammals that are in the area include coyote, white tail and mule deer, pronghorn, and elk.

5.3.20.1 Impacts

Impacts to wildlife will include modifications to habitat, and an increase of human activity in the area. Activities may result in temporary displacement of wildlife in the area and the disturbance of avian nest locations. The Migratory Bird Treaty Act of 1918, 16 U.S.C. §§ 703-712) protects bird species, including, but not limited to, cranes, ducks, geese, shorebirds, hawks, and songbirds and their nests. These impacts will be temporary and permanent impacts are not anticipated. Activities closer to the construction will be more concentrated, and may temporarily displace nesting birds and wildlife, or destroy nests. The impact on terrestrial wildlife will be short-term and minimal, and permanent impacts are not anticipated.

5.3.20.2 Mitigation

To protect species protected under the Migratory Bird Treaty Act, a presence/absence survey for active nests will be conducted prior to construction. To minimize impacts, migratory birds and nests should be avoided during construction and operation of the pipeline. Any wildlife encountered during work activities should be avoided to the extent possible. Clearing and grubbing of the Project ROW should occur in the fall or early spring to discourage bird nesting. Consultation with the USFWS regarding nesting avian species will be continued during construction activities.

5.3.21 Rare and Unique Natural Resources

Federally listed threatened, endangered, and candidate species have been documented in the area of the proposed Project. The USFWS, North Dakota Game and Fish (NDGF), and North Dakota Parks and Recreation Department (NDPR) were asked to review the Corridor for threatened and endangered species and unique habitats.

The Endangered Species Act (16 U.S.C. §§ 1531-1544) ensures that any actions authorized, funded, or carried out by federal agencies do not jeopardize the existence of any listed endangered, threatened, or candidate species. The USFWS stratifies potential candidates based upon the species' biological vulnerability. Species listed as endangered or threatened are provided full protection, which includes prohibition of destruction of critical habitat. Candidate species are those under consideration for inclusion onto the threatened or endangered species list. Sensitive species are identified within North Dakota although they are not afforded formal protection under the Act.

At this time, the USFWS includes six listed species, two candidate species, and one Designated Critical Habitat in the project area counties (Table 27).

Table 27. Threatened and Endangered Species and Designated Critical Habitat

Species	Status	County				
		Billings	Dunn	McKenzie	Stark	Williams
Interior Least Tern	Endangered		X	X		X
Whooping Crane	Endangered	X	X	X	X	X
Black-footed Ferret	Endangered	X	X	X	X	X
Pallid Sturgeon	Endangered		X	X		X
Gray Wolf	Endangered	X	X	X	X	X
Piping Plover	Threatened		X	X		X
Piping Plover	Designated Critical Habitat		X	X		X
Sprague's Pipit	Candidate	X	X	X	X	X
Dakota Skipper	Candidate		X	X		

5.3.21.1 Interior Least Tern

Approximately 100 pairs of interior least tern breed and nest sparsely vegetated sandbars along the Yellowstone and Missouri River systems in North Dakota (USFWS 2011). Their nests are small bowl-shaped depressions on barren sands. Least terns nest in colonies, and the nests can be a few feet apart. The nesting period is between the middle of May through the middle of August. Potential habitat is located in the area but high water levels in Lake Sakakawea have decreased its availability. If lake levels recede and expose sandy beaches and sandbars, further habitat opportunities may arise.

5.3.21.2 Whooping Crane

Whooping cranes nested in North Dakota in the 19th Century, and now only migrate through the state in the spring and fall. Along their migration path, whooping cranes use large shallow marshes for roosting and loafing while feeding in harvested grain fields. Twenty-five cranes were reported in the 2009 fall migration and twelve were reported in the 2010 spring migration through North Dakota (Stehn 2010).

Approximately 75% of the whooping crane sightings in North Dakota have been recorded within a 90-mile wide corridor along the Missouri River. The northern portion of the Corridor and Route are located in this area. The nearest documented sighting is approximately 4 miles from the Route.

5.3.21.3 Black-Footed Ferret

Black-footed ferrets were historically in the southwest portion of North Dakota but their occurrence is unlikely or questionable at this time. The black-footed ferret requires expansive black-tailed prairie dog colonies for food and den habitat. The Black-Footed Ferret Survey Guidelines (USFWS 1989) states that 80 acres is the minimum size prairie dog habitat needed to support black-footed ferret. Black-footed ferret reintroduction into the wild began in 1991 (Black-footed Ferret Recovery Implementation Team 2009). There have been nineteen

reintroduction sites, but none in North Dakota at this time. Potential habitat is found in the area, but the species has not been observed in North Dakota since 1954.

5.3.21.4 Pallid Sturgeon

Pallid sturgeons are found in the Mississippi, Missouri, and Yellowstone River system. The pallid sturgeon population in North Dakota has decreased since the 1960's. Habitat includes large rivers with high turbidity and a natural flow. The preferred habitat includes a diversity of depths and velocities formed by braided channels, sandbars, islands, sand flats and gravel bars. The crossing at Lake Sakakawea includes this habitat. The Project will not result in any permanent change to the habitat. If sturgeons are in the area during construction, it can be expected that they will move away from the area.

5.3.21.5 Gray Wolf

Gray wolves historically ranged throughout North America. With the exception of Minnesota, Wisconsin, Michigan, Montana, Idaho, and Washington, the gray wolf is absent from the lower 48 states. Gray wolves have been documented in North Dakota since 1990 however their presence in North Dakota is sporadic, consisting of occasional dispersing animals from Minnesota and Manitoba (USFWS 2008). Gray wolf habitat varies from woodlands to grasslands, but they generally avoid populated areas and areas with high road densities (Johnson 1999).

5.3.21.6 Piping Plover

North Dakota's population of piping plovers was 496 breeding pairs in 1991 and was reduced to 399 breeding pairs by 1996. Approximately 75% of piping plovers in North Dakota nest on prairie alkali lakes, and 25% use the Missouri River (USFWS 2011). The USFWS designates the piping plover as Threatened in North Dakota, with specific areas in McKenzie County designated as Critical Habitat (USFWS 2010). Nest locations are most likely selected due to their sparse vegetation. In North Dakota, they nest on alkali lakes, sandy beaches (300 to 1,200 feet wide), and barren river sandbars. The nearest known nesting area is approximately 4 miles from the Route. Potential habitat is located in the area but high water levels in Lake Sakakawea have decreased its availability. If lake levels recede and expose sandy beaches and sandbars, further habitat opportunities may arise.

5.3.21.7 Sprague's Pipit

Between 1996 and 2007, the population of Sprague's pipits in North Dakota has declined by 2% (Sauer et. al. 2008). Sprague's pipits inhabit extensive rolling, mixed grass prairies preferring habitat that is un-grazed or lightly-grazed grasslands and with few trees. Common grasses on these desired tracts include western wheatgrass, prairie junegrass, blue grama, needle-and-thread, green needlegrass, threadleaf sedge, and needleleaf sedge. Breeding activities takes place in two periods, from late April to early June, and again from mid-July to early September.

5.3.21.8 Dakota Skipper

Dakota skippers use two types of habitat (USFWS 2006). One habitat is mesic native bluestem prairie with flowering wood lily, harebell, and smooth camas. The second habitat is

upland prairie ridges and hillsides dominated by bluestem and needle grasses with purple coneflower and blanket flower.

5.3.21.9 Rare Animal and Plant Species and Ecological Significant Communities

The North Dakota Heritage Inventory (NDHI) has identified state ranked raptors (prairie falcon and merlin), fish species (sturgeon chub, northern redbelly dace, flathead chub, and paddlefish), plant species (heart-leaved buttercup) and some significant ecological communities (Badlands Slope, Needle-and-thread Mixed Grass Prairie, Western Wheatgrass Prairie, Western Little Bluestem Prairie, Rocky Mountain Juniper Woodland, Brackish Wet Meadow, and Western Three-square Meadow) in the area. The NDHI noted the presence of these natural resources, but deferred comments to the NDGF. The NDGF requested avoidance of native prairie, wooded draws, stream crossings and wetlands to the extent possible.

5.3.21.10 USFS Sensitive Plants

USFS (USFS 1991 and 2011) includes fourteen sensitive plant species that may be in the LMNG. A large portion of the Corridor and Route are tilled, and commonly seeded with annual cereal grains, alfalfa or alfalfa and introduced grasses. The majority of lands within the LMNG are native grasslands. These include a variety of suitable habitats for plant species. Within the general type in a given area, the sensitive plant species are often in micro-niches or as small inclusions. Based on historic records, there are fifteen known populations within the Corridor (Table 28).

Table 28. Known sensitive plant populations in Corridor

SPECIES	LOCATION				Distance from Route (feet)	Date Recorded	Observers[1]
	QTR	SEC	TWP	RNG			
Townsendia sp	NW	3	154	95	1500	8/27/2010	Kjar, Krapp
Townsendia sp	SW	3	154	95	250	8/27/2010	Kjar, Krapp
Townsendia sp	SW	34	154	95	2300	8/31/2010	Kjar, Krapp
Townsendia sp	SW	34	154	95	2300	8/31/2010	Kjar, Krapp
Townsendia sp	SW	34	154	95	100	8/27/2010	Kjar, Krapp
Townsendia sp	NW	3	153	95	2000	8/31/2010	Kjar, Krapp
Townsendia sp	NW	3	153	95	1500	8/27/2010	Kjar, Krapp
Townsendia sp	NW	3	153	95	1300	8/27/2010	Kjar, Krapp
Townsendia sp	SW	10	153	95	600	8/25/2010	Kjar, Krapp
Townsendia sp	NW	15	153	95	950	8/23/2010	Kjar, Krapp
Townsendia sp	NW	15	153	95	1600	8/24/2010	Kjar, Krapp
Townsendia sp	NW	15	153	95	750	8/24/2010	Kjar, Krapp

[1] Observers are Kathie J. Kjar and Ryan J. Krapp, McCain and Associates

Hooker's townsendia (*Townsendia hookeri*) is a small tufted inconspicuous perennial with linear basal leaves. Habitat varies from butte summits to prairie hillsides. Large white flowers appear between April and June. This species is easily mistaken for Easter daisy (*Townsendia exscapa)*. Flowering parts are required for proper identification. The identification of Townsendia is further complicated by apomixes, which creates intermediate plants between the normal expected species. The species is very inconspicuous outside of its flowering and seed stages, forming tufts generally around 5 cm in height and circumference. Plant visibility in surveys conducted after the first week in June is significantly reduced. Locations of plants in

Table 28 were conducted after flowering and species verification was not made. In 2011, *Townsendia exscapa* was added to the USFS list of sensitive species.

Suitable habitat for other vegetation species exists within the Corridor, but no known populations of these species has been documented. These species include lance-leaf cottonwood (*Populus acuminata*), alkali sacaton (*Sporobolus airoides)*, alyssum-leaved phlox (*Phlox alyssifolia),* blue lips (*Collinsia parviflora),* bristly mousetail (*Myosurus apetalus* var. *montanus),* Dakota buckwheat (*Eriogonum visheri*), golden stickleaf (*Mentzelia pumila*), nodding wild buckwheat (*Eriogonum cernuum),* sand lily (*Leucocrinum montanum)*, slimleaf goosefoot *(Chenopodium subglabrum),* Missouri pincushion cactus (*Coryphantha missouriensis),* and Torrey's Cryptantha (*Cryptantha torreyana).*

5.3.21.11 Impacts

The proposed Corridor does not include any areas designated as Wildlife Management Areas (NDGF 1999) or USFWS Waterfowl Production Areas.

Adverse impacts to threatened and endangered species are not anticipated. All areas of sensitive habitats are expected to be avoided by routing and underground boring or HDD. Surveys will be conducted immediately prior to construction in sensitive areas (during the nesting season). If threatened and endangered species and/or their nests are encountered, construction will be halted and the USFWS will be notified and consulted for additional information on how to proceed.

5.3.21.12 Mitigation

A survey for raptor nests and sharp-tail grouse lek locations was conducted along the Corridor in April 2011. The results of that survey are discussed in Section 3.0. Additional surveys may be conducted immediately prior to construction in sensitive areas (during the nesting season).

Rare Animal and Plant Species and Ecological Significant Communities will be protected by implementation of BMPs. Significant communities (i.e., woodlands and wetlands) will be bored under or disturbances will be minimized to the extent practicable. Raptor surveys will be conducted immediately prior to construction in sensitive areas (during the nesting season). Significant long-term impacts are not anticipated. BMPs will also be implemented during pipeline maintenance and repairs.

Mitigation of resources within the Corridor is not necessary because adverse impacts to threatened and endangered species and designated critical habitat are not anticipated.

5.4 Qualifications of Contributors

Steven J. Griesser, President - BakkenLink Pipeline Company

Steven has 27 years of comprehensive midstream energy industry experience. He formed Ventura Energy, LLC in late 2002. At Ventura Energy, he has worked with senior management of energy companies, focusing on oil and natural gas asset development activities, strategic planning and analyses, and evaluations related to pipeline, midstream, storage and LNG import terminal investments.

Steven began his career as a reservoir engineer with ANR Pipeline Company in 1983, evaluating gas reserves and deliverability. He has also worked for various companies at The Coastal Corporation and El Paso Corporation and has held senior positions in domestic and international business development and strategic planning. His experience includes preparation and execution of business plans, gas supply and market demand forecasting, project investment reviews, gas supply contracting, gas marketing and due diligence valuations related to major capital investments and oil and gas reserves-based financial lending. He also provided midstream-related technical and commercial support to the Exploration & Production division of The Coastal Corporation on numerous international projects.

Education

- B.S. Chemical Engineering, University of Houston, 1983
- M.S. Petroleum Engineering, University of Houston, 1986

Dennis E. Smith, Consultant – BakkenLink Pipeline Company

Dennis has 40 years of experience in the engineering design, construction and operation of crude oil and other liquid pipeline facilities. His experience includes serving as President and Chief Operating Officer for a 1500 mile Gulf-Coast pipeline system transporting crude oil, refined products and natural gas liquids, and Senior Vice President of a marketing affiliate, directing trucking operations, distribution terminals and rail car leasing. He has also been the President and Chief Executive Officer for a 1,200 mile crude oil gathering and trunk pipeline system in the Mid-Continent area and has served as an Assistant Vice President in charge of the Corporate Engineering Department of a large independent oil company.

Education

B.S. Mechanical Engineering, University of Nebraska, Lincoln, 1970

Registration

Registered Professional Engineer Texas (Inactive)

Richard A. Voss, Project Management - BakkenLink Pipeline Company

Rich has 38 years of experience in project development and management experience most of which had been in North Dakota's energy industry – refineries, coal mines and power plants. His career has encompassed all facets of project development from conceptualization through design, construction, startup and operations. His experience includes working on the Alaskan Pipeline and he most recently served 10 years as Vice President – Project Development for the nation's largest private coal reserve holder where his responsibilities included managing the North Dakota project development activities including feasibility studies, contractor/venture partner negotiations, selection and management, governmental interfaces at the federal/state/local levels, design, transmission, permitting, construction and operation.

Education

B.S. Construction Management-College of Civil Engineering, North Dakota State University, 1973

Todd A. Hartleben, P.E. – McCain and Associates, Inc.

Todd has over 15 years of experience as an engineer in general civil engineering, environmental permitting and review of pipeline and transmission projects, NEPA documentation, construction services, waste management facility design, and materials testing. Todd's pipeline experience includes compiling FERC Resource Reports, preparing

Environmental Assessments and Environmental Impact Statements, construction inspections and planning, and environmental compliance activities.

Education

- B.S. Civil Engineering, North Dakota State University, 1994
- B.A. Math and Biology, Jamestown College, 1990

Registration

- Registered Professional Engineer: ND, MT, MN, IA, IL, VA

Kathie J. Kjar, PhD Senior Ecologist/Botanist – McCain and Associates, Inc.

Kathie has thirty-five years' experience in vegetation and wildlife research and reporting. Since 1991, Kathie has conducted numerous botanical and wildlife surveys and prepared Biological Assessments and Evaluations. She has collected quantitative vegetation data for land grant colleges, federal offices, and coal companies. Kathie has conducted numerous studies and searches for sensitive plant species. Wetland experience includes delineations, ordinary high water mark determinations, and proper functioning condition of riparian areas. She is experienced with GPS and GIS data acquisition and preparation.

Education

- Ph.D., Botany, North Dakota State University, Fargo, North Dakota, 1985.
- M.S., Agronomy (Range Ecology emphasis), University of Nebraska at Lincoln, Lincoln, Nebraska, 1979.
- B.S., Biology, Kearney State College, Kearney, Nebraska, 1977

John S. Spilman, CSP, CHMM, CMI, Senior Environmental Scientist – McCain and Associates, Inc.

John has over 21 years of experience as an Environmental Scientist/Engineer, Industrial Hygienist, and Safety Consultant. Specific areas of focus include industrial hygiene, health and safety consulting, asbestos management, indoor air quality surveys, OSHA monitoring and compliance, Phase I and II environmental site assessments, Brownfields cleanup projects, environmental assessments, environmental impact statements, underground storage tank management and removal, mold sampling and abatement, PPE consultation, and LBP testing and abatement.

Education

- A.S. Hazardous Waste Management, May 1991 Front Range College - Westminster, Colorado
- B.S. Electrical and Electronics Engineering, August 1988, North Dakota State University - Fargo, North Dakota

Certification

- Certified Safety Professional #13474 (1995-present)
- Certified Hazardous Materials Manager, Master Level #8452 (1997-present)
- Certified Hazardous Materials Technologist (1991-present)
- EPA-Based Indoor Air Quality Inspector (1993-present)
- Certified Mold Inspector (1993-present)
- NIOSH 582 Equivalent Course for Analyzing Asbestos Air Samples (1989-present)
- 40-Hour OSHA Hazardous Waste Management
- OSHA 10-Hour Safety Training

- First Aid and CPR

License

- Asbestos Building Inspector (ND, SD, MT)
- Air Sampling Professional (ND, SD, MT)
- Asbestos Project Designer (ND)

Ryan J. Krapp, MS, Fisheries and Wildlife Biologist/GIS Specialist – McCain and Associates, Inc.

Ryan Krapp is an Ecologist/Fisheries Scientist, with knowledge and skills in fisheries and aquatic habitat investigations and GIS applications. Ryan studied effects of fluctuating water levels on quantity and quality of critical fish habitats in the Devils Lake, North Dakota basin, including field substrate sampling, vegetation response, habitat mapping and GPS/GIS analysis. Ryan's work experience also includes bathymetric and vegetative habitat mapping of over 120 lakes and impoundments throughout North Dakota. Work experience also includes identification, evaluation and documentation of invasive aquatic nuisance species, wetland delineations, wildlife and botanical surveys, and evaluations for threatened, endangered, and sensitive species.

Education

- Geographic Information Systems Certificate, University of North Dakota, 2003
- M.S., Biology, University of North Dakota, 2003
- B.S., Fisheries and Wildlife Biology, University of North Dakota, 2000

Greg W. Meyer, MS, Wildlife Biologist/Ecologist – McCain and Associates, Inc.

Greg has over ten years' experience in wetland delineations, and mitigations; and wildlife and habitat research. Greg's wetland experience includes delineations and mitigation, scope and effect determinations, health assessments, vegetation studies, and gas emission studies. Greg's wildlife and habitat experience includes avian surveys, raptor surveys, endangered, threatened, and sensitive plant and animal surveys, prairie dog surveys, botany surveys, habitat evaluations, and land inventories.

Education

- M.S., Wildlife Biology, University of North Dakota, 2004
- B.A., Biology Major and Chemistry Minor, Concordia College, 2000

David Ferer, Project Director – Project Consulting Services, Inc.

David has 18 years of experience in the oil and gas industry, with a focus on pipeline installation and operations. David has managed numerous onshore pipeline and facility projects in various states. For these projects, he was accountable for all aspects of the project, including route selection, environmental and regulatory permitting, contractor selection, scheduling, material acquisition, budgeting and installation. Some of his most recent notable projects are: Texas Offshore Oil Port (TOPS) and Cameron Highway Oil Pipeline (CHOPS). Currently, Mr. Ferer is the Director of PCS-Houston where he is accountable for the resources, execution, and performance of the company's project and engineering work. Prior to his joining PCS, David was an operations supervisor and project manager for a major transmission company.

Education

- Louisiana State University, Baton Rouge, LA, 1993 – BS – Mechanical Engineering
- Southeastern Louisiana University, Hammond, LA. 1994 – Accounting Principles

- IBM Project Management Courses
- Root Cause Failure Training

Mike Istre, P.E., Chief Engineer – Project Consulting Services, Inc.

Mike has over 14 years of oil and gas pipeline and facility design experience. Mike has been employed with Project Consulting Services, Inc. (PCS) since November 1996 and currently serves as Chief Engineer. Under his leadership, many of the analytical procedures and specifications used by PCS' Design Engineering department have been developed and refined. Mr. Istre has been involved with many world-class pipeline installations during his employment with PCS as well as providing engineering oversight to unique, non-pipeline projects. Some of his most notable assignments include the 320 mile Denbury CO2 Pipeline and the Louisiana Offshore Oil Port (LOOP) Expansion.

Education

- Master of Science in Mechanical Engineering, 1994 - The University of Texas at Austin
- Bachelor of Science in Mechanical Engineering, 1992 - The University of Southwestern Louisiana
- Registered Professional Engineer – North Dakota, Montana, Alaska, Mississippi, Texas, Louisiana, Alabama, Florida, South Carolina, New Jersey, & New York
- NACE Cathodic Protection Specialist Certification

Registration

- Registered Professional Engineer: ND, MT

Jame Todd, P.E. – Bartlett and West, Inc.

Jame is the project manager for Bartlett and West, Inc. and is responsible for oversight of all activities associated with surveying, easements, permitting, and environmental. Jame serves as the Location Manager for the Bismarck Office and is responsible for all the day-to-day business activities of a 60 person engineering office. He provides assistance to other project managers on a variety of regional water and energy sector projects in North Dakota and South Dakota. He also provides technical oversight, quality assurance and management support for the preparation of plans, designs, specifications and other contract related activities. Jame has worked for Bartlett & West since 2008.

Prior to joining Bartlett & West, Jame worked for the Bureau of Reclamation on a broad range of projects. He started as a modifications engineer on the Roosevelt Dam Upgrade project in Arizona and held various positions working on major civil related construction projects. His most recent position with Reclamation was as Chief of Engineering and Construction for the Dakotas Area Office where he was responsible for the development and/or oversight and technical approval of various designs, plans and specifications for all of Reclamation's construction projects in both North Dakota and South Dakota.

Education

- B.S. Civil Engineering, Montana State University, 1986

Registration

- Registered Professional Engineer: ND, MT, SD, OK, KS, CO, NE, WY, UT

6.0 Maps

6.1 Criteria Maps

Maps identifying the criteria within the proposed corridor are included in Appendices E, F, G, and H. The Appendices are as follows:

Appendix E	Aerial Photography and Avoidance Areas
Appendix F	Topography and Managed Lands
Appendix G	Land Use
Appendix H	Soils Classification

Electronic versions of the maps have also been provided as Portable Document Format (PDF) files on the enclosed Compact Disc.

6.2 Mylar Maps

Mylar is no longer used in document creation; therefore, Mylar maps are not included in this application. Project overview maps are instead included as 11x17 inch paper reproductions in the Appendices and as electronic files.

Application for Route Permit

7.0 Introduction

The majority of the requirements for the Route Permit are also required in the Application for a Certificate of Corridor Compatibility, except for a discussion of factors listed in Sections 49-22-08.1(e) and (f), and 49-2-09 of the NDCC. Most of the information provided in this Application for a Route Permit will reference the appropriate Section in the Application for a Certificate of Corridor Compatibility (Application for Corridor Certificate) except for information specific to the pipeline centerline and factors referenced above.

8.0 Description of Transmission Facility

8.1 Type of Transmission Facility

Refer to Section 2.1 of the Application for a Corridor Certificate.

8.2 Product

Refer to Section 2.2 of the Application for a Corridor Certificate.

8.3 Size and Design

Refer to Section 2.3 of the Application for a Corridor Certificate.

8.4 Time Schedule

Refer to Section 2.4 of the Application for Corridor Compatibility.

9.0 Location

The proposed Route is generally located at the center of the Corridor. The requirements of NDAC § 69-06-08-02 and NDCC Ch. 49-22-09 were considered when selecting the Route, as discussed in the following Sections. Legal descriptions of the proposed Route are presented in Table 29.

Table 29. Route Legal Description

County	Civil Township	TWP	RNG	Section(s)
Billings	Unorganized Territory	139	100	2, 10, 11
Billings	Unorganized Territory	140	100	35, 36
Billings	Unorganized Territory	141	99	3, 10, 15, 22, 27, 34
Billings	Unorganized Territory	142	99	3, 10, 15, 22, 27, 34
Billings	Unorganized Territory	143	99	1, 2, 10, 11, 15, 22, 27, 34
Billings	Unorganized Territory	144	99	1, 2, 11, 14, 23, 24, 25, 26, 35
Dunn	Unorganized Territory	145	95	19, 20, 21
Dunn	Unorganized Territory	145	96	24, 25, 26, 27, 28, 29, 30
Dunn	Unorganized Territory	145	97	25, 31, 32, 33, 34, 35, 36
McKenzie	Unorganized Territory	145	98	7, 18, 19, 20, 28, 29, 33, 34, 35, 36
McKenzie	Unorganized Territory	146	99	1, 12, 13, 24, 25, 36
McKenzie	Unorganized Territory	147	98	7, 18
McKenzie	Unorganized Territory	147	99	1, 12, 13, 24, 25, 36
McKenzie	Unorganized Territory	148	99	3, 10, 11, 14, 23, 24, 25, 36
McKenzie	Unorganized Territory	149	98	6, 7, 18, 19, 30, 31
McKenzie	Grail	150	95	6, 7, 18
McKenzie	Unorganized Territory	150	96	13, 14, 15, 16, 17, 18
McKenzie	Unorganized Territory	150	97	13, 14, 15, 16, 17, 18
McKenzie	Unorganized Territory	150	98	13, 21, 22, 23, 24, 27, 28, 29, 31, 32
McKenzie	Unorganized Territory	151	95	30, 31
McKenzie	Blue Butte	151	96	1, 12, 13, 24, 25
McKenzie	Keene	152	96	1, 12, 13, 24, 25, 36
McKenzie	Elm Tree	153	95	3, 4, 9, 10, 15, 16, 21, 28, 33
McKenzie	Elm Tree	154	95	34
Stark	Unorganized Territory	140	99	6, 7, 14, 15, 16, 17, 18, 19, 30, 31
Williams	Unorganized Territory	154	95	5, 8, 9, 16, 21, 27, 28
Williams	Dry Fork	155	95	5, 8, 17, 20, 29, 32

9.1 Minimizing Environmental Impacts

BakkenLink is committed to minimizing environmental impacts. In addition to the mitigation measures discussed in Section 5 of the Application for a Corridor Certificate, and in

the following Sections, BakkenLink will develop and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the North Dakota Department of Health (NDDH) to aid in minimizing construction impacts. BakkenLink will implement other project-specific plans to avoid or minimize environmental impacts during construction, including:

- Spill Prevention Control and Countermeasure (SPCC) Plan;
- Horizontal Directional Drilling Contingency Plan;
- Erosion Control Plan; and
- Unanticipated Discovery Plan.

In addition to the environmental analysis of the Corridor presented in the Application for a Corridor Certificate, the Route was analyzed for the same factors. The proposed Route consists of a 100-foot-wide temporary construction ROW and a permanent 50-foot easement. The following sections discuss environmental considerations specific to the proposed Route.

9.1.1 Demographics

Refer to Section 5.3.1 of the Application for a Corridor Certificate.

9.1.2 Public Services

Refer to Section 5.3.2 of the Application for a Corridor Certificate.

9.1.3 Human Health and Safety

The BakkenLink pipeline system is designed to provide transportation of crude oil in the safest, most environmentally friendly manner possible. The design philosophy is to build the system such that the likelihood of a discharge is minimal. The pipeline design incorporates the latest developments in materials, controls, oil spill prevention and accident mitigation. The exact nature and design specifics of the systems will be finalized in the design process. Critical design and operational features will be reviewed through a procedure called Hazard and Operability (HAZOPS) review. This system brings together operators, maintenance personnel, engineers and safety experts to individually review all aspects of the design to detect and correct any potential safety or environmental risk.

In the event that there is a failure of systems or personnel, detailed response plans and supporting equipment will be in place to respond to a spill. The use of industry contractors, consortiums and shared equipment will be relied upon for an event requiring assets exceeding pre-positioned materials. These levels of equipment will be determined during design and during development of the facility specific response plan. The response plan is mandated under Title 49 CFR, Part 194 – Response Plans for Onshore Oil Pipelines. The federally mandated response plan will contain, at a minimum, the following:

- Immediate notification procedures;
- Spill detection and mitigation procedures;
- Name, address, and telephone number of the oil spill response organization;
- Response activities and response resources;
- Names and telephone numbers of Federal, State, and local agencies have pollution control responsibilities;
- Training procedures;

- Equipment testing procedures;
- Drill programs in accordance with the National Preparedness for Response Exercise Program (PREP) guidelines;
- Plan review and update procedures;
- Worst case discharge calculations and response zones; and
- Operators response management system with a clearly defined chain of command.

BakkenLink will develop an ERP with local authorities as discussed in Section 5.3.7 of the Application for a Corridor Certificate. Additionally, the pipeline will incorporate the design features discussed below to minimize discharge incidents.

9.1.3.1 Mechanical Design

The following have been incorporated into the pipeline design:

- The pipeline is designed to utilize pipe with extra steel wall thickness in areas of high consequence, such as crossings under major roads, streams and other areas identified as extremely sensitive. This allowance is in addition to the code requirements that the steel operate at less than 72% of demonstrated strength.
- The construction of the pipeline will be tracked with the latest computer aided systems. The materials will be traceable back to the chemistry of the original heats at the foundry. The lengths of pipe will trace back to the mills that fabricated them, to the physical location the joints of pipe are located and the welders and inspectors that worked on each one.
- Valves are provided on each side of every major water crossing. In the event of damage to the pipe beneath the water body, valves on both sides can be closed and limit the volume of oil spilled.
- The pipeline will be protected by a cathodic protection system. This system uses an electric current to control external corrosion of the pipe, supplementing a specialized pipeline coating system. The system is monitored along the entire length by numerous test stations. The performance is rigorously monitored and documented. Any areas not showing adequate protection will be scheduled for immediate investigation and correction.
- The interior of the pipe will be measured and integrity verified before being placed in service by an in-line inspection tool. Periodic re-inspections will be scheduled and the results compared to the baseline.
- Certain areas will be protected by mechanical devices designed to prevent any over pressure event.

9.1.3.2 Controls/Operational Procedures

The control and safety systems will use a distributed philosophy. This means that various layers of control at various locations can all provide redundant intervention in the event of an abnormal operating condition. These controls include:

- At the local site, computers will monitor sensors and act to control or shutdown equipment as required for safe operation without any intervention by personnel.
- The control room computer will be simultaneously monitoring the system and provide intervention in the event that local controls do not react appropriately.

- The pipeline will be monitored 24 / 7 from a computerized control room. In the event an unanticipated problem occurs, operators will have the capacity to intervene.
- Local machines will be designed to "fail-safe". This means that the equipment will be chosen so that in the event of power failure, loss of communications, or other abnormal conditions, the system will enter a "safe" operating regime or shut down.
- Personnel will be available to act locally in the event that all other systems are not sufficient.
- Operating procedures will be developed using best industry practices. These will be developed as the system is engineered. The basis of these procedures will be the API quality management principles.
- The pipeline will be monitored by a leak detection system. Meters measure the amount of oil injected at every point along the pipeline and the amount of oil received at the terminus. A computerized analysis program calculates the "net sum" of oil flow. It makes adjustments in the expected "over/under" based temperature and pressure expansion. If there is a discrepancy in the total flow, it will alarm a possible leak and operators will cease flow and determine if there is a leak or other problem.

BakkenLink will be a modern system incorporating the most up-to-date best practices. BakkenLink will have redundant levels of control for the protection of both the public and the environment. In the event of an accident, pre-positioned response assets, planned response, and well trained personnel will mount an appropriate response. Further operating safeguards and emergency response planning are discussed in Section 5.3.7 of the Application for a Certificate of Corridor Compatibility.

Following construction, markers will be placed along the Route indicating the pipeline location. Markers will display the material transported in the pipeline, the name of the pipeline operator, and a telephone number indicating where the operator can be reached in the event of an emergency. Appropriate markers and security fencing will be installed as necessary.

9.1.4 Noise

During construction, noise levels will be greater closer to the Route. The Route is located a minimum distance of 500 feet from existing residences. This will help minimize noise heard along the Route. At 500 feet or greater from the Route, pipeline construction noise will generally be below background noise levels and will be temporary.

Post-construction activities would be periodic and noise associated with them would be temporary. Additionally, these activities are similar in nature to operation activities that take place for any existing facilities in the area.

9.1.5 Visual Impacts

During construction, the majority of the Route will be visible to travelers along the highways, as well as local residents. These impacts will be temporary. Impacts to aesthetics are minimized by the placement of the Route along existing road and transmission line corridors. Visual impacts along the reclaimed Route will be dependent on the land use in the area. Areas across croplands and hay fields will be rapid in re-establishment, whereas areas on native grasslands will be visible longer following reclamation.

Visual impacts to the Route will diminish in time. Impacts to annual cropland and perennial hay fields are anticipated to have little visibility after the first year. Impacts to native grassland areas will be slower, and will be dependent on the reclamation and seasonal conditions following reclamation. Significant long-term visual impacts are not anticipated. Mitigation practices will continue through pipeline maintenance and repairs.

9.1.6 Recreational Resources

Recreational impacts will be primarily visual and limited to individuals using public or private property for hiking, hunting, fishing or nature observation. Public access to the temporary ROW will be restricted during construction. Significant impacts to recreational activities are not anticipated along the Route.

9.1.6.1

After installation, recreational activities will resume on private and public properties. No designated recreational areas will be converted to non-recreational properties. Mitigation is not anticipated to be necessary.

The designated roadless area (USFS property) will be crossed using the HDD method. No construction traffic will be allowed to access this property. Surface disturbance of the roadless area is not anticipated.

9.1.7 Land Based Economics

Short-term impacts to farmland may include soil disturbance, potential compaction of soils, and loss of standing crops in work areas. Construction of the pipeline could affect grazing land by removing vegetation, reducing the carrying capacity, damaging or removing fences, or cutting water supply lines.

The use of heavy equipment may cause some soil compaction. If necessary, compacted soils will be disked following construction. Pipeline construction will have limited impact on the annual production of crops. Family farms may be temporarily impacted by loss of use to a minor acreage during the construction phase. Landowners will be compensated for crop and other damages. Permanent impacts are not anticipated.

9.1.8 Land Use

The Project Area varies from nearly level cropland areas to rugged badlands. Farming and ranching are the primary use of the area. Farmsteads and small towns are scattered throughout the region. Oil development began in the area in the early 1950's. Although not quantified, the majority of the area is multi-use and includes recreational activities such as hunting, fishing and boating. Land use data for the Route is based on a review of the USFWS 2010 Land Cover database information. Estimated acreages for the land uses found along the Route are shown in Table 30. The Land Cover database information is depicted on the Figures in Appendix G.

Table 30. Current Land Uses - Route

Habitat	Pipeline Route	
	Acres	Percent of Route
Grassland	1,050	48
Badlands	13	1
Cultivated Cropland	652	30
Developed	85	4
Pasture and Hayland	208	10
Shrubland	17	1
Stream and Water Body Crossings	50	2
Wetlands	38	2
Woodland	63	3
TOTAL	2,176	100

The majority of the Route is used for agriculture; i.e., grazing lands, cultivated crops, or hayland. The installation of the pipeline will not impact the use of the area for these purposes. Impacts along the route will be temporary removal of crops or cover.

Disturbed areas will be returned to a similar contour as the original condition. Disturbed areas will be seeded with species similar to those prior to disturbance; e.g., native species will be seeded on grassland areas, and grass and/or legume mixture on pasture and hayland areas.

9.1.9 Soils

General soil map units (MUs) for the Project Area were identified using the NRCS State Soil Geographic Database (STATSCO), and the Soil Survey Geographic Database (SSURGO). The STATSCO data consists of a generalized inventory of soils and non-soil areas that occur in a repeatable pattern on the landscape. The STATSCO data is depicted on the figures in Appendix H. Table 31 provides a summary of the STATSCO data along the Route.

Table 31. General Soil Types (STATSCO) - Route

SOIL TYPE	STATSCO code	Route (acres)	% of Route
Cabba-Badland	4810	43	2
Fleak-Cherry-Cabbart-Badland	4836	50	3
Rhoades-Cabba-Amor	4809	114	7
Rhoades-Daglum-Cabba-Amor	6782	0	0
Rhoades-Moreau-Belfield	4830	359	21
Rhoades-Reeder-Cabba-Amor	6783	155	9
Sen-Cabba-Brandenburg	4807	58	3
Shambo-Savage-Regent-Belfield-Amor	4805	168	10
Straw	4822	5	0
Toby-Havre-Badland-Absher	4840	9	1
Vebar-Grail-Daglum-Belfield-Amor	4832	243	14

Vebar-Parshall-Flasher	4815	39	2
Vebar-Parshall-Flasher-Amor	4828	45	3
Water	8369	28	2
Williams-Savage-Regent-Morton-Cabba	4833	141	8
Williams-Tansem-Makoti	4799	13	1
Zahl-Williams	4792	30	2
Zahl-Williams-Harriet-Cabba	4793	110	6
Zahl-Williams-Vida-Bowbells	4787	107	6
Zahl-Zahill-Williams-Cabbart-Cabba	4811	18	1

9.1.10 Prime Farmland

Prime farmland is important to crop production in North Dakota. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The NRCS includes two classifications for prime farmland (7 CFR Agriculture, Part 657). The first classification includes all areas of the soil series and the second includes only the drained areas of the soils series.

The NRCS also identifies farmland of statewide and local importance. Farmland of statewide or local importance also includes those that are considered nearly prime soils and produce high yields of crops when treated and managed according to acceptable farming methods. Some of these soils may produce as high a yield as prime farmland soils, if conditions are favorable.

SSURGO data for each county was used to identify prime farmland and soils of statewide importance. Prime farmland and soils of statewide importance that are within the Corridor and Route are designated on the figures in Appendix H. Table 32 summarizes the amounts of prime farmland located within the Route in each County, and Table 33 identifies MUs within the Counties designated as prime farmland.

Table 32. County acreages of prime farmland - Route

Area	County	All Prime Farmland (acres)	Prime Farmland if Drained (acres)	Farmland of Statewide Importance (acres)	% Prime Farmland and Prime Farmland if Drained
Route	Billings	9	-	73	3
	Dunn	3	-	51	2
	McKenzie	1	1	208	0
	Stark	-	-	10	-
	Williams	1	-	30	1
	TOTAL ACRES	14	1	372	1

Table 33. Prime farmland map unit acres - Route

County	Map Unit Symbol	Map Unit	Farmland Classification	Acres
				Route
Billings	3	Peta loam, 0-2% slopes	All prime farmland	0.0
Billings	7	Arnegard loam, 0-2% slopes	All prime farmland	1.5
Billings	9F	Cabba-Sen-Chama silt loams, 15-70% slopes	All prime farmland	7.8
Dunn	4B	Arnegard loam, 2-6% slopes	All prime farmland	2.2
Dunn	33	Grail silt loam, 0-2% slopes	All prime farmland	0.0
Dunn	33B	Grail silt loam, 2-6% slopes	All prime farmland	0.7
McKenzie	5	Tonka-Hamerly complex, 0-3% slopes	Prime if drained	0.6
McKenzie	7	Harriet silt loam, 0-2% slopes	All prime farmland	0.0
Stark	E2107A	Arnegard loam, 0-2% slopes	All prime farmland	0.0
Stark	E2107B	Arnegard loam, 2-6% slopes	All a prime farmland	0.0
Williams	1835	Tonka silt loam, 0-1% slopes	Prime if drained	0.0

No permanent impacts to the soils in the Route are anticipated. Soils crossed by the Route will be susceptible to contamination from spills or leaks of liquids used during construction. BakkenLink will develop a Spill Prevention Control and Countermeasure Plan that will outline methods to reduce this potential. Any contaminated soils will be excavated and removed from the project area.

Other impacts may include the mixing of topsoil and subsoil, the potential loss of topsoil due to wind and/or water erosion, and compaction/rutting. The impacts would primarily result from trench excavation and backfilling, and equipment and vehicle traffic along the ROW. Grading may be required in some places to ensure safe working platforms for equipment. Generally, these areas would be on steep slopes which are not agriculturally productive.

Potential hazards for the soil may be wind and water erosion. Wind erosion will be more of a hazard in those portions with coarse-textured soils, such as the Vebar-Parshall-Flasher soil complex. Erosion potential can be influenced by the size of area being disturbed at any given time. Since the length of the pipeline will be disturbed in segments during the construction phase, erosion potential will be minimized.

9.1.11 Geologic and Groundwater Resources

9.1.11.1 Geology

As noted in Application for a Corridor Certificate, known mineral resources within the Corridor are limited to gravel/scoria pits and oil and gas wells. Construction and operation of the pipeline is not anticipated to have any effect on future mining production, including loss of revenue or diminished mineral land values. No geological hazards are expected to be created.

9.1.11.2 Groundwater

Construction activities could temporarily alter overland flow and groundwater recharge. Surface soil compaction caused by the operation of heavy equipment could reduce the soil's

ability to absorb water, which could increase surface runoff and the potential for erosion. These impacts would be temporary and localized.

Some dewatering of construction areas and the pipeline trench may occur; however, relatively small volumes are expected and effects on the overall groundwater system will be small and temporary. Potential impacts on the groundwater would include minor fluctuations in groundwater levels and/or increased turbidity with the aquifer adjacent to the activity. Because of the relatively small amount of water removed, the short duration of the activity, and the local discharge of the water, groundwater levels would quickly recover after pumping stops.

The greatest risk for impacts to groundwater would result from the accidental release of a hazardous substance during construction or from a release during operations of the pipeline. BakkenLink will develop a SPCC and SWPPP to address preventive and mitigation measure that will be used to avoid or minimize the potential impact of hazardous material spills during construction. BakkenLink will also develop an emergency management plan to address the potential for contamination from a pipeline release. The Project will be monitored through a SCADA system, which will alert operations personnel to any potential leaks. Additionally communications equipment will be installed allowing valves to be operated remotely to minimize any potential impacts of a spill.

9.1.12 Surface Water and Floodplain Resources

9.1.13 Surface Water

The Route traverses five watersheds including Lake Sakakawea (HUC 10110101), the Lower Little Missouri (HUC 10110205), the Knife River (HUC 10130201), the Upper Heart River (HUC 10130202), and the Middle Little Missouri River (HUC 10110203). The topography of the Route varies from level agricultural fields, rolling pasturelands, and rugged badlands terrain. Wetlands and perennial streams are crossed by the Route.

Most of the stream flow along the Route is as a result of patterns in precipitation, evapotranspiration, soils, and topography. Although these flows can vary, the highest stream flows generally occur in spring and early summer as a result of snowmelt, rainfall on melting snow, or heavy rainfall on saturated soils.

The route crosses five perennial streams: The Missouri River (Lake Sakakawea), Cherry Creek, Northfork Creek, and two crossings of the Little Missouri River. The proposed Route crosses several other perennial (P) and intermittent (I) streams as listed in Table 34.

Table 34. Stream Crossings

County	Waterbody Name	Type	Length	Section	TWP	RNG
Billings	Unnamed tributary to Heart River	I	12	2	139	100
Billings	Unnamed tributary to Heart River	I	16	2	139	100
Billings	Unnamed tributary to Heart River	I	21	2	139	100
Billings	Unnamed tributary to Heart River	I	22	2	139	100
Billings	Unnamed tributary to Heart River	I	29	2	139	100
Billings	Unnamed tributary to Heart River	I	39	2	139	100
Billings	Unnamed tributary to Heart River	I	37	11	139	100
Billings	Unnamed tributary to Green River	I	32	3	141	99

County	Waterbody Name	Type	Length	Section	TWP	RNG
Billings	Unnamed tributary to Green River	I	26	15	141	99
Billings	Unnamed tributary to Green River	I	134	15	141	99
Billings	Unnamed tributary to South Fork Green River	I	31	22	141	99
Billings	South Fork Green River	I	37	22	141	99
Billings	Unnamed tributary to South Fork Green River	I	63	22	141	99
Billings	Unnamed tributary to South Fork Green River	I	152	22	141	99
Billings	Unnamed tributary to South Fork Green River	I	10	34	141	99
Billings	Unnamed tributary to South Fork Green River	I	20	34	141	99
Billings	Unnamed tributary to Spring Creek	I	47	10	142	99
Billings	Unnamed drainage	I	89	10	142	99
Billings	Unnamed tributary to Spring Creek	I	93	10	142	99
Billings	Unnamed tributary to Green River	I	16	27	142	99
Billings	Unnamed tributary to Green River	I	18	27	142	99
Billings	Green River	I	85	27	142	99
Billings	Unnamed tributary to Green River	I	32	34	142	99
Billings	Unnamed tributary to Knife River	I	26	2	143	99
Billings	Unnamed tributary to Knife River	I	42	2	143	99
Billings	Unnamed tributary to Whitetail Creek	I	32	10	143	99
Billings	Unnamed tributary to Whitetail Creek	I	10	15	143	99
Billings	Unnamed tributary to Spring Creek	I	36	27	143	99
Billings	Unnamed tributary to Spring Creek	I	31	34	143	99
Billings	Unnamed tributary to Spring Creek	I	36	34	143	99
Billings	Beicegel Creek	I	143	1	144	99
Billings	Unnamed drainage	I	54	10	144	99
Billings	Unnamed tributary to Beicegel Creek	I	72	11	144	99
Billings	Unnamed tributary to Knife River	I	23	23	144	99
Billings	Unnamed tributary to Knife River	I	30	25	144	99
Billings	Unnamed tributary to Knife River	I	62	25	144	99
Billings	Unnamed tributary to Knife River	I	56	35	144	99
Billings	Unnamed tributary to Knife River	I	59	35	144	99
Billings	Unnamed tributary to Knife River	I	108	35	144	99
Dunn	Unnamed tributary to Spring Creek	I	30	19	145	95
Dunn	Unnamed tributary to Spring Creek	I	56	19	145	95
Dunn	Spring Creek	I	35	20	145	95
Dunn	Spring Creek	I	40	20	145	95
Dunn	Spring Creek	I	40	20	145	95
Dunn	Unnamed tributary to Spring Creek	I	48	25	145	96
Dunn	Unnamed tributary to Spring Creek	I	16	26	145	96
Dunn	Unnamed tributary to Spring Creek	I	47	26	145	96
Dunn	Unnamed tributary to Spring Creek	I	10	27	145	96
Dunn	Spring Creek	I	92	28	145	96
Dunn	Unnamed tributary to Little Knife River	I	87	29	145	96
Dunn	Unnamed tributary to Little Knife River	I	49	25	145	97
Dunn	Unnamed tributary to Little Knife River	I	13	31	145	97
Dunn	Unnamed tributary to Little Knife River	I	14	31	145	97

County	Waterbody Name	Type	Length	Section	TWP	RNG
Dunn	Unnamed tributary to Little Knife River	I	77	31	145	97
Dunn	Unnamed tributary to Little Knife River	I	46	32	145	97
Dunn	Unnamed tributary to Little Knife River	I	21	33	145	97
Dunn	Unnamed tributary to Little Knife River	I	42	33	145	97
Dunn	Unnamed tributary to Little Knife River	I	90	34	145	97
Dunn	Unnamed tributary to Little Knife River	I	74	36	145	97
McKenzie	Unnamed tributary to Ranch Creek	I	10	7	145	98
McKenzie	Unnamed tributary to Charlie Bob Creek	I	20	18	145	98
McKenzie	Unnamed tributary to Little Knife River	I	10	34	145	98
McKenzie	Little Knife River	I	39	34	145	98
McKenzie	Unnamed tributary to Little Knife River	I	12	35	145	98
McKenzie	Unnamed tributary to Little Knife River	I	56	35	145	98
McKenzie	Unnamed tributary to Little Knife River	I	29	36	145	98
McKenzie	Unnamed tributary to Ranch Creek	I	10	1	145	99
McKenzie	Unnamed tributary to Ranch Creek	I	18	1	145	99
McKenzie	Unnamed tributary to Bennett Creek	I	12	13	146	99
McKenzie	Unnamed tributary to Ranch Creek	I	10	24	146	99
McKenzie	Unnamed tributary to Ranch Creek	I	12	25	146	99
McKenzie	Ranch Creek	I	10	36	146	99
McKenzie	Unnamed tributary to Ranch Creek	I	10	36	146	99
McKenzie	Unnamed tributary to Dry Creek	I	28	24	147	98
McKenzie	Unnamed tributary to Dry Creek	I	60	25	147	98
McKenzie	Unnamed tributary to Dry Creek	I	11	24	147	99
McKenzie	Dry Creek	I	19	25	147	99
McKenzie	Unnamed tributary to Little Missouri River	I	20	36	148	99
McKenzie	Little Missouri River	P	600	36	148	99
McKenzie	Unnamed Tributary to Cherry Creek	I	54	6	149	98
McKenzie	Unnamed Tributary to Cherry Creek	I	87	6	149	98
McKenzie	Spring Creek	I	114	18	149	98
McKenzie	Unnamed tributary to Spring Creek	I	36	31	149	98
McKenzie	Unnamed tributary to Spring Creek	I	50	31	149	98
McKenzie	Unnamed tributary to Spring Creek	I	43		149	98
McKenzie	Unnamed tributary to Little Missouri River	I	21	3	150	93
McKenzie	Unnamed tributary to Dry Creek	I	10	6	150	95
McKenzie	Unnamed tributary to Dry Creek	I	10	6	150	95
McKenzie	Unnamed tributary to Dry Creek	I	54	6	150	95
McKenzie	Unnamed tributary to Dry Creek	I	59	6	150	95
McKenzie	Unnamed tributary to Dry Creek	I	73	6	150	95
McKenzie	Unnamed tributary to Dry Creek	I	280	6	150	95
McKenzie	Unnamed tributary to Dry Creek	I	42	7	150	95
McKenzie	Unnamed tributary to Northfork Creek	I	33	15	150	96
McKenzie	Unnamed tributary to Northfork Creek	I	45	15	150	96
McKenzie	Unnamed tributary to Northfork Creek	I	22	13	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	57	13	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	166	13	150	97

County	Waterbody Name	Type	Length	Section	TWP	RNG
McKenzie	Unnamed tributary to Northfork Creek	I	16	14	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	18	14	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	47	14	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	82	15	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	29	16	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	52	16	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	55	16	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	53	18	150	97
McKenzie	Unnamed tributary to Northfork Creek	I	92	18	150	97
McKenzie	Unnamed Tributary to Cherry Creek	I	175	21	150	98
McKenzie	Unnamed Tributary to Cherry Creek	I	18	23	150	98
McKenzie	Cherry Creek	P	32	23	150	98
McKenzie	Unnamed tributary to Northfork Creek	I	35	24	150	98
McKenzie	Northfork Creek	P	158	24	150	98
McKenzie	Unnamed Tributary to Cherry Creek	I	26	31	150	98
McKenzie	Unnamed Tributary to Cherry Creek	I	37	31	150	98
McKenzie	Unnamed Tributary to Cherry Creek	I	82	32	150	98
McKenzie	Unnamed tributary to Dry Creek	I	57	31	151	95
McKenzie	Unnamed tributary to Clear Creek	I	20	1	151	96
McKenzie	Unnamed tributary to Clear Creek	I	23	1	151	96
McKenzie	Clear Creek	I	67	12	151	96
McKenzie	Unnamed tributary to Clear Creek	I	67	13	151	96
McKenzie	Unnamed tributary to Clear Creek	I	20	24	151	96
McKenzie	Unnamed tributary to Clear Creek	I	49	24	151	96
McKenzie	Unnamed tributary to Handy Water Creek	I	72	24	151	96
McKenzie	Unnamed tributary to Handy Water Creek	I	59	25	151	96
McKenzie	Unnamed tributary to Sand Creek	I	10	1	152	96
McKenzie	Unnamed tributary to Sand Creek	I	51	1	152	96
McKenzie	Unnamed tributary to Sand Creek	I	46	12	152	96
McKenzie	Unnamed tributary to Sand Creek	I	18	13	152	96
McKenzie	Unnamed tributary to North Branch Clear Creek	I	28	24	152	96
McKenzie	Unnamed tributary to North Branch Clear Creek	I	19	25	152	96
McKenzie	Unnamed tributary to North Branch Clear Creek	I	35	25	152	96
McKenzie	North Branch Clear Creek	I	69	25	152	96
McKenzie	Unnamed tributary to North Branch Clear Creek	I	24	36	152	96
McKenzie	Unnamed drainage	I	10	10	153	95
McKenzie	Unnamed drainage	I	10	10	153	95
McKenzie	Unnamed drainage	I	10	10	153	95
McKenzie	Unnamed tributary to Missouri River	I	39	10	153	95
McKenzie	Unnamed tributary to Sand Creek	I	23	28	153	95
McKenzie	Unnamed tributary to Sand Creek	I	34	28	153	95

County	Waterbody Name	Type	Length	Section	TWP	RNG
McKenzie	Unnamed tributary to Sand Creek	I	90	28	153	95
McKenzie	Unnamed tributary to Sand Creek	I	13	33	153	95
McKenzie	Missouri River	P	3,405	27/34	154	95
Stark	Unnamed tributary to South Fork Green River	I	13	6	140	99
Stark	Unnamed tributary to North Creek	I	10	7	140	99
Stark	Unnamed tributary to Heart River	I	58	7	140	99
Stark	Unnamed tributary to North Creek	I	125	15	140	99
Stark	Unnamed tributary to North Creek	I	32	16	140	99
Stark	Unnamed tributary to Heart River	I	35	17	140	99
Stark	Unnamed tributary to Heart River	I	26	18	140	99
Stark	Unnamed tributary to Heart River	I	30	18	140	99
Stark	Unnamed tributary to Heart River	I	37	18	140	99
Stark	Unnamed tributary to Heart River	I	55	18	140	99
Stark	Heart River	I	36	19	140	99
Stark	Unnamed tributary to Heart River	I	13	30	140	99
Williams	Unnamed tributary to Dry Fork Creek	I	28	8	154	95
Williams	Unnamed tributary to Missouri River	I	10	16	154	95
Williams	Missouri River	P	9,005	21/27/28	154	95
Williams	Unnamed tributary to Dry Fork Creek	I	12	5	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	10	17	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	11	17	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	40	17	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	74	17	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	104	17	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	27	20	155	95
Williams	Dry Fork Creek	I	46	29	155	95
Williams	Unnamed tributary to Dry Fork Creek	I	50	32	155	95

Construction of the Project could affect surface water in several ways. Clearing, grading, trenching and soil stockpiling activities could temporarily alter overland flow. Surface soil compaction caused by the operation of heavy equipment could reduce the soil's ability to absorb water, which could increase surface runoff and the potential for ponding. These impacts would be localized and temporary.

Environmentally sensitive areas such as wetlands and water bodies can be by-passed underground with trenchless methods such as using HDD techonology. Selection of an appropriate crossing method depends on site conditions and Project priorities. Feasible construction methods will be evaluated during preliminary design. Recommended construction methods will be provided during the final design to confirm the alignments, crossing length, and anticipated geotechnical conditions. Additional temporary work areas may be required in areas of rough or steep terrain, water body and drainage crossings, and wetlands. If HDD is employed, inadvertent releases of drilling fluids and lubricants through seepage may occur, which sometimes can reach surface water(s).

The proposed Project will be designed and constructed so it will not impede the flow of any waterway. The pipeline will be installed below the bed of the waterway, at a level so the channel bed gradient does not change.

Pipeline crossings will be scheduled at times when there is as little rainfall as possible. This will minimize the risks of debris, stockpiled soil, and other sources of sediment from being washed into water bodies or wetlands. Temporary erosion and sediment control BMPs will be installed across the entire width of the construction ROW after clearing and before ground surface disturbance. No silt/turbid discharge water from the trench dewatering operations will be allowed to enter any water body or wetland.

If temporary dewatering of groundwater is required during construction activities, dewatering will be discharged in compliance with a NPDES permit and SWPPP. The SWPPP will provide guidance on the location of dewatering structures, resulting in no deposition of sediments into wetlands and water bodies, and no impacts on cultural resource or habitat for sensitive species. The discharge of water from dewatering and hydrostatic testing operations will comply with relevant state discharge guidelines. Effects from dewatering will be localized, temporary, and generally insignificant.

9.1.13.1 Lake Sakakawea

The proposed Lake Sakakawea crossing is in a USACE designated utility corridor where the route will parallel three existing pipelines. BakkenLink has evaluated alternative routes and lake crossing locations; however, the USACE has indicated a preference for this location due to the existing pipelines.

BakkenLink has explored the possibility of completing this crossing using the HDD method. However, both the subsurface geology and distance of the crossing indicate that an HDD crossing is not feasible. BakkenLink is evaluating alternative crossing methods and is discussing these methods with the USACE. Any construction method will need to be approved and permitted by the USACE prior to construction.

The NDDH is a cooperating agency with the USACE through the state-run 401 Water Quality certification program. The NDDH has indicated that sediment sampling of the lake sediments at the crossing location will need to be performed and analytical testing completed to determine the chemical composition of these sediments. The NDDH will review the results of these tests prior to approval and permitting by the USACE.

9.1.14 Wetlands

Wetland resources for the Route were identified by reviewing USFWS National Wetland Inventory (NWI) data, topographic maps (USGS 2011), and recent aerial photography (USDA Farm Service Agency 2009). NWI records indicate that six acres of wetlands will be crossed by the Route. Wetlands crossed by the Route average less than two tenths of an acre in size. Fringe wetlands located in the riparian areas of the riverine systems vary in width from five to 500 feet.

Table 35 summarizes wetland types and acreages identified within the Route. Wetlands for this application were identified using the NWI database. These wetland areas are depicted on the Figures in Appendices E and F. A field delineation of wetlands crossed by the Project will be conducted prior to construction.

Table 35. NWI Wetland Types and Acres[1]

Wetland Area Classification Type[2]	Route	
	Count	Acres
Palustrine Aquatic Bed Semi-permanently Flooded *Diked/Impounded*	8	2.18
Palustrine Emergent Temporarily Flooded	9	1.54
Palustrine Emergent Temporarily Flooded	1	0.2
Palustrine Emergent Temporarily Flooded *Diked/Impounded*	1	0.03
Palustrine Emergent Seasonally Flooded	12	1.32
Palustrine Emergent Seasonally Flooded *Diked/Impounded*	2	0.07
Palustrine Scrub-Shrub Temporarily Flooded	1	0.26
Palustrine Unconsolidated Shore Seasonally Flooded *Diked/Impounded*	1	0.04

[1] Wetland acreage does not include the entire wetland acreage, i.e., the wetlands were truncated and the acreage reflects the amount that is within the corridor or route

[2] NWI designation. This does not include Riparian Wetlands as classified by the NWI, which are included herein as river and stream crossings

A field delineation of wetlands will be conducted prior to construction. The delineation will follow procedures outlined by the USACE Wetland Delineation Manual (USACE 1987) and Regional Supplement to the Manual: Great Plains Region (COE 2008). The field findings will be summarized in a wetland delineation report filed as an addendum to this application.

The pipeline will be routed to avoid most wetland crossings. Wetlands that cannot be avoided will be crossed using HDD, to the extent practical. Where HDD is not used, standard wetland construction mitigation measures will include limiting equipment working in wetlands to that essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where access to the ROW is only available through the wetland area, non-essential equipment will be allowed to travel through wetlands only if the ground is firm enough, or has been stabilized, to avoid rutting. If rutting is anticipated, non-essential equipment will be allowed to travel through the wetlands only one time, and essential equipment will need to be stabilized with prefabricated mats or terra mats.

Erosion and sediment control BMPs will be used during construction, operation, and maintenance of the pipeline to protect topsoil and minimize soil erosion into adjacent wetlands. Vegetation clearing will be limited to trees and shrubs, and disruption of the area will be restricted to the area immediately over the route. During clearing activities, sediment barriers will be installed and maintained adjacent to wetland areas and within temporary extra workspaces, as necessary to minimize the potential for sediment runoff.

9.1.15 Vegetation

Specific land cover types found along the Route were determined using the Gap Analysis Program (GAP) 2010 National Land Cover dataset (USGS 2010). Cover types along the Route are detailed in Table 36.

Table 36. GAP 2010 National Land Cover Dataset, Level 3 Ecological Systems - Route

GAP Cover Type	Description	Route	
		Acres	%
Cultivated Cropland	Areas used for the production of annual crops, such as wheat, corn, soybeans, sugar beets, and peas. Crop vegetation accounts for greater than 20% of total vegetation. This class includes all land that is actively tilled.	504	29
Developed, Low Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49% of total cover. These areas most commonly include single-family housing units.	7	<1
Developed, Open Space	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.	79	5
Disturbed, Non-specific	Areas that are barren or have relatively low vegetation cover that is associated with some form of generic human alteration or management regime. Typically associated with heavy grazing.	7	<1
Big Sagebrush Shrubland / Steppe	Big sagebrush shrublands have soils that are deep, well-drained and not salty. Big sagebrush dominates and other common shrubs include bitterbrush, rabbitbrush, or snowberry. Shrubs are the dominant vegetation, with grasses making up less than 25% of the cover. Big sagebrush steppe vegetation has >25% grass cover. In recent years this systems has been invaded by non-native annual grasses or weeds, in particular annual brome, which changes the patterns of fire. Pronghorn antelope, sage grouse, pygmy rabbit, sage sparrow, and many plant and animal species utilize sagebrush steppe as their primary habitat.	1	<1
Introduced Upland Vegetation	Areas that are dominated by introduced perennial forb or grassland species such as Canada thistle, bull thistle, star thistle, leafy spurge, mustards, sweetclover, scotch thistle, crested wheatgrass, smooth brome, Kentucky bluegrass, intermediate wheatgrass.	22	1
NW Great Plains Mixed grass Prairie	Grasses typically comprising the greatest canopy cover include western wheatgrass, green needlegrass, and fescue. Fire and grazing constitute the primary dynamics affecting this system. Drought can also impact this system, in general favoring the shortgrass component at the expense of the mid-grasses. With intensive grazing, cool-season exotics such as Kentucky bluegrass and brome can increase in dominance. Shrub species such as can also increase in dominance with fire suppression.	872	50

GAP Cover Type	Description	Route	
		Acres	%
NW Great Plains Shrubland	This ecological system is found on shallow to deep, fine to sandy loam soils. These sites are typically moister than most of the surrounding area. This system is composed largely of tall, deciduous shrubs occurring along upper terraces, gentle slopes near breaks, and toeslopes, often in upper terraces or near rivers and streams. It usually is composed of one or more shrubs with grasses such as junegrass, bluebunch wheatgrass, thread-leaf sedge and fescue. It is similar to midgrass prairie systems, but can be easily distinguished by the presence of at least 10% cover of shrubs assuming that little to no fire suppression has occurred. Fire and grazing constitute the primary dynamics affecting this system. Drought can also impact this system.	11	<1
Open Water	All areas of open water, generally less than 25% cover of vegetation or soil. Specifically, inland waters of streams, rivers, ponds and lakes.	30	2
Pasture / Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.	99	6
W Great Plains Dry Bur Oak Forest and Woodland	This system is in small to large patches on buttes, escarpments, and in foothill zones, usually on north facing slopes. It is dominated by bur oak with a sparse to moderate cover of prairie grasses or woodland sedges. Shrubs such as chokecherry, beaked hazelnut, snowberry, or serviceberry can occur. Historically, higher cover of grass species occurred as these stands were more open due to more frequent fires. Grazing, conversion to agriculture, and past timber harvesting also can impact this system. Overgrazing can also lead to a decrease in understory species, and timber harvesting can completely eliminate examples of this system.	1	<1
W Great Plains Floodplain Systems	This riparian system group is found in the floodplains of medium and large rivers. Alluvial soils and periodic, intermediate flooding (every 5-25 years) typify this system. Dominant communities range from floodplain forests to wet meadows to gravel/sand flats; however, they are linked by underlying soils and the flooding regime. Stands are also on alluvial soils in highly variable landscape settings, from deep cut ravines to wide, braided streambeds. Dominant species include big bluestem, silver sagebrush, hairy sedge, cottonwood, ryegrass, green ash, switch grass, western wheatgrass, bur oak, willows, little bluestem, sand dropseed, and American elm. In addition, exotic species such as salt cedar, Siberian elm, and Russian olive can invade these systems.	4	<1
W Great Plains Sand Prairie	Sandhills have coarse-textured soils predominate and the dominant grasses are well-adapted to this condition. Another important feature is their susceptibility to wind erosion. Grasses dominate the sand prairies, although relative dominance can change due to impacts of wind disturbance. Sand bluestem and prairie sandreed are the most common species. The primary use of this system has been grazing. The fragility of the soils and the cautions used by ranchers to avoid poor grazing practices have allowed for fewer significant changes in the vegetation of sand prairies compared to other grassland systems. Fire also can influence this system.	5	<1

GAP Cover Type	Description	Route	
		Acres	%
W Great Plains Wooded Draw and Ravine	This system is typically associated with permanent or ephemeral streams. It may occur on steep northern slopes or within canyon bottoms that do not experience periodic flooding, although soil moisture and topography allow greater than normal moisture conditions compared to the surrounding areas. Occurrences can be either tree-dominated or predominantly shrub land. Ash and elm trees typically characterize this system. Fire can influence this system; however, grazing is the most prevalent dynamic process influencing this system. This system can be heavily degraded in some areas. In addition, exotic species such as Siberian elm and Russian olive can invade this system.	63	4

Existing agricultural and grazing practices along the Route have substantially altered the original vegetative landscape. Minimal impacts are expected to occur to native plant communities. Permanent vegetative impacts from pipeline construction are not anticipated.

Temporarily disturbed areas that are normally cultivated will be available after Project construction. Areas not currently being cultivated will be seeded with native seed mixes per USFS, USFWS, and NRCS recommendations.

Any trees along the route will be protected to the extent practicable and in a manner compatible with safe operation, maintenance, and inspection of the pipeline. Impacts on wooded areas due to construction activity are anticipated to be temporary. It may be necessary to clear some mature trees during construction.

9.1.16 Wildlife

Refer to Section 5.3.20 of the Application for a Corridor Certificate.

9.1.17 Rare and Unique Natural Resources

Refer to Section 5.3.20 of the Application for a Corridor Certificate.

9.2 Factors Listed in NDCC § 49-22-09

9.2.1 Available Research and Investigations

Refer to Sections 3 and 5 of the Application for a Corridor Certificate, and the following Sections of this Application for a Route Permit, for a discussion of available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.

9.2.2 Effects of New Energy Conversion and Transmission Technologies

The pipeline design incorporates the latest developments in materials, controls, spill prevention and accident mitigation. Operation of the pipeline will be fully operational with SCADA, remote sensing, and automatic shutdown systems, to help minimize the potential for adverse environmental effects. The evolution of pipeline technology parallels advancements in

pipeline safety and involves improvements to just about every aspect of pipeline construction, maintenance and operation.

Pipeline construction technology and methodology has improved greatly in the last several decades with respect to minimizing adverse effects to the environment. For example, advances in the use of HDD technology will allow BakkenLink to minimize impacts to wetlands, streams, and other sensitive areas. BakkenLink will use HDD and other trench technologies to the extent practical. Advances in construction equipment and techniques, such as automatic welding machines, will also be utilized. Other environmental mitigation methods that will be employed are discussed throughout the Application for a Corridor Certificate and Application for a Route Permit documents.

9.2.3 Potential for Beneficial Uses of Waste Energy

The proposed Project does not include any energy conversation facility. The currently proposed pumping facilities will be constructed and operated by others. As such, the proposed Project does not offer the possibility for the beneficial use of waste energy.

9.2.4 Adverse Direct and Indirect Environmental Effects Which Cannot Be Avoided

BakkenLink does not anticipate any permanent adverse direct or indirect environmental effects due to the proposed Project. Refer to Sections 3 and 5 of the Application for a Corridor Certificate, and following Sections of this Application for a Route Permit, for further discussion(s).

9.2.5 Alternatives to the Proposed Site, Corridor, or Route

Refer to Section 4 of the Application for a Corridor Certificate.

9.2.6 Irreversible and Irretrievable Commitments of Natural Resources

Commitments of irreversible and irretrievable commitments of natural resources will be limited in nature and include such resources as steel for the pipeline and associated facilities, gravel/scoria for improvements to service roads and fossil fuels used to power construction equipment and to provide power to Project facilities.

9.2.7 Direct and Indirect Economic Impacts

The United States consumes about 21 million barrels per day of petroleum products. A complex transportation network is in place to move the raw materials, which is mainly crude oil, from where they are produced to where they are refined and consumed. Pipelines are an integral part of this network. Pipelines transport roughly two-thirds of the petroleum shipped in the United States, or about 14 billion barrels per year. Because many volumes are shipped first as crude oil and then reshipped as refined product, the annual pipeline shipments are more than double the actual consumption (Barr, 2011).

The United States has the largest network of petroleum pipelines of any country. Although petroleum pipeline shipments account for more than 17 percent of the freight, they account for less than 2 percent of the cost.

Transporting large volumes of crude oil over large distances by pipeline is less expensive than by truck, railcar, or barge. It is also safer. Pipelines are the safest, most reliable and efficient manner of transporting crude oil.

North Dakota is currently the fourth largest producer of crude oil in the country. The Project will supplement the capacity needed within North Dakota to export increasing volumes of crude oil and encourage development of additional export capacity. Thus, the Project will improve netbacks at the wellhead, boost the economy, and allow the state to capitalize on tax revenue collected from increased extraction and production taxes.

Beneficial impacts on the economy would also result during construction from temporarily hiring local employees, and from a relatively large-scale, temporary influx of non-local construction workers. Unemployment in the area would see a temporary drop, and payroll taxes would temporarily rise. Local businesses would benefit from demands for gasoline and other fuels, goods and services generated by the temporary workforce's need for food, lodging, and other basic needs.

State and local governments will realize additional tax revenue from retail purchases by temporary workers. In addition to purchases by workers, BakkenLink will purchase some materials necessary for construction of the Project locally. BakkenLink expects that local purchases made for construction of the Project would primarily include consumables, fuel, equipment rental, space leasing, and miscellaneous construction-related materials (e.g., office supplies), and that state and local governments would realize additional sales tax revenues from these purchases.

Of greater significance to state and local tax revenues would be the sales or use taxes on pipe and other materials and installed equipment associated with the Project. Such purchases are subject to sales tax if the items are purchased in-state, or use tax when purchased outside the state and imported into and used within the state. Typically, project owners and contractors are entitled to a credit for taxes paid in another jurisdiction (e.g., the point of purchase or manufacture), but generally have an option.

During operation of the pipeline, BakkenLink will pay *ad valorem* taxes to local governments crossed by the proposed Project. Pipelines are centrally assessed by the state, with the total valuation then allocated among the local counties based on their respective shares of the installed pipelines and facilities. Initially, the cost of construction provides a reasonable proxy for the assessed valuation of a pipeline system. Over time, the assessment focuses more on the facilities' contribution to system-wide income and depreciated value, generally resulting in lower assessment.

9.2.8 Existing Plans of the State, Local Government, and Private Entities

BakkenLink has consulted with various federal, state, and local governments, as well as local businesses and residents, and has not identified any conflicts with proposed developments in the vicinity of the Project. BakkenLink has identified several energy infrastructure projects near the project but has not identified any potential conflicts. In fact, the proposed Project may benefit several of these projects. Refer to Section 4.0 of the Application for a Corridor Certificate.

9.2.9 Effects of the Proposed Route on Existing Scenic Areas, Historic Sites and Structures, and Paleontological or Archaeological Sites

Refer to Sections 3 and 5 of the Application for a Corridor Certificate and the preceding Sections of this Application for a Route Permit.

9.2.10 Effects of the Proposed Route on Unique Biological Areas

Refer to Sections 3 and 5 of the Application for a Corridor Certificate and the preceding Sections of this Application for a Route Permit.

9.2.11 Problems Raised by Federal Agencies, Other State Agencies, and Local Entities

BakkenLink is in the process of obtaining permits and approvals to construct from several federal, state, and local agencies. In compliance with the Siting Act and the Siting Rules, local, state and regional agencies were notified of the proposed Project. Scoping letters were mailed in October 2010 and additional correspondence has occurred with various agencies. Copies of the Scoping Letters are provided in Appendix I.

A list of recipients and their comments, if received are summarized in Table 37. Copies of the comment letters received from the agencies are included as Appendix J.

Table 37. Agency Comments on Proposed Project

Recipient	Comments Received	Comments	Action
US Agencies			
Fish and Wildlife Service	No	The USFWS will serve as a cooperating agency to the USACE and USFS for threatened and endangered species consultation.	BakkenLink will continue to correspond with the USFWS regarding threatened and endangered species.
Natural Resources Conservation Service	Yes	• No action required for important farmland • Disturbance of wetlands must be temporary • No drainage of wetlands is allowed (temporary or permanent) • Landscaping necessitated by project must be minimal and proper contours maintained • Temporary side-cast material must not be dispersed in a wetland • Trenches must be backfilled to original wetland bottom elevation • Avoid impacts to wetlands if possible • If passage or disturbance of wetlands is anticipated, NRCS will complete a certified wetland determination if requested • There are no Wetlands Reserve Program Easements in the Corridor	Construction procedures and mitigation measures are discussed in Section 5.3 of the Application for a Certificate of Corridor Compatibility and Section 3.1 of the Application for a Route Permit.

Recipient	Comments Received	Comments	Action
Department of the Army, Corps of Engineers	Yes	• Pre-construction notification to the COE is required as a Nationwide Permit 12 • Project requires determination of need of Section 404 permit • A Real Estate Easement is required for the Lake Sakakawea crossing.	BakkenLink will continue to correspond with the USACE to acquire the applicable permits and easements.
Bureau of Reclamation	No	N/A	N/A
Forest Service McKenzie Ranger District	No	N/A	BakkenLink will continue to correspond with the USFS to determine routing, permitting, and construction procedures on the Little Missouri National Grasslands.
Forest Service Medora Ranger District	No	N/A	BakkenLink will continue to correspond with the USFS to determine routing, permitting, and construction procedures on the Little Missouri National Grasslands.
National Park Service	Yes	• Theodore Roosevelt National Park, North Unit is a few hundred yards from the Corridor, and two miles from the South Unit; therefore, no concerns; • Want to be informed if the Route is relocated	N/A
State Agencies			
Department of Transportation	Yes	• No adverse effect on NDDOT highways • Pipelines are allowed to cross highways • Pipelines are not allowed to run longitudinally in the highway ROW • Work in highway ROW requires NDDOT permits and risk management documents	BakkenLink will acquire the necessary permits prior to construction.
Game and Fish Department	Yes	• Native prairie and wooded draws should be avoided to extent possible • Disturbances reclaimed to pre-project conditions • Special use permit required if crossing the Lewis & Clark or Hofflund Wildlife Management	Construction procedures and mitigation measures are discussed in Section 5.3 of the Application for a Certificate of Corridor Compatibility and Section 3.1 of the Application for a Route Permit.

Recipient	Comments Received	Comments	Action
		Areas which are near the project • Wetlands should be avoided, but if cannot be, no alterations should be made to existing drainage patterns • Above ground appurtenances should not be placed in wetland areas • The Missouri River, Little Missouri River, White Earth River, Green River, Little Knife River, and Cherry Creek should be crossed by directional boring if possible. If not, construction should be avoided between April 15 and June 1. • Erosion and sedimentation controls should be implemented • Acquire appropriate USACOE permits	
Parks and Recreation Department	Yes	• Project does not impact any State Parks • Land and Conservation Fund sites near the project must be replaced with property of equal market value if property is taken from a site that receives assistance from the Federal Land and Water Conservation Fund • Project development must have least amount or no visual impact to views from the Theodore Roosevelt National Park North Unit Scenic Byway • Letter identifies numerous plant and animal species of concern and significant ecological communities • Project conducted with minimal impacts to ensure critical habitats are not disturbed • Revegetate with native species • Proposed pipeline should use horizontal direction boring across all rivers and streams • Potential impact to ecologically significant areas must be adequately addressed	Construction procedures and mitigation measures are discussed in Section 5.3 of the Application for a Certificate of Corridor Compatibility and Section 3.1 of the Application for a Route Permit.

Recipient	Comments Received	Comments	Action
Department of Health	Yes	• Fugitive dust emissions during construction must be minimized • Fugitive dust complaints must be dealt with efficiently and effectively • Construction near water must minimize adverse effects, including: disturbance of stream beds and banks to prevent siltation; replacement and revegetation as soon as possible; prevention of oil and grease into receiving water • Must have a permit to discharge storm water runoff • Local officials must be contacted to determine if local storm water management requirements or BMP are necessary • Care must be taken to avoid spills of any materials that will have an adverse effect on groundwater quality • Any spills must be reported to NDDH • Noise levels must be minimized, i.e., good mufflers, and timing of construction during the day	BakkenLink will acquire the necessary permits prior to construction. Construction procedures and mitigation measures are discussed in Section 5.3 of the Application for a Certificate of Corridor Compatibility and Section 3.1 of the Application for a Route Permit.
Aeronautics Commission	No	N/A	N/A
Job Service of ND	Yes	• No applicable permits for the Job Service required	N/A
Indian Affairs Commission	No	N/A	N/A
Office of the Governor	No	N/A	N/A
Economic Development and Finance Division	No	N/A	N/A
Department of Human Service	No	N/A	N/A
Office of Attorney General	No	N/A	N/A
Department of Agriculture	No	N/A	N/A

Recipient	Comments Received	Comments	Action
NDSU Extension Service	No	N/A	N/A
ND Pipeline Authority	No	N/A	N/A
ND Department of Career and Technical Education	No	N/A	N/A
Water Commission	Yes	• Not in an identified floodplain, so floodplains will not be affected • All waste material must be properly disposed of, and not placed in floodway areas • Sole-source aquifers have not been designated in North Dakota	No further action required.
Division of Community Services	No	N/A	N/A
State Land Department	No	N/A	N/A

BakkenLink will comply with all agency rules and regulations having jurisdiction over the proposed project and will obtain all other necessary licenses and permits. Possible Federal and State permits and approvals required are shown in Table 38. BakkenLink continues to correspond with the various agencies and local governing units to determine applicable permit and permit requirements. Conditional use permits at the township level have not been identified at the time of this filing; however, BakkenLink will continue to discuss the proposed Project with applicable entities and local governing units. All applicable permits will be acquired prior to construction.

Table 38. Required Permits

Agency	Type of Approval	Status	Need
Federal Permits			
Army Corps of Engineers	• Nationwide Permit 12 • Section 10 Permit • 404 Permit	Pending	• If needed, Nationwide Permit 12 will be obtained. • Section 10 Permit required for the Lake Sakakawea crossing. • If needed, required for fill in jurisdictional waters of the US.
Forest Service	Special Use Permit	Pending	Required to cross LMNG.

Agency	Type of Approval	Status	Need
Department of Transportation, Federal Highway Administration	Permit	Pending	Required to cross federal-aid highways.
Fish and Wildlife Service	Consultation	On-going	Required to determine potential impacts to species listed under Section 7 of the Endangered Species Act.
State of North Dakota Permits			
Public Service Commission	Certificate of Corridor Compatibility and Route Permit	Pending	Required to construct a transmission facility.
Game and Fish Department	Consultation	On-going	Suggested timing restrictions for construction in waterways. Cooperating agency with Federal Agencies.
Department of Health, Air Quality Division	Permit to construct	Pending	Required for construction of receipt points.
Department of Health, Water Quality Division	401 Water Quality Certification	Pending	NDDH is a cooperating agency with the USCOE and will determine impacts to water quality.
Department of Health, Water Quality Division	• NDPDES • Permit to Discharge Hydrostatic Test Water	Pending	• Required for all construction projects that disturb 1 acre or more of land must have either: an individual storm water permit, or coverage under one of North Dakota's general permits. • Required for dewatering of pipeline following hydrostatic testing.
State Historical Society	Cultural Resource Review	On-going	Compliance with NDCC 55-03 to assess the potential project impacts to cultural resources
Department of Transportation	Utility Occupancy Permit	Pending	ROW occupancy permit for state roadway crossings.
State Water Commission	Sovereign Land Permit	Pending	ROW access across Missouri River
County Permits			
Billings	Conditional Use/Pipeline Permit	Pending	Required to construct a pipeline.
Dunn	Conditional Use/Pipeline Permit	Pending	Required to construct a pipeline.
McKenzie	Conditional	Pending	Required to construct a pipeline.

Agency	Type of Approval	Status	Need
	Use/Pipeline Permit		
Stark	Conditional Use/Pipeline Permit	Pending	Required to construct a pipeline.
Williams	Conditional Use/Pipeline Permit	Pending	Required to construct a pipeline.

9.3 Routing Criteria

The exclusion and avoidance area criteria set forth in NDAC § 69-06-08-02(1) and (2) were taken into consideration when establishing the location of the proposed route. Any exclusion and avoidance areas located within the Corridor are depicted on the figures in Appendices E and F. Further discussion of these areas, the selection criteria, the policy criteria and other criteria considered is provided in the following Sections. The criteria set forth in NDCC § 49-22-09 were also evaluated, as discussed in the following Sections.

9.3.1 Exclusion Areas

Pursuant to NDAC § 69-06-08-02(1), specific geographical areas shall be excluded in the consideration of a route for a transmission facility, and shall include a buffer zone of a reasonable width to protect the integrity of the area. Natural screening may be considered in determining the width of the buffer zone. Exclusion areas may be located within a corridor, but may not encompass more than fifty percent of the corridor width at any given point, unless there is no reasonable alternative. As noted in Table 39, no Exclusion Areas are present within the proposed Route.

Table 39. Exclusion Areas - Route

Geographic Area	Crossed by Route
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; monuments; and wilderness areas.	No
Designated or registered state: parks; historic sites; monuments; historical markers; archaeological sites; and nature preserves.	No
County parks and recreational areas; municipal parks; and parks owned or administered by other governmental subdivisions.	No
Areas critical to the life stages of threatened or endangered animal or plant species.	No
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	No

9.3.2 Avoidance Areas

NDAC § 69-06-08-02(2) requires that specific geographical areas not be considered in routing a transmission facility unless the applicant shows that under the circumstances there is no reasonable alternative. Avoidance Areas may be located within a corridor, but may not encompass more than fifty percent of the corridor width at any given point, unless there is no

reasonable alternative. Avoidance areas within the Corridor and crossed by the Route are shown in Table 40, and depicted on the Figures in Appendix E.

Table 40. Avoidance Areas - Route

Avoidance Area	Crossed by Route
Designated or registered national: historic districts; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	Yes, the Little Missouri National Grasslands is crossed by the pipeline. BakkenLink is coordinating with the USFS to determine necessary permitting and routing requirements.
Designated or registered state: wild, scenic, or recreational rivers; game refuges; game management areas; management areas; forests; forest management lands; and grasslands.	No
Historical resources which are not specifically designated as exclusion or avoidance areas.	Yes . A Class III Cultural Resource Survey will be conducted prior to construction. Historical resources will be avoided to the extent practical. TheSHPO will be consulted to determine significance of sites and avoidance or mitigation measures.
Areas that are geologically unstable.	No
Within five hundred feet of a residence, school, or place of business.	No
Reservoirs and municipal water supplies	Yes, Lake Sakakawea.
Water sources for organized rural water districts.	No
Irrigated land. This criterion shall not apply to an underground transmission facility.	NA
Areas of recreational significance which are not designated as exclusion areas	No

9.3.3 Selection Criteria

Pursuant to NDAC § 69-06-08-02(3), a route shall be approved only when it is been demonstrated that any significant adverse effects resulting from the location, construction, and maintenance of the facility as they relate to the criteria shown in Table 41, and will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum.

Table 41. Selection Criteria - Route

Selection Criteria	Anticipated Impact
Agricultural production	No permanent impacts are anticipated.
Family farms and ranches	No permanent impacts are anticipated. No farms or ranches will be displaced due to construction and operation.

Selection Criteria	Anticipated Impact
Land which the owner can demonstrate has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation.	No permanent impacts are anticipated.
Surface drainage patterns and ground water flow patterns	No permanent impacts are anticipated.
Noise-sensitive land uses	Noise-sensitive areas include residences near the Project. Increased noise may be experienced at these locations during construction of the project, but no long-term noise impacts are anticipated.
The visual effect on the adjacent area	No permanent impacts are anticipated.
Extractive and storage resources	No permanent impacts are anticipated.
Wetlands, woodlands, and wooded areas	Temporary impacts may occur. Mitigation measures are discussed in Sections 5.3.18 and 5.3.19 of the Application for a Certificate of Corridor Compatibility.
Radio and television reception, and other communication or electronic control facilities	No permanent impacts are anticipated.
Human health and safety	No permanent impacts are anticipated. Mitigation measures will be implemented as discussed in Section 5.3.7 of the Application for a Certificate of Corridor Compatibility and Section 3.1.3 of the Application for a Route Permit.
Animal health and safety	No permanent impacts are anticipated. No impacts to domestic livestock are anticipated. Mitigation and avoidance measures with respect to wildlife will be implemented as discussed in Section 5.3.12 of the Application for a Certificate of Corridor Compatibility.
Plant life	No permanent impacts are anticipated. Mitigation and avoidance measures will be implemented as discussed in Section 5.3.13 of the Application for a Certificate of Corridor Compatibility.

9.3.4 Policy Criteria - Route

Pursuant to NDAC §69-06-08-02(4), the Commission may give preference to an applicant that will maximize benefits that result from the adoption of the policies and practices shown in Table 42.

Table 42. Policy Criteria - Route

Policy Criteria	Suitable Policy or Practice of Applicant
Location and design	The Route selection took into consideration the criteria set forth in the Siting Act and the Siting Rules.
Training and utilization of available labor in this state for the general and specialized skills required.	Local labor will be used to the extent practical.
Economies of construction and operation	BakkenLink will explore all economic efficiencies for construction and operations. Efficiencies may include: starting pipeline construction with completion of similar pipeline projects in order to minimize mobilization/demobilization costs, timing pipe acquisition and delivery with other projects in the area, and constructing the pipeline using multiple spreads in order to minimize overall construction time. BakkenLink may use a combined workforce with other pipeline operators in the service area for control room monitoring and other operation and maintenance services to avoid duplication of efforts, share office/warehouse space, and inventory.
Use of citizen coordinating committees	BakkenLink will continue to coordinate with landowners, townships, and other local committees in siting the Project.
A commitment of a portion of the transmitted product for use in ND	The only oil refinery in the state (Tesoro, Mandan) is currently operating at capacity and has no need for additional crude oil.
Labor relations	No labor relations will be affected.
The coordination of facilities	BakkenLink will transport crude oil from up to six proposed receipt points including existing and proposed crude oil loading terminals.
Monitoring of impacts	BakkenLink is committed to ensuring that BMPs are utilized during construction to minimize environmental impacts and will monitor construction compliance with the commitments made in this application and applicable permit conditions.
Utilization of existing and proposed rights of way and corridors	The majority of the proposed route is along existing highway and transmission corridors
Other existing or proposed transmission facilities	The footprint of the Project will encourage the development of receipt points and interconnects with third party pipelines, including potentially the Enbridge North Dakota pipeline system, the Tesoro High Plains pipeline system, and the Bridger pipeline system.

Please refer to Section 5 of the Application for a Corridor Certificate and the preceding sections of this Application for a Route Permit, for further discussions regarding the criteria.

9.4 Discussion of the Relative Value of Each Criteria

Please refer to Section 5.3 of the Application for a Corridor Certificate and the preceding sections of this Application for a Route Permit.

9.5 Criteria to be Evaluated

Please refer to Section 5 of the Application for a Corridor Certificate and the preceding sections of this Application for a Route Permit.

9.6 Mitigation Measures

Please refer to Section 5 of the Application for a Corridor Certificate and the preceding sections of this Application for a Route Permit.

9.7 List of Preparers

Please refer to Section 5.4 of the Application for a Corridor Certificate.

9.8 Maps

Please refer to Section 6 of the Application for a Corridor Certificate.

10.0 Right-of-way Preparation and Construction Procedures (Required by NDCC § 49.22-08.1(e))

10.1 Construction Procedures

BakkenLink's facilities will be designed, constructed, tested, operated, and maintained in accordance with applicable requirements of the USDOT regulations in 49 CFR §195, United States Department of Labor regulations, Occupational Safety and Health Administration (OSHA) requirements, and other applicable federal and state regulations. These regulations are intended to ensure adequate protection for the public and to prevent crude oil pipeline accidents and failures. Among other design standards, 49 CFR §195 specifies pipeline material selection; minimum design requirements; protection from internal, external and atmospheric corrosion; and qualification procedures for welding and operations personnel.

Pipeline construction is much like a moving assembly line. Construction of the pipeline involves several procedures that are summarized in the following Sections. These operations include:

- Survey and staking;
- Clearing and grading;
- Trenching;
- Pipe stringing;
- Bending;
- Welding;
- Lowering the pipeline;
- Backfilling;
- Hydrostatic testing; and
- ROW cleanup and restoration.

Construction will proceed along the pipeline in one continuous operation. As construction proceeds along a spread, construction at any single point along the pipeline, from initial surveying and clearing, to backfilling and finish grading, is anticipated to last about six to ten weeks. Multiple spreads may be constructed at the same time. The entire process will be coordinated in such a manner as to minimize the total time an individual tract of land is disturbed, exposed to erosion, or temporarily precluded from its normal use.

10.2 Survey and Staking

The first step of construction will involve marking the limits of the approved work area (the construction ROW and temporary workspaces), the pipeline centerline, access roads, existing utility lines, and other special areas. Sensitive areas such as wetland boundaries and cultural resource sites will be marked and flagged. BakkenLink will notify landowners in advance of construction activities that could affect their property, business, or operations.

10.3 Clearing and Grading

The construction ROW will be cleared and graded (where necessary) to provide a relatively level surface for construction equipment, a sufficiently wide work space for the passage of heavy construction equipment, and safety for the pipeline workers. Vegetation will be mowed and cleared to the edge of the work area in grassland areas where grading is not required.

To avoid soil mixing, topsoil is removed and segregated from the underlying subsoil. Topsoil is stored separately from subsoil and protected from construction-related activities. After pipeline installation is complete, the subsoil is replaced in the pipeline trench and adjacent areas to restore the land's natural contours. Only then is the topsoil replaced where it had been before.

The depth of topsoil stripping will vary according to the ROW landscape position (discussed in following sections). Construction activities will be suspended during abnormally wet conditions to prevent excessive rutting or mixing of topsoil with subsurface soils. Topsoil is typically stored at the far edge of the ROW on the opposite side of the trench from where construction machinery does its work. In some instances, topsoil may be stored off site or on the "working side" of the trench. In the latter case, the topsoil is again stored away from where machinery will operate.

Fences and gates will be constructed during the clearing and grading operations to allow continuous use of pastures, grazing units, and livestock facilities. Silt fence will be installed along the ROW adjacent to wetlands and streams.

When crossing small water features such as small ponds, streams, creeks, approved temporary flumed structures will be constructed to minimize impacts to the water feature.

Temporary erosion controls will be installed after initial disturbance of soils, where necessary, to minimize erosion. Erosion controls will be maintained throughout construction.

10.4 Trenching

Trenches will be excavated using a wheel trencher or backhoe. Explosives or special equipment may be used if large quantities of solid rock are encountered. The contractor will carefully use explosives in accordance with state and federal guidelines to ensure a safe and controlled blast.

Trenches will be excavated to a depth sufficient to provide the minimum cover required by federal, state and local municipalities as well as landowner requirements. USDOT specifies a minimum cover of 3 feet from natural ground to top of pipe. For 12-inch diameter pipe, the trench is normally about five feet deep (to allow for approximately four feet of cover); approximately two feet wide in stable soils, and up to 11 feet wide in saturated or otherwise unstable soils. Additional trench width may be required to maintain stability of trench walls for the safety of pipeline workers and equipment.

In cultivated areas, the depth of cover may be increased so as not to interfere with land use activities. The pipeline will be installed at a depth to provide a minimum of 4 feet of cover over the pipeline except or as needed at road and stream crossings or as needed for safety considerations.

10.5 Pipe Stringing, Bending and Welding

After clearing and grading, the contractor will string the pipe along the ROW. Pipe will either be stored at storage yards or transported directly to the pipeline ROW. The pipe lengths are typically 40 to 80 feet long. A stringing crew using special trailers will move the pipe along the ROW.

A pipe-bending machine will be used to make slight bends in the pipe to account for changes in the pipeline route and to conform to the topography. The bending machine uses a series of clamps and hydraulic pressure to make a smooth, controlled bend in the pipe. All bending is performed in strict accordance with federally prescribed standards to ensure integrity of the bend.

Pipe will be bent at the mill when necessary for sharp bends. The pipe will be pre-coated at the mill with a fusion-bonded epoxy external coating (or other coating technique) to provide corrosion protection.

A welding process will be utilized to join the sections of pipe into one continuous length. Each welder will be required to pass an approved qualification test to work on a particular pipeline aspect. The qualification tests will be conducted using project specific weld procedure(s) that will be developed in accordance with federally adopted welding standards.

Welds will be nondestructively tested to ensure structural integrity and compliance with the applicable USDOT regulations. Those welds not meeting established specifications will be repaired or removed. Once the welds are approved, the welded joints will be externally coated and the entire pipeline will be visually and electronically inspected for coating defects, scratches or other damage. Any damage or defects will be repaired before lowering into the trench.

10.6 Lowering-in, Padding, and Backfilling

A series of side-boom tractors will simultaneously lift welded sections of the pipe and carefully lower the sections into the trench. Non-metallic slings protect the pipe and coating as it is raised and moved into position. In rocky areas, the contractor may place sandbags or foam blocks at the bottom of the trench prior to lowering-in to protect the pipe and coating from damage. Trench breakers or water stops will be installed, as necessary, adjacent to wetlands and stream crossings to eliminate groundwater migration along the trench.

The trench will be dewatered, as necessary, prior to lowering in. Dewatering effluent will pass through sediment filters (hay bale structures and/or filter bags), if necessary, to ensure compliance with applicable water quality requirements.

The trench will be backfilled after the pipe has been installed. Soil will be returned to the trench in the reverse order of excavation. Where topsoil has been segregated, subsoil will be backfilled first, followed by the topsoil. The trench line (subsoil) will be compacted with a wheeled-roller or other suitable construction equipment. A crown will be left over the trench line to allow for natural subsidence. If the excavated material (rock) can damage the pipe and/or coating, the pipeline will be protected with a rock shield and/or covered with select fill, obtained from commercial borrow areas or by separating suitable material from nearby trench spoil. Topsoil will not be used for padding.

10.7 Hydrostatic Testing

The entire length of the pipeline will be hydrostatically tested before being placed into service. Requirements for this test are prescribed in the USDOT's federal regulations. Depending on the varying elevation of the terrain and the location of available water sources, the pipeline may be divided into sections to facilitate the test. Use from municipal water sources is anticipated.

Each pipe section will be filled with water and pressured to a level higher than the operating pressure. The test pressure will be held for a specific period to confirm that it meets the design strength requirements and if any leaks are present.

Hydrostatic test water will be discharged in accordance with applicable permits. It is anticipated that hydrostatic test water will be discharged overland within or along the edges of the construction ROW using energy dissipation devices to minimize erosion and sedimentation. Test water will contact only new pipe and BakkenLink does not anticipate the addition of chemicals to the test water. Once a test section successfully passes the hydrostatic test, the water is emptied from the pipeline in accordance with federal and state requirements. The pipeline will then be dried to assure it has no free water in it before oil is put into the pipeline.

10.8 Cleanup

The final step in the construction process is restoring the ROW as closely as possible to its original condition. Depending on the project requirements, this typically involves decompacting construction work areas, replacing the topsoil, and seeding non-cultivated land. Final grading is anticipated to occur within 20 days of backfilling the trench. Permanent erosion controls will be installed within the ROW during this phase.

Rocks greater than 6" across will not be placed within one foot of the surface on tilled land. Rocks will be collected and disposed of off the ROW or at a location designated by the landowner.

Pipeline markers and/or warning signs will be placed along the pipeline centerline at specified intervals to identify the location of the pipe. Access roads will be restored to pre-construction conditions, unless otherwise specified by the property owner and approved by regulatory agencies. Private and public property (fences, gates, driveways, roads, etc.) that were disturbed by construction will be restored to their original or better conditions, consistent with agreements with individual landowners, counties and/or townships, and any applicable permit requirements.

10.9 Special Construction Techniques

10.9.1 Residential Areas

BakkenLink will generally avoid construction near residential areas to ensure that impacts to residences from construction and operations are minimized. Where applicable, the following measures will be implemented to minimize impacts on residences:

- Temporary safety fences will be erected to limit access to the construction area. The fence(s) will extend at least 100 feet on either side of the residence along the ROW.

- Residents will be notified in advance of any scheduled disruption of household utilities. The duration of the interruption will be kept as brief as possible. Representatives of the local utility companies will be invited to be on-site during construction when necessary.
- Special consideration will be made to accommodate requests regarding private landscaping and other potential conflicts.
- The contractor will minimize the time the trench is left open.
- Dust will be controlled during construction.

10.9.2 Agricultural Areas

Specific construction measures will be implemented during different phases of construction including:

- Grading
    - Topsoil will be stripped as appropriate (ditch-plus-spoil side) and segregated from subsoil piles.
    - Natural flow patterns will be maintained.
- Drain Tiles and Irrigation Systems
    - Landowners will be contacted prior to construction to locate existing drainage tiles and irrigation facilities. Future plans for drainage tiles and irrigation facility locations will also be requested.
    - Colored flags/stakes marking drain tiles and irrigation pipes will be placed and maintained during construction.
    - Drainage flows and irrigation water supplies will be maintained, unless service interruption is coordinated with the landowner.
    - Drain tiles will be probed to determine if damage has occurred beyond the ditch line. Tiles damaged during construction will be documented by station number and orientation. Tiles damaged during construction will be repaired to their original condition or better.
    - Records of repairs will be maintained by BakkenLink and will be available for landowner reference.
- Restoration and Revegetation
    - Rutting and compaction will be repaired prior to revegetation.

In general, the ROW will revert to previous land use after construction is completed and during operation of the pipeline. Landowners will be compensated for loss of use due to construction.

10.9.3 Highway, Road, and Railroad Line Crossings

Highway, road, and railroad line crossings will be constructed according to applicable crossing permits. Primary roads are generally major roads and highways with relatively large volumes of traffic that have a well-defined traveled roadway (traffic lane) and shoulders with a granular pavement and/or concrete surface. Primary roads and railroad crossings will be constructed using the conventional bore method or by the HDD method. Little or no traffic disruption is expected when using the bore or HDD method.

Secondary roads are generally roads with moderate traffic. Usually the traveled roadway will be defined but may have apparent shoulders. The road surface may contain

granular material, soil, or a combination of both. Secondary roads will be crossed using the open-cut method.

Unimproved roads are generally minor roads with minimal, if any, traffic. They will normally be identified as small roadways, trailer, or tracks with no embankment or adjacent ditches and constructed/situated in natural earth material. The surface may have a light sprinkling of granular material. Unimproved roads will be crossed using the open-cut method.

Open cutting a road may require temporary closure of the road. Detours may be necessary if one lane of traffic cannot be kept open. Temporary closures and/or detours will be conducted according to applicable permits and in coordination with local road authorities and landowners. Safety and minimizing traffic disruptions are important in open cut project implementation.

Depending on permit conditions, the pipe may not be cased at road crossings.

10.9.4 Waterbody Crossings

"Waterbody" includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes. Waterbody crossings will be constructed in accordance with applicable permits. Waterbody crossings will be constructed using various methodologies including: Designed Pipeline Self-Lowering, Open Cut trenching and/or HDD technology. The methodology for each waterbody location will be determined by the crossing size and sensitivity.

For the lake crossing, the proposed methodology is based on the self-lowering of the pipeline section. BakkenLink will obtain geotechnical cores at selected locations along the crossing centerline. A study of the soils analysis will determine the specific gravity (SG) that will be required for the pipeline to self-lower based on its own weight. The BakkenLink Design Engineers will determine the steel pipe wall thickness (WT) and the concrete weight coating that will be applied to the sections of pipe before mobilization to site. Supplemental lowering contingency plans and supplemental mechanical protection contingency plans will be developed should the self-bury option not be feasible per results of soil analyses.

BakkenLink's SWPPP will specify measures based on best management practices (BMPs) that will address erosion control, equipment refueling, temporary bridge crossings, timing, construction methods, and restoration. Temporary workspaces are typically required on each side of a waterbody crossing to stage construction, fabricate the pipeline, and store materials. Temporary workspace will be located in upland areas a minimum of 50 feet from the waterbody edge. Trench spoil will be stored at least ten feet from the waterbody banks (topography permitting). Sediment barriers, such as silt fence, will be installed to prevent spoil and sediment-laden water from entering the waterbody.

10.9.5 Wetland Crossings

BakkenLink will avoid wetlands to the extent practical by routing or by crossing using HDD technology. Wetlands that cannot be avoided by either procedure will be crossed using open cut trenching similar to conventional upland construction procedures, with modifications and limitations to reduce the potential for pipeline construction to affect wetland hydrology and soil structure.

Techniques for wetland crossing will vary according to the type of wetland to be crossed, the length of the crossing, and the level of soil saturation or standing water at the time of crossing.

A “push-pull” technique may be used for trenching and installation where soils are saturated. This technique consists of stringing and welding the pipe outside of the wetland and excavating the trench through the wetland using equipment supported by mats. Water that seeps into the trench is used to float the pipeline into place using attached flotation devices and by pushing or pulling the pipe with equipment. The floats are then removed from the pipe and the pipe sinks into place. The trench is then backfilled and cleanup completed. Most pipes installed in saturated wetlands will be coated with concrete or equipped with weights to provide negative buoyancy.

If trench dewatering is necessary within wetlands, water will be discharged in accordance with BakkenLink’s SWPPP and in a manner that does not cause erosion and does not discharge silt-laden water into waterbodies. Water will be discharged into an energy dissipation device/sediment filtration device such as a straw bale structure or geotextile filter bag. Dewatering structures will be sized to handle the volume of water in the trench.

Construction mitigation measures will limit equipment working in wetlands to that necessary for clearing, excavation, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. If equipment must operate within a wetland that cannot support the equipment weight without rutting, the contractor will use wide-track or balloon-tire construction equipment or conventional equipment operated from timber mats or prefabricated equipment mats. All timber mats, prefabricated equipment mats, and subsoil not used as trench backfill will be removed upon completion of construction.

Clearing of vegetation will be limited to trees and shrubs cut flush with the ground surface and removed from the wetlands. Stump removal, grading, topsoil stripping, and excavation will be limited to the area immediately over the trench line. A limited amount of grading and vegetation clearing may be conducted in other areas if needed for safety-related issues. Topsoil segregation will occur if soils are not saturated at the time of construction.

Sediment barriers and erosion control measure will be installed and maintained adjacent to wetlands as necessary to minimize the potential for sediment runoff. Sediment barriers will also be installed where necessary to minimize the potential for sediment to run off the construction ROW and into wetland areas outside of work areas. Sediment barriers will be installed across the full width of the construction ROW at the base of slopes adjacent to wetlands. Sediment barriers installed across the working side of the ROW will be removed when construction equipment is present to allow orderly progression along the ROW. Sediment barriers will be replaced at the end of the day.

Restoration of contours will be accomplished during backfilling. Where topsoil has been segregated, subsoil will be backfilled first, followed by the topsoil. Topsoil will be backfilled to the original ground level, leaving a crown over the trench. If rocky soils are present, the pipe will be padded with rock-free soil or sand before backfilling with native bedrock and soil. Trench breakers, consisting of polyurethane foam or sand bags, will be installed where necessary to prevent subsurface drainage of water from wetlands.

Temporary erosion control devices will be installed where necessary until vegetation of adjacent upland areas is successful. Permanent slope breakers may be installed across the ROW in upland areas adjacent to the wetland boundary.

Temporary workspace may be required on both sides of the wetland to stage construction, fabricate the pipeline, and store materials. Temporary workspaces will be located in upland areas at least 50 feet from the wetland edge.

10.9.6 Open Cut Construction

The open cut crossing method of construction involves excavating a pipeline trench installing a section of pipe, and then backfilling the trench with material excavated from the trench. Excavation and backfilling of the trench will be performed using backhoes or other excavation equipment.

10.9.7 Conventional Bore

The boring method requires the excavation of pits on each side of the feature being crossed. Boring equipment is then lowered into the pits. Temporary workspace is needed on each side of the feature to store excavated materials and for pipe stringing. Sufficient pit depth and space is needed to allow boring equipment to bore a hole under the feature at the minimum depth prescribed by the permitting agency (typically five feet).

10.9.8 Horizontal Directional Drill Technology

Horizontal directional drilling can reduce or mitigate surface disturbance, traffic interruptions, damage to roads, and environmental impacts to streams, wetlands, cultural resources or other sensitive areas. HDD technology will be used when conventional boring is not feasible for major road crossings, when necessary due to a waterbody's or wetland's size, or when environmental sensitivity makes the use of other installation methods undesirable or impractical. HDD technology requires specialized equipment and personnel.

Directional drilling involves drilling a hole in a shallow arch from one surface location to another, beneath the feature to be avoided. The pipeline is then pulled through the hole or through a casing installed in the hole. Drilling the pilot hole establishes the ultimate position of the installed pipeline. The head of the pilot drill string contains a pivoting head that can be controlled as the drill progresses by an operator at the ground surface. Typically the pilot hole is directed downward at an angle until the proper depth is achieved, then turned and directed horizontally for the required distance, and then angled upward back to the ground surface. Pressurized mud slurry consisting of bentonite and water is pumped through the drill stem to lubricate the drill, provide pressure to maintain the hole, and remove drill cuttings. Bentonite is the commercial name for a mixture of non-toxic clay and rock particles.

The drilling mud has the potential of being inadvertently released (referred to as a "frac-out") to the ground surface if fractures or fissures are encountered in the substrate during drilling. The potential for a frac-out is generally greatest during drilling of the pilot hole, when the pressurized drilling mud is seeking the path of least resistance. The path of least resistance is typically back along the path of the drilled pilot hole; however, if the drill path becomes temporarily blocked or encounters other areas such as large fractures or fissures that lead to the ground, a wetland, or a waterbody, then a frac-out can occur. The route and circulation of the drilling mud is monitored throughout the drilling process for indications of a frac-out. Drilling

is immediately stopped and corrective actions implemented if a frac-out is observed or suspected. Corrective actions will be outlined in the HDD contingency plan.

When the pilot hole exits at the proper location, the reaming operation is started. A reaming head is attached to the drill pipe and pulled back through the pilot hole to enlarge it to the proper size for pipe installation. Multiple reaming passes may be made with incrementally larger reaming heads to enlarge the hole to about 1.5 times the diameter of the pipe. The potential for a frac-out generally decreases as the path of least resistance becomes increasingly well-established along the drill hole. Pressurized drilling mud will continue to be jetted through the reaming head to float out drill cuttings and debris, to cool and lubricate the drilling head, and to stabilize the hole. Pipe is pulled back through the reamed hole once the proper diameter has been achieved.

HDD may be impractical at certain location due to geotechnical conditions that may affect drilling mud circulation, drill whole stability, or pipeline integrity. These include fractured bedrock, subsurface boulders, or unconsolidated deposits such as loose sand and gravel. A feasibility assessment of HDD locations will be conducted prior to drilling.

It is expected that water from a municipal water source, stored on site, will be used for the drilling mud. Temporary pits are used to store mud and drill cuttings. Drilling mud and drill cuttings will be disposed of at an approved facility after drilling is complete and before final restoration.

Temporary workspaces will be required for drilling equipment, pipe assembly, supplies and materials, temporary mud pits and tanks, support vehicles, access to drilling sites, and equipment turn around areas. Erosion control measures will be installed as necessary and in accordance with the SWPPP.

10.10 Restoration Procedures

The construction contractor will limit ground disturbance wherever possible and use appropriate erosion and sediment control measures. Disturbed areas will be restored to their original contours and condition to the extent practical, unless landowner consent is obtained to do otherwise. Post-construction reclamation activities include removing and disposing of debris, dismantling temporary facilities, leveling or filling tire ruts, soil decompaction, and reseeding non-cultivated areas.

10.11 Maintenance Procedures

BakkenLink will periodically use the permanent ROW to perform inspections, maintain equipment, and make repairs during the life of the pipeline. Undesired vegetation that may interfere with the safe and reliable operations of the pipeline will also be removed.

11.0 Easement / ROW Acquisition (Required by NDCC § 49.22-08.1(f))

BakkenLink plans to secure the ROW by obtaining easements from landowners crossed by the Project. At the time of this filing, BakkenLink is in the process of contacting affected landowners to inform them of the easement acquisition process. During easement negotiations, landowners will be informed of the easement conditions and restrictions. Landowners will be compensated for the easement, as well as for damages resulting from construction of the Project. Landowners have been contacted to obtain permission to survey and to conduct necessary soil investigations. As the Project progresses, landowners will be appraised of the survey and construction schedule, necessary site access, and any vegetation clearing and grading required for construction.

Where possible, staging and lay down areas will be located within the ROW and limited to previously disturbed or developed areas. Temporary easements/workspaces will be obtained from landowners, as needed, for the duration of construction.

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