Application to the South Dakota Public Utilities Commission for a Permit for the Keystone XL Pipeline Under the Energy Conversion and Transmission Facility Act

October 2009

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[1] ARSD = Administrative Rule of South Dakota.

List of Acronyms

amsl	above mean sea level
APE	area of potential effect
API	American Petroleum Institute
BLM	Bureau of Land Management
BMP	Best Management Practice
bpd	barrels per day
CAPP	Canadian Association of Petroleum Producers
CFR	Code of Federal Regulations
CMR Plan	Construction, Mitigation, and Reclamation Plan
CWA	Clean Water Act
dBA	decibels on an A-weighted scale
DEQ	Department of Environmental Quality
DOS	Department of State
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EOC	Emergency Operations Center
ERP	Emergency Response Plan
FBE	fusion bonded epoxy
GIS	Geographic Information System
HCA	High Consequence Area
HDD	horizontal directional drill
IMP	integrity management program
IPA	Integrated Public Awareness
Keystone	TransCanada Keystone Pipeline, LP
mg/L	milligrams per liter
MLV	mainline valve

MOP	maximum operating pressure
NAGPRA	Native American Grave Protection and Repatriation Act
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NPDES	National Pollutant Discharge Elimination System
NRC	National Response Center
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSA	Noise Sensitive Area
NWI	National Wetland Inventory
OCC	Operations Control Center
PEM	palustrine emergent wetlands
PFO	palustrine forested wetlands
PHMSA	Pipeline and Hazardous Materials Safety Administration
POD	Plan of Development
Project	Keystone XL Project
psig	pounds per square inch gauge
PSS	palustrine scrub-shrub wetlands
PUC	Public Utilities Commission
QC/QA Plan	Quality Control/Quality Assurance Plan
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SDCL	South Dakota Codified Law
SDCWCP	South Dakota Comprehensive Wildlife Conservation Plan
SDDENR	South Dakota Department of Environment and Natural Resources
SDGFP	South Dakota Game, Fish, and Parks
SHPO	State Historic Preservation Officer

SPCC	Spill Prevention, Control, and Countermeasure
SWPA	source water protection area
TDS	total dissolved solids
TSS	total suspended solids
US	United States
USACE	US Army Corps of Engineers
USC	United States Code
USDA	US Department of Agriculture
USDOT	US Department of Transportation
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WCSB	Western Canadian Sedimentary Basin

1.0 Introduction

TransCanada Keystone Pipeline, LP (Keystone) hereby submits its application to the South Dakota Public Utilities Commission (PUC) for a permit under the South Dakota Energy Conversion and Transmission Facilities Act, with respect to the proposed Keystone XL Project (Project). Referenced tables and numbered exhibits (Exhibit 1, Exhibit 2, etc.) are included within the text of this document; lettered exhibits (Exhibit A, Exhibit B, etc.) are provided as attachments on DVD.

1.1 Project Purpose

The purpose of the Project is to transport crude oil production from the Western Canadian Sedimentary Basin (WCSB) to meet growing demand by refineries and markets in the United States (US). The demand for the facility is addressed in detail in Chapter 3.0 of this application.

1.2 Project Overview and General Site Description

The Project will consist of three segments: the Steele City Segment, the Gulf Coast Segment, and the Houston Lateral (Exhibit 1). From north to south, the Steele City Segment extends from Hardisty, Alberta southeast to Steele City, Nebraska. The Gulf Coast Segment extends from Cushing, Oklahoma south to Nederland, in Jefferson County, Texas. The Houston Lateral extends from the Gulf Coast Segment in Liberty County, Texas southwest to Moore Junction, Harris County, Texas. In total, the Project will consist of approximately 1,707 miles of new, 36-inch-diameter pipeline, consisting of approximately 327 miles in Canada and 1,380 miles within the US. It will interconnect with the northern and southern termini of the previously approved 298-mile-long, 36-inch-diameter Keystone Cushing Extension segment of the Keystone Pipeline Project.

The pipeline will enter South Dakota at the Montana/South Dakota border in Harding County. It will extend in a southeasterly direction through portions of Harding, Butte, Perkins, Meade, Pennington, Haakon, Jones, Lyman, and Tripp counties. It will exit the state at the South Dakota/Nebraska border in Tripp County. The length of pipeline through South Dakota is approximately 314 miles.

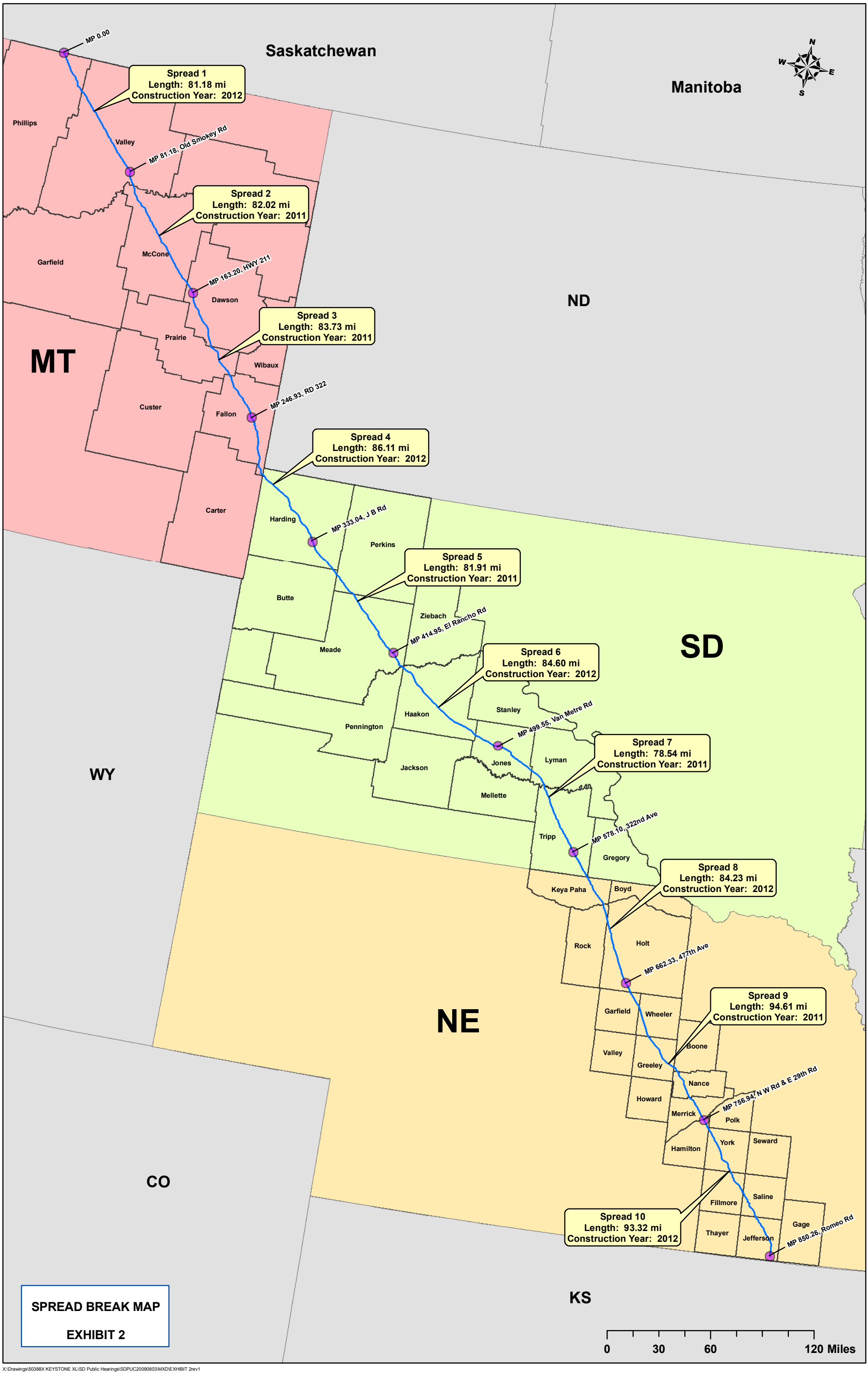
1.3 Estimated Capital Costs

The total estimated cost of equipment and installation of the Project in South Dakota is approximately $921.4 million.

1.4 Project Schedule

Keystone proposes to commence construction of the Project in South Dakota in 2011 and to complete construction in 2012. Construction will require all or portions of five spreads in South Dakota. A drawing illustrating the spreads in South Dakota is provided in **Exhibit 2**. Keystone


Hardisty
Morgan
CANADA
U S A
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
KEYSTONE XL
STEELE CITY
SEGMENT
Steele City
KEYSTONE PIPELINE
CUSHING EXTENSION
Cushing
KEYSTONE XL
GULF COAST
SEGMENT
KEYSTONE XL
HOUSTON LATERAL
Nederland
Houston
200 100 0 200 Miles
ROUTE MAP
EXHIBIT 1



X:\Drawings\50388X KEYSTONE XL\SD Public Hearings\SDPUC20090803\MXD\EXHIBIT 2rev1

proposes to place its pipeline in service by 2012. This timing is consistent with the requirements of the shippers making the contractual commitments that underpin the Project.

1.5 Project Participants

The permit applicant is TransCanada Keystone Pipeline, LP, a limited partnership, organized under the laws of the State of Delaware, and owned by affiliates of TransCanada Corporation, a Canadian public company organized under the laws of Canada. Keystone's primary business address is 450 1st Street, S.W., Calgary, Alberta, Canada T2P 5H1.

1.6 Individuals Authorized to Receive Communications

The individuals authorized to receive communications regarding this application are:

Mr. Brett Koenecke
May, Adam, Gerdes and Thompson, LLP
PO Box 160
Pierre, SD 57501
Ph: (605) 224-8803
Fax: (605) 224-6289
koenecke@magt.com

Mr. William G. Taylor
Woods, Fuller, Shultz & Smith P.C.
PO Box 5027
Sioux Falls, SD 57117-5027
Ph: (605) 336-3890
Fax: (605) 339-3357
bill.taylor@wfss.com

Mr. James P. White
Associate General Counsel – Pipelines & Regulatory Affairs
TransCanada
4547 Rincon Place
Montclair, VA 22025
Ph: (703) 680-7774
jim_p_white@transcanada.com

1.7 Ownership and Management

It is anticipated that the pipeline will be owned, managed, and operated by TransCanada Keystone Pipeline, LP. The Project Director for the Project is:

Mr. Kenneth Murchie
450 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1
Ph: (403) 920-2943
Fax: (403) 920-2661
ken_murchie@transcanada.com

1.8 Other Required Permits and Approvals

In order to construct pipeline facilities across the international border, Keystone is required to obtain a Presidential Permit from the US Department of State (DOS). The proposed pipeline facilities will be the subject of an Environmental Impact Statement (EIS), which is currently being prepared by the DOS

under the National Environmental Policy Act (NEPA), with the assistance of other cooperating agencies. It is anticipated that the Draft EIS for the Project will be issued by the DOS during the third quarter of 2009, with the Final EIS issued in the first quarter of 2010. In support of its Presidential Permit application, Keystone has submitted studies and other environmental information to the DOS. The DOS has established an informational web site for the Project at: http://www.keystonepipeline-xl.state.gov/clientsite/keystonexl.nsf?Open.

In addition to the facility siting permit under the Energy Conversion and Transmission Facility Act, Keystone has identified additional federal and South Dakota permits and regulatory approvals that will be required for construction and operation of the proposed Project in South Dakota. The principal additional federal and South Dakota permits and approvals required or potentially required by the Project are listed in **Table 1**.

Table 1 Permits, Licenses, Approval, and Consultation Requirements

Agency	Permit or Consultation/Authority	Agency Action	Filing Date
Federal			
US Department of State (DOS)	Presidential Permit, Executive Order 11423 of August 16, 1968 (33 Fed. Reg. 11741, et seq.)	Consider approval of cross-border facilities; lead federal agency under NEPA	September 19, 2008
Bureau of Land Management (BLM)	ROW Grant and Temporary Use Permit under Section 28 (MLA)	Consider approval of ROW grant and temporary use permits for the portions of the Project that would encroach on federal lands	March 17, 2008
	Archeological Resources Protection Act (ARPA) permit	Consider issuance of cultural resource use permit to excavate or remove cultural resources on federal lands	N/A
	Notice to Proceed	Following issuance of a ROW grant and approval of the Project's POD, consider the issuance of a Notice to Proceed with Project development and mitigation activities for federal lands	--
US Corps of Engineers (USACE) – Omaha, Tulsa, Fort Worth, and Galveston	Section 404, CWA	Consider issuance of Section 404 permits for the placement of dredge or fill material in Waters of the US, including wetlands	Fall 2010

Agency	Permit or Consultation/Authority	Agency Action	Filing Date
Districts	Section 10 Permit (Rivers and Harbors Act of 1899)	Consider issuance of Section 10 permits for pipeline crossings of navigable waters	Fall 2010
US Fish and Wildlife Service (USFWS)	ESA Section 7 Consultation, Biological Opinion	Consider lead agency findings of an impact of federally-listed or proposed species; provide Biological Opinion if the Project is likely to adversely affect federally-listed or proposed species or their habitats	DOS will issue with DEIS
US Bureau of Reclamation (USBR)	ROW Grant and Temporary Use Permit under Section 28 of the MLA	Determine if ROW grant issued under MLA by BLM is in compliance with USBR standards	--
Federal Highway Administration (FHA)	Crossing Permit	Consider issuance of permits for the crossing of federally funded highways	Fall 2010
Pipeline and Hazardous Materials Safety Administration -	49 CFR Part 195	Review IMP for HCAs	Prior to Operations
	49 CFR Part 194	Review ERP	Prior to Operations
	Special Permit	Authorization to use 0.80 design factor in specified areas	Prior to Operations
US Environmental Protection Agency (USEPA), Regions VI, VII, VIII	Section 401, CWA, Water Quality Certification	Consider approval of water use and crossing permits for non-jurisdictional waters (implemented through each state's Water Quality Certification Program)	Fall 2010
	Section 402, CWA, National Pollutant Discharge Elimination System (NPDES)	Review and issue NPDES permit for the discharge of hydrostatic test water (implemented through each state's Water Quality Certification Program, where required)	Spring 2011
US Department of Treasury – Bureau of Alcohol,	Treasury Department Order No. 120-1 (former No. 221), effective 1 July 1972	Consider issuance of permit to purchase, store, and use explosives should	Prior to Construction

Agency	Permit or Consultation/Authority	Agency Action	Filing Date
Tobacco, and Firearms		blasting be required	
South Dakota			
South Dakota Public Utilities Commission (SDPUC)	Energy Conversion and Transmission Facilities Act	Consider issuance of permit for a pipeline and appurtenant facilities	March, 2009
Department of Environment and Natural Resources, Surface Water Quality Program	Section 401, CWA, Water Quality Certification	Consider issuance of permit for stream and wetland crossings; consult for Section 404 process	Fall 2010
	Hydrostatic Testing/Dewatering & Temporary Water Use Permit (SDG070000)	Consider issuance of General Permit regulating hydrostatic test water discharge, construction dewatering to waters of the state ,and Temporary Water Use Permit	Spring 2011
South Dakota Department of Game, Fish, and Parks	Crossing easements	Consider issuance of easements for crossing state lands managed by the Department	Fall 2010
	Consultation	Consult regarding natural resources	ongoing
South Dakota Department of Transportation	Crossing Permits	Consider issuance of permits for crossing of state highways	Fall 2010
South Dakota Commissioner of School and Public Lands	Crossing Easements	Consider issuance of easements for crossing state lands managed by the Commissioner	Fall 2010
County Road Departments	Crossing Permits	Consider issuance of permits for crossing of county roads	Spring 2011
County and Local Authorities	Pump state zoning approvals, where required	Review under county approval process	Fall 2010
	Special or Conditional Use Permits, where required	Review under county approval process	Fall 2010

2.0 Project Description

2.1 Nature of Proposed Project

2.1.1 Facility Description Overview

Approximately 314 miles of the pipeline will be constructed within South Dakota. Detailed route maps are presented in **Exhibit A**.

In addition to the pipeline, Keystone will construct aboveground facilities in South Dakota, including pump stations and mainline valves (MLVs). Power lines required for providing power to pump stations will be permitted and constructed by local power providers, not by Keystone.

2.1.2 Future Expansion and Other Industrial Facilities

Three pumps will be installed at the pump stations to provide an initial nominal volume of 700,000 bpd. However, if future demand warrants, pumps may be added to the proposed pump stations for a total of up to five pumps per station, thereby increasing volume to a maximum nominal throughput to 900,000 bpd. No additional pump stations will be required to be constructed beyond those included in this application for this additional throughput. No tank facilities or other industrial facilities will be constructed in South Dakota.

2.2 Engineering Design

The proposed facilities will be designed, constructed, tested, and operated in accordance with all applicable requirements, including the US Department of Transportation (USDOT) regulations at 49 Code of Federal Regulations (CFR), Part 195, Transportation of Hazardous Liquids by Pipeline; American Society of Mechanical Engineers Standard B31.4; and other applicable federal and state regulations. These regulations and standards specify pipeline material and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion, thereby ensuring adequate protection for the public and environment by preventing pipeline incidents. Keystone has filed an application with Pipeline and Hazardous Materials Safety Administration (PHMSA) for a Special Permit authorizing Keystone to design, construct, and operate the project at up to 80 percent of the steel pipe specified minimum yield strength for most locations.

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

2.2.1 Pipeline

Exhibit 3 is a process flow diagram for the Steele City Segment of the pipeline route in the US. The portion of the pipeline in South Dakota is represented from Milepost 2825 to Milepost 597. The Project generally will not be co-located with other utility corridor routes in South Dakota due to the lack of existing corridors traversing South Dakota in a northwest to southeast direction. No lateral lines will be

constructed in South Dakota. The pipeline will have batching capabilities in Hardisty, Alberta, Canada and will be able to transport products ranging from light crude oil to heavy crude oil.

The pipeline will be constructed of high-strength steel pipe (American Petroleum Institute [API] 5L). The pipeline will have a 36-inch nominal pipe size diameter. Pipe material grade will be X-70 or X-80 and comply with API 5L-PSL2. Subject to the Special Permit discussed previously, all pipe will be manufactured, constructed, and operated in accordance with applicable federal regulations. Pipe wall thickness will be 0.463 inch (X-70) or 0.405 inch (X-80). To protect against corrosion, Keystone will apply an external fusion bonded epoxy [FBE] coating to the pipeline and an impressed cathodic protection system will be used.

The design of the pipeline system is based on a maximum 1,440 pounds per square inch gauge (psig) discharge pressure at each pump station. The result is that the maximum operating pressure (MOP) of the pipeline between pump stations generally is 1,440 psig. In liquid pipelines, some sections at lower elevations relative to the pump station discharge may be exposed to slightly higher pressures due to the combined station discharge pressure and hydrostatic head. This can occur during both normal and abnormal operating conditions. The design of the pipeline is based on a steady state and transient analysis to identify MOPs under normal and abnormal operating conditions.

For location-specific, low elevation segments close to the discharge of pump stations, the MOP will be 1,600 psig as identified in **Table 2**. This allows a consistent maximum discharge pressure for all pump stations, optimized for efficiency at nominal flow capacity. Pipe associated with these segments of 1,600 psig MOP are excluded from the Special Permit and will have a design factor of 0.72 and pipe wall thickness of 0.572 inch (X-70) or 0.500 inch (X-80). All other segments in South Dakota will have a MOP of 1,440 psig.

Table 2 Pipe Segments with MOP of 1,600 psig

Pipe Segment Between Pump Stations	Milepost Beginning to End	County	Length in Miles
PS 15 & 16	285.7 to 285.7	Harding	<0.1
PS 16 & 17	333.3 to 334.5 337.5 to 338.8	Harding	2.46
PS 17 & 18	387 to 388.2	Meade	1.28
PS 18 & 19	440 to 443.9	Haakon	3.85
PS 19 & 20	495.8 to 498	Jones	2.14
PS 20 & 21	546.4 to 548	Tripp	1.6
PS 21 to state line	591.7 to 596.2	Tripp	4.47
		Total	**15.83**

Discrepancies between mileposts and length of pipe segments are due to rounding.

All pipeline segments will allow the passage of internal inspection devices, which are capable of detecting internal and external anomalies in the pipe such as corrosion, dents, and scratches. Internal inspection of pipelines has been largely responsible for reducing pipeline incident frequencies over the past decade. Pig launchers and receivers are designed to launch and receive these internal inspection devices. The launchers and receivers will be located at certain pump stations and generally spaced about 150 miles apart along the pipeline length as identified in **Exhibit 3**.

2.2.2 Pump Stations

The seven pump stations in South Dakota (Pump Stations 15 to 21) will be located in Harding (2), Meade, Haakon, Jones, and Tripp (2) counties (locations are indicated on the route maps provided in **Exhibit A**). While Pump Station 15 was originally located in Montana, the pump station site was re-located to a site within Harding County, South Dakota. Pump station sites will be acquired in fee from landowners. Pump stations will be designed and constructed to meet the requirements of the National Electric Code and API 500. Each station will be fenced and contain up to five pumps driven by electric motors, an electrical building, electrical substation, a small maintenance building, a communications tower, and parking area for station personnel. Keystone will purchase electricity for its pump stations from local power providers.
Pump stations will utilize electricity for all pumps, lights, and heating in the buildings. Pump stations will be fully automated for unmanned operation. Remote start/stop, set point controls, unit monitoring equipment, and station information will be installed at each location. The pipe entering and exiting the pump station sites will be located below grade; however, some of the piping within the pump station yard (after entering and prior to exiting the pump station facilities) will be aboveground. **Exhibit 4** shows a typical pump station layout.

Backup power at the pump stations will consist of batteries to maintain communications between the pump station and the pipeline control center and to provide lighting and power for minor facility procedures if the local utility power supply is disrupted.

In some cases, pigging facilities and deep well anode ground beds for the cathodic protection system also will be located within the fenced pump station facility.

Keystone is currently evaluating the use of a radio communication system, with a self-supporting radio and antenna mast, which will relay data from remotely operated valve sites to a nearby pump station. At pump stations, both a mast to receive signals from the valve sites and a satellite dish to communicate with the pipeline control center will be installed. Keystone intends to utilize radio communication at valve sites and pump stations wherever possible; however, final engineering has yet to be determined.

2.2.3 Mainline Valves

Keystone plans to construct a total of 16 MLVs in South Dakota (7 MLVs located at pump stations; 7 intermediate MLVs capable of remote operation; and 2 manually operated MLVs with check valves). The approximate locations for these valves are shown in the route mapping presented in **Exhibit A**. MLVs will be installed at each pump station and along the right-of-way (ROW). When not located at a pump station, MLVs will be sectionalizing block valves constructed within a 50-foot-wide by 50-foot-long site located within the 50-foot-wide, permanently maintained ROW. These intermediate valve sites will be located within an easement obtained from landowners. The spacing intervals between the MLVs

along the ROW are based upon the location of the pump stations; water bodies greater than 100 feet in width; high consequence areas (HCAs), including densely populated areas and highly sensitive environmental areas; and other topographic and environmental considerations. Remotely activated valves are located at pump stations, upstream of major river crossings, and upstream of sensitive water bodies. In the unlikely event of an emergency, these valves can be quickly activated to isolate sections of the pipeline to minimize environmental impacts.

2.2.4 Land Requirements

Keystone will construct the Project within a 110-foot-wide construction ROW, consisting of both a 60-foot-wide temporary ROW and a 50-foot-wide permanent ROW. Additional temporary workspace will be required where special construction techniques are used. These include stream crossings, road and railroad crossings, hilly terrain, and other areas. **Exhibit 5** illustrates the typical construction ROW and equipment work locations in most areas.

Surface disturbance associated with the construction and operation of the Project is summarized in **Table 3**. In South Dakota, approximately 5,327 acres of land will be disturbed during construction. This total includes approximately 3,372 acres of temporary construction ROW and additional temporary workspace(TWA), approximately 1,904 acres that will be retained as permanent pipeline ROW and 42 acres for pump stations and valves and 9 acres for a permanent access road. All disturbed acreage will be restored and returned to its previous aboveground land use after construction, except for approximately 42 acres of permanent ROW and 9 acres for a permanent access road, which will not be restored but will serve to provide adequate space for aboveground facilities, including pump stations and valves, and permanent access to a pump station for the life of the pipeline.

Table 3 Summary of Project Land Requirements in South Dakota

Facility	**Land Affected During Construction[1] (acres)**	**Land Affected During Operation[2] (acres)**
Pipeline ROW	4,188	1,904
Additional TWAs[4]	255	0
Pipe Stockpile Sites, Rail Sidings, and Contractor Yards	579	0
Construction Camps	160	0.0
Pump Stations/Delivery Facilities	42	42
Access Roads[5]	103	9
South Dakota Total[3]	***5,327***	***1,955***

Table 3 Summary of Project Land Requirements in South Dakota

Facility	Land Affected During Construction[1] (acres)	Land Affected During Operation[2] (acres)

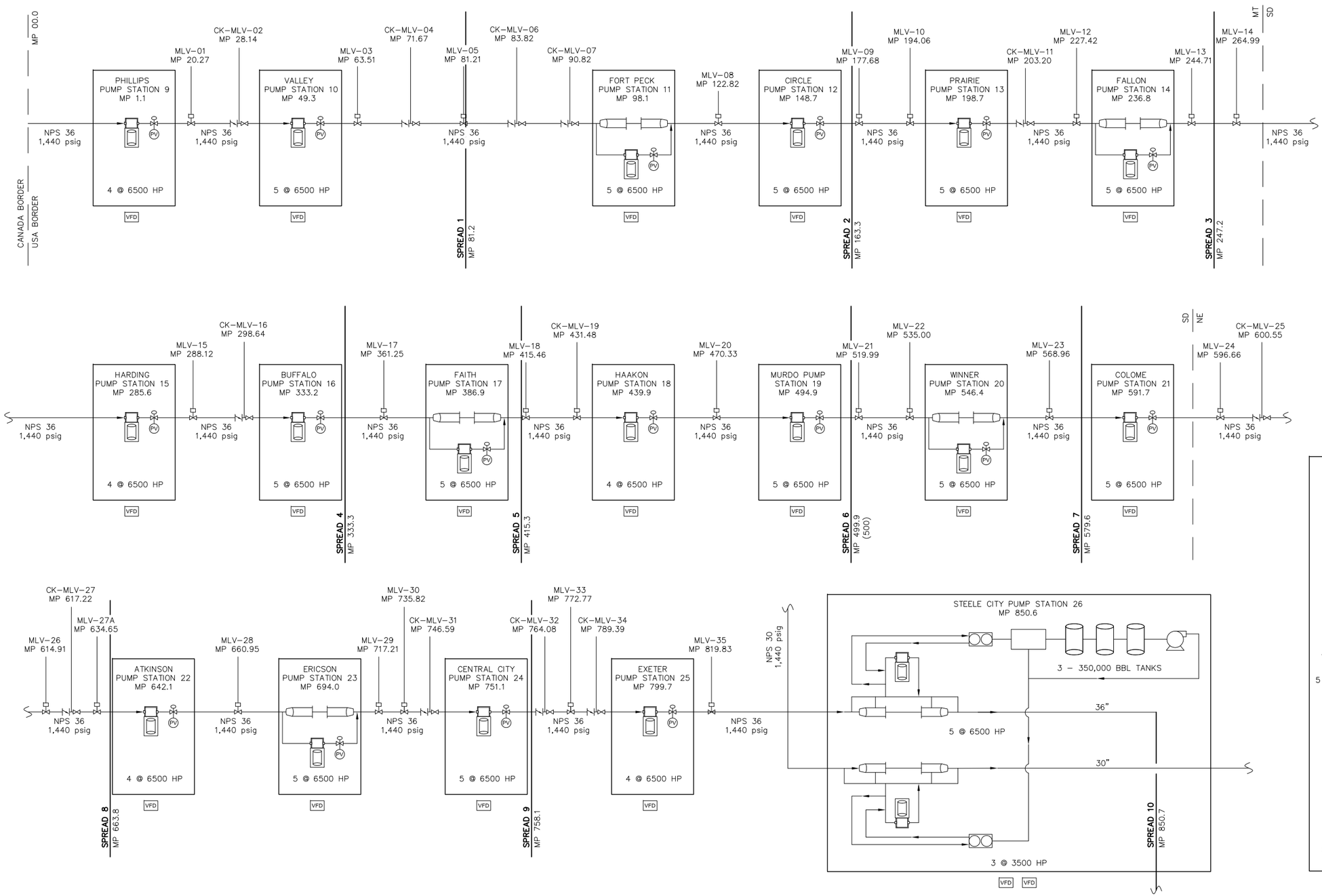
[1] Disturbance is based on a total of 110-foot construction ROW for a 36-inch-diameter pipe, except in certain wetlands, cultural sites, shelterbelts, residential areas, and commercial/industrial areas where an 85-foot construction ROW will be used, or in areas requiring extra width for workspace necessitated by site conditions. Disturbance also includes pipe stockpile sites, contractor yards, rail yards, and construction camps

[2] Operational acreage was estimated based on a 50-foot permanent ROW in all areas. In South Dakota, pigging facilities will be located within pump station sites. Intermediate MLVs will be constructed within the construction easement and operated within the permanently maintained 50-foot ROW. Other MLVs, check valves and block valves will be located within the area associated with a pump station, or permanent ROW. Consequently, the acres of disturbance for these aboveground facilities are captured within the Pipeline ROW and Pump Station categories within the table.

[3] Discrepancies in total acreages are due to rounding.

[4] Includes staging areas of approximately 5 acres. Does not include the potential for extended additional TWAs necessary for construction in rough terrain or in unstable soils. These locations currently are undergoing identification and analysis.

[5] Access road temporary and permanent disturbance is based on 30-foot width; all non-public roads are conservatively estimated to require upgrades and maintenance during construction.



AREAS SUBJECT TO MOP 1,600 psig

PUMP STATION NUMBER	PUMP STATION [MP]	MP OF 1600 MOP PIPE SECTION MP [START]	MP [END]
0	0.000	0	0
PS 9 TO 10	1.123	1.178	2.900
PS 10 TO 11	49.274	49.274	53.561
	49.274	54.926	56.018
PS 11 TO 12	98.105	98.105	101.546
PS 12 TO 13	148.694	148.694	148.850
PS 13 TO 14	198.679	199.619	203.679
PS 14 TO 15	236.793	236.929	237.100
PS 15 TO 16	286.595	285.595	285.672
PS 16 TO 17	333.226	333.226	333.284
	333.226	333.284	334.493
	333.226	337.495	338.752
PS 17 TO 18	386.896	386.896	388.243
PS 18 TO 19	439.940	439.996	443.853
PS 19 TO 20	494.851	494.851	494.940
	494.851	497.137	497.299
PS 20 TO 21	546.365	546.365	548.028
PS 21 TO 22	591.686	591.686	600.063
PS 23 TO 24	642.127	693.387	696.563

LEGEND

- NEW PIPE, EQUIPMENT AND MATERIALS
- MAIN LINE PUMP
- SCRAPER LAUNCHER/RECEIVER
- METER
- TANK
- NPS 36 / 1,440 psig — NOMINAL PIPE SIZE / PUMP DISCHARGE PRESSURE
- 5 @ 6500 HP — OPERATING PUMPS
- BOOSTER PUMP
- CONTROL VALVE
- VFD — VARIABLE FREQUENCY DRIVE
- MANIFOLD
- MOTOR OPERATED VALVE
- CHECK AND MANUAL VALVE
- MLV-XX — MOTOR OPERATED VALVE DESIGNATION
- CK-MLV-XX — CHECK AND MANUAL VALVE DESIGNATION

REFERENCE DRAWINGS

DRAWING No	TITLE

REVISION

REV No	DATE	DESCRIPTION
0	01-12-09	ISSUED FOR REVIEW
1	02-07-09	UPDATED PER TRANSCANADA REQUEST
2	02-17-09	ADDED VALVES
3	05-13-09	REVISED MILE POSTS AND ADDED SPREADS
4	06-11-09	ADDED MILE POSTS AT SPREADS; CHANGED DWG. NO.; ADDED TABLE

APPROVAL

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
	CB	TW	RB	GR	JP	TROW/UEI
	CB	TW	RB	GR	JP	TROW/UEI
	CB	TW	RB	GR	JP	TROW/UEI
	CB	TW	RB	GR	JP	TROW/UEI
	CB	TW	RB	GR	BW	TROW/UEI

PROFESSIONAL ENGINEER/RPT | PERMIT/ ENG. APPROVAL | DATE

REV. NO. | DATE | PERMIT NUMBER:

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KEYSTONE XL PROJECT
EXHIBIT 3: MECHANICAL FLOW SCHEMATIC
UNITED STATES STEELE CITY SEGMENT

SCALE N.T.S. | DRAWING No 1399-01-ML-0S-700 | REV 4

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Exhibit 4 Plot Plan for Pump Station with Pig Launcher and Receiver

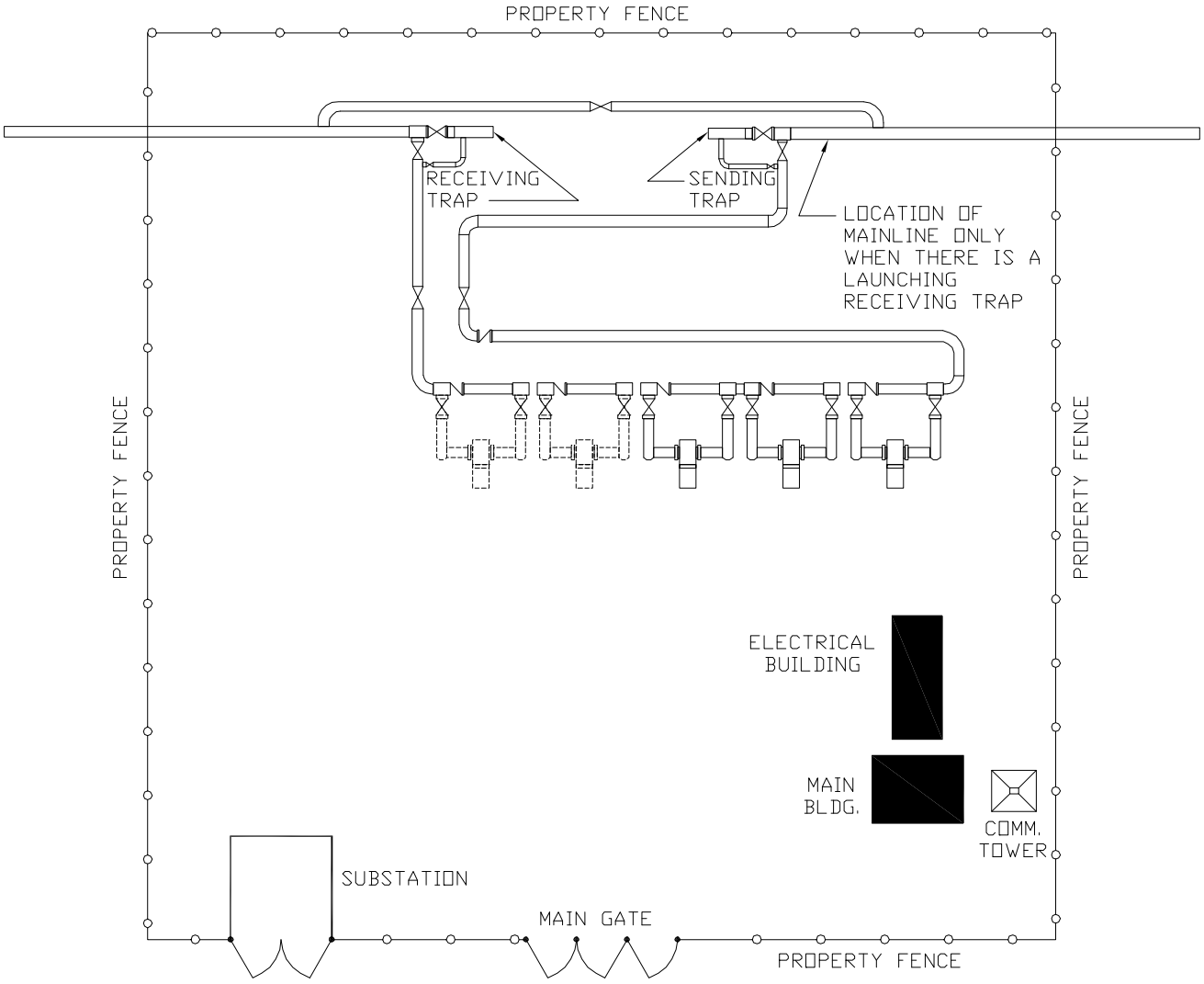
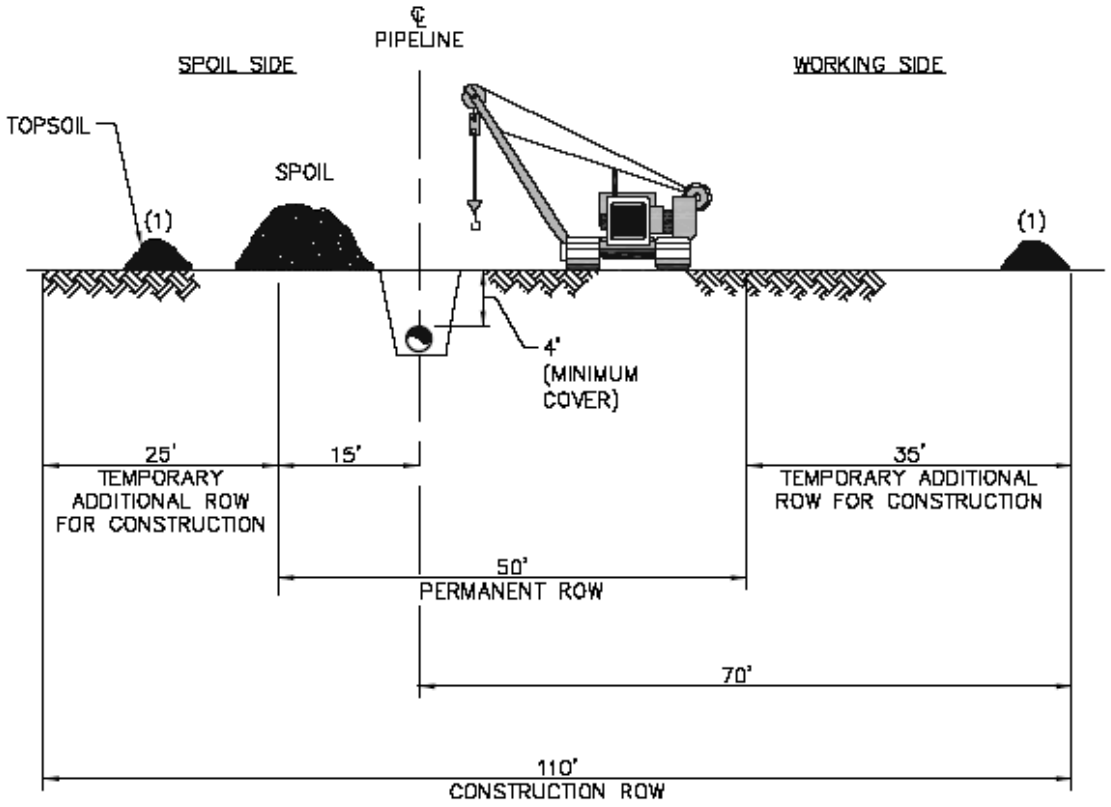


Exhibit 5 **Typical 110-foot Construction ROW with Topsoil Removal Only Over Trench Line (not to scale)**



(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

Extra workspace areas off of the construction ROW will be required during the construction of the Project to serve as pipe storage sites, railroad sidings, and contractor yards. Keystone has identified potential pipe stockpile sites and contractor yards summarized in **Table 4** and attached as **Exhibit A**. Pipe stockpile sites along the pipeline route typically have been identified in proximity to railroad sidings. Contractor yards will reduce worker transportation requirements during construction. To the extent practical, Keystone proposes to use existing commercial/industrial sites or sites that previously were used for construction. Existing public or private roads will be used to access each yard. Both pipe stockpile sites and contractor yards will be used on a temporary basis and will be restored upon completion of construction per the CMRP (attached as Exhibit B.

Table 4 Locations and Acreage of Potential Pipe Stockpile Sites, Railroad Sidings, and Contractors Yards in South Dakota

Type of Yard	Counties	Combined Acreage[1]
Contractor Yards (5)	Gregory, Haakon, Harding, Meade, Jones	151
Railroad Siding (5)[2]	Butte, Pennington (2), Stanley, Hutchinson	100
Pipe Stockpile Sites (11)	Harding (3), Meade (2), Haakon (2), Jones (2), Tripp (2)	328

[1]Land use of these sites is currently under evaluation. The final acreage may be reduced to avoid biological or cultural resources, if any are identified.

[2]Estimated size and location.

Some portions of the Project in South Dakota lack adequate temporary housing. In these remote locations, the construction phase of the Project will require the installation of additional temporary housing for workers. Keystone has decided instead of temporary RV parks that it needs two temporary construction camps in South Dakota, to be located in the general vicinity of Union Center and Winner. These locations will be permitted, constructed, and operated in compliance with applicable county, state, and federal regulations. **Table 5** summarizes the regulations and permits required for construction camps.

Table 5 Construction Camp Permits and Regulations

Agency	Permit/Discussion
South Dakota Department of Environment and Natural Resources Office of Drinking Water and Waste Water	Permit required for a Transient Non-community (TNC) PWS. There also are sampling requirements for a TNC PWS. A NPDES Permit will be required for waste water discharge.
Counties	An approach permit and a building permit may be necessary in some counties. A wide load permit is necessary for transport of modulars to camps.

Construction camp sites will be approximately 80 acres each in size, of which 30 acres will be used as a contractor yard and 50 acres will be used as the actual camp site. Each camp will be designed to house approximately 600 people. The temporary housing will consist of prefabricated, modular, dormitory-style units that include heat and air conditioning systems. Camps will include sleeping areas with shared and private wash rooms, recreation facilities, telecommunications/media rooms, kitchen/dining facilities, laundry facilities, security unit, and an infirmary unit. Where feasible, potable water will be provided by drilling a well. If adequate supply cannot be obtained from the well, water will be provided by municipal sources or trucked to each camp. A wastewater treatment facility will be

included in each camp. Electricity for the camps will be generated on site through diesel-fired generators or it will be provided by local utilities from an interconnection to their distribution system. Each campsite will be restored following the CMR plan after construction.

2.2.5 General Construction Procedures

Before starting construction, Keystone will finalize engineering surveys of the ROW centerline and extra workspaces and substantially complete the acquisition of ROW easements and any necessary acquisitions of property in fee.

To manage construction impacts, Keystone will implement its CMRP (attached as **Exhibit B**). This plan contains construction and mitigation procedures that will be used throughout the Project. Subsections address specific environmental conditions. Specific environmental conditions in South Dakota are described in Chapters 5.0 and 6.0 of this application.

Overland pipeline construction generally proceeds as a moving assembly line called a "spread." Each full spread will consist of approximately 80 to 90 miles of pipeline construction. Separate crews will be used for construction of the aboveground facilities.

Standard pipeline construction is composed of specific activities, including survey and staking of the ROW, clearing and grading, trenching, pipe stringing, bending, welding, lowering in, backfilling, hydrostatic testing, cleanup, and reclamation. Additional details on construction sequence can be found in the CMR Plan. Construction on individual properties generally will last between 8 to 12 weeks depending on weather and other conditions.

2.2.6 Special Construction Procedures

In addition to standard pipeline construction methods, Keystone will use special construction techniques where warranted by site-specific conditions. These special techniques will be used when constructing across paved roads, primary gravel roads, highways, railroads, water bodies, wetlands, sand hills areas, and steep terrain. These special techniques are described below with further details found in the CMR Plan.

2.2.6.1 Road, Highway, and Railroad Crossings

Construction across paved roads, highways, and railroads will be in accordance with the requirements of the road and railroad crossing permits and approvals obtained by Keystone. In general, paved roads, primary gravel roads, highways, and railroads will be crossed by boring beneath the road or railroad. Boring requires the excavation of a pit on each side of the feature, the placement of boring equipment in the pit, and boring a hole under the road at least equal to the diameter of the pipe. Once the hole is bored, a prefabricated pipe section will be pulled through the borehole. Boring will result in minimal or no disruption to traffic at road or railroad crossings. Each boring will be expected to take 1 to 2 days for most roads and railroads and up to 10 days for long crossings such as interstate or four-lane highways.

Most smaller, unpaved roads and driveways will be crossed using the open-cut method unless otherwise required by local authorities or private owners. The open-cut method will require temporary closure of the road to traffic and establishment of detours. If no reasonable detour is feasible, at least one lane of traffic will be kept open, except during brief periods when it is essential to close the road to

install the pipeline. Most open-cut road crossings can be finished and the road resurfaced in 1 or 2 days. Keystone will take measures, such as posting signs at open-cut road crossings, to ensure safety and minimize traffic disruptions. All warnings and signage will comply at a minimum with accepted traffic control practices.

2.2.6.2 Water body Crossings

A total of 15 perennial streams and rivers, 129 intermittent streams 206 ephemeral streams, and 7 man-made ponds/reservoirs will be crossed in South Dakota during the construction of the Project. Perennial water bodies will be crossed using one of four techniques: the open-cut wet method (Keystone's preferred method), open-cut flume method, open-cut dam-and-pump method, or horizontal directional drill (HDD) method. The open cut method will be used to cross intermittent and ephemeral streams unless site-specific resources require an alternative crossing method. Keystone will adhere to the water body crossing guidelines outlined in its CMR Plan. Additional information on water body crossings is provided in Section 5.4.1. If the waterbody is dry, and topographic conditions permit, Keystone will use conventional upland construction to lay through the intermittent or ephemeral stream.

2.2.6.3 Wetland Crossings

Data from wetland delineation field surveys, aerial photography, and National Wetland Inventory (NWI) maps were used to identify wetlands crossed by the proposed pipeline. Approximately 1.2 miles of wetlands will be crossed by the Project in South Dakota, resulting in the temporary disturbance of 16 acres during construction. Pipeline construction across wetlands will be similar to typical conventional upland cross-country construction procedures, with several modifications where necessary to reduce the potential impacts to wetland hydrology and soil structure. Specific protection measures for wetlands are described in Section 5.5.1.1.

2.2.6.4 Sand Hills Construction

In South Dakota, the Sand Hills region is found in southern Tripp County. Construction personnel will be educated regarding the Sand Hill soils stability, and the necessity to strictly adhere to Project Best Management Practices (BMPs) designed to minimize impacts. In 2009, Keystone will conduct pedestrian surveys through this region to identify minor route re-alignments to be incorporated prior to construction to avoid particularly erosion-prone locations, such as ridge tops and existing blowouts to the greatest extent practicable. Highly saturated areas, such as wetlands, will be avoided to the maximum extent practicable. Topsoil conservation will be conducted on areas where excavation occurs, with topsoil piles protected from erosion through matting, mulching, watering, or tackifying as deemed appropriate. Traffic management limitations will be employed on specific areas possessing high erosion potential.

2.2.6.5 Steep Terrain

Additional grading may be required in areas where the proposed pipeline route will cross steep slopes. Steep slopes often need to be graded down to a gentler slope for safe operation of construction equipment and to accommodate pipe-bending limitations. In such areas, the slopes will be excavated prior to pipeline installation.

In areas where the proposed pipeline route crosses laterally along the side of a slope, cut and fill grading may be required to obtain a safe, flat work terrace. Topsoil will be stripped from the entire ROW and stockpiled prior to cut and fill grading on steep terrain. Generally, on steep side-slopes, soil from the high side of the ROW will be excavated and moved to the low side of the ROW to create a safe and level work terrace. After the pipeline is installed, the soil from the low side of the

ROW will be returned to the high side and the slope's original contours will be restored. Topsoil from the stockpile will be spread over the surface, erosion control features installed, and seeding implemented.

In steep terrain, temporary sediment barriers such as silt fence and straw bales will be installed during clearing to prevent the movement of disturbed soil into wetland, water body, or other environmentally sensitive areas. Temporary slope breakers consisting of mounded and compacted soil will be installed across the ROW during grading and permanent slope breakers will be installed during cleanup. Following construction, seed will be applied to steep slopes and the ROW will be mulched with hay or non-brittle straw or covered with erosion control fabric. Sediment barriers will be maintained across the ROW until permanent vegetation is established.

2.3 Operation and Maintenance

Keystone will operate and maintain the Project's facilities in accordance with 49 CFR Parts 194 and 195 and other applicable federal and state regulations. Operation and maintenance of the pipeline system will be accomplished by Keystone personnel or its contractors. Keystone estimates that operation of the pipeline will require a small number of permanent employees for the South Dakota segment of the pipeline.

2.3.1 Normal Operations and Routine Maintenance

The pipeline will be inspected periodically via aerial and ground surveillance as required by 49 CFR Part 195. These surveillance activities will provide information on possible encroachments and nearby construction activities, erosion, exposed pipe, and other potential concerns that may affect the safety and operation of the pipeline. Evidence of population changes will be monitored and HCAs identified as necessary. MLVs will be inspected twice annually and the results documented.
In order to maintain accessibility of the permanent easement and to accommodate pipeline integrity surveys, woody vegetation along the pipeline permanent easement will be periodically cleared. Cultivated crops will be allowed to grow in the permanent easement. Keystone will use mechanical mowing or cutting along its permanent easement in non-row crop or pastureland areas for normal vegetation maintenance.

Keystone will monitor the ROW to identify areas where soil productivity may be degraded as a result of pipeline construction and further reclamation measures will be implemented to rectify such issues. Applicable reclamation measures are outlined in the CMR Plan.

Supervisory Control and Data Acquisition (SCADA) facilities will be located at all pump stations and remotely operated valves. The pipeline SCADA system will allow the Operation Control Center (OCC) to perform the following functions:

- Remote reading of MLV positions;
- Remote starting and stopping at pump stations;
- Remote reading of tank levels (Nebraska only);
- Remote closing and opening of MLVs;
- Remote reading of line pressure and temperature; and
- Remote reading of total flow.

The OCC will be manned by an experienced and highly trained crew 24 hours per day every day of the year. The OCC is being developed for the Keystone Pipeline project currently under construction and will be operational later this year. The Keystone XL Project will utilize the same facility. A fully redundant backup OCC will be constructed and will be available as needed.

Real time information communication systems, including backup systems, will provide up-to-date information from the pump stations to the OCC plus the ability to contact field personnel. The OCC will have highly sophisticated pipeline monitoring systems.

2.3.2 Abnormal Operations

Keystone will comply with federal regulations including 49 CFR Section 195.402 with respect to the preparation of manuals and procedures for responding to abnormal operations. Section 195.402(a) requires a pipeline operator to prepare and follow a manual of written procedures for conducting normal operations and maintenance activities and handling abnormal operations and emergencies. Section 195.402(d) (Abnormal Operation) requires the manual to include procedures to provide safety when normal operating design parameters have been exceeded. These include:

- Responding to, investigating, and correcting the cause of:
  - Unintended closure of valves or shutdowns;
  - Increase or decrease in pressure or flow rate outside normal operating limits;
  - Loss of communications;
  - Operation of safety device; and
  - Other malfunction of a component, deviation from normal operation, or personnel error which could cause a hazard to persons or property.
- Checking variations from normal operation after abnormal operation has ended at sufficient critical locations in the system to determine continued integrity and safe operation.
- Correcting variations from normal operation of pressure and flow equipment and controls.
- Notifying responsible operator personnel when notice of an abnormal operation is received.
- Periodically reviewing the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation and taking corrective action where deficiencies are found.

2.3.2.1 SCADA and Leak Detection

Keystone will utilize a SCADA system to remotely monitor and control the pipeline system. Highlights of Keystone's SCADA system include:

- Redundant fully functional backup OCC available for service at all times;
- Automatic features installed as integral components within the SCADA system to ensure operation within prescribed pressure limits; and
- Additional automatic features installed at the local pump station level will provide pipeline pressure protection in the event communications with the SCADA host are interrupted.

Keystone also will have a number of complimentary leak detection methods and systems available within the OCC and in the field. These methods and systems are overlapping in nature and progress in leak detection thresholds. The leak detection methods are as follows:

- Remote monitoring performed by the OCC Operator, which consists primarily of monitoring pressure and flow data received from pump stations and valve sites fed back to the OCC by the Keystone SCADA system. Remote monitoring is typically able to immediately detect leaks down to approximately 25 percent to 30 percent of pipeline flow rate;
- Software based volume balance systems that monitor receipt and delivery volumes. These systems are typically able to detect leaks down to approximately 5 percent of pipeline flow rate;
- Computational Pipeline Monitoring or software-based leak detection systems that utilize a model to break the pipeline system into smaller segments and monitor each of these segments on a mass balance basis. These systems are typically capable of detecting leaks down to a level approximately 1.5 percent to 2 percent of pipeline flow rate;
- Computer-implemented, non-real time, accumulated gain/(loss) volume trending to assist in identifying low rate or seepage releases below the 1.5 to 2 percent by volume detection thresholds; and
- Direct observation methods, which include aerial patrols, ground patrols and public and landowner awareness programs that are designed to encourage and facilitate the reporting of suspected leaks and events that may suggest a threat to the integrity of the pipeline.

According to PHMSA data (2008), the majority of pipeline spills were detected within 3 hours. The mean spill volume of spills that were not detected within the first 48 hours was 527 barrels and declined with time. These data support Keystone's assertion that a sizable volume of oil is unlikely to escape detection for more than a few days.

2.3.2.2 Emergency Response Procedures

Several federal regulations define the notification requirements and response actions, including the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300), the Clean Water Act (CWA), and the Oil Pollution Act. At the most fundamental level, these interlocking programs mandate notification and initiation of response actions in a timeframe and on a scale commensurate with the threats posed.

Under the National Contingency Plan, the US Environmental Protection Agency (USEPA) is the lead federal response agency for oil spills occurring on land and in inland waters. The USEPA will evaluate the size and nature of a spill, its potential hazards, the resources needed to contain and clean it up, and the ability of Keystone to handle the incident. Spills meeting legally defined criteria (see criteria above per 40 CFR Part 112) must be monitored by the USEPA, even though most spills would be small and cleaned up by Keystone. The USEPA will monitor activities to ensure that the spill is being contained and cleaned up appropriately.

Keystone is required to prepare site-specific Emergency Response Plans (ERPs) for the system, which will be submitted to and approved by the PHMSA prior to operation. Keystone has already received PHMSA-approval for its Keystone Pipeline ERP. Keystone will use the Keystone Pipeline ERP as the basis for preparation of a Keystone XL project-specific ERP. Prior to operations, Keystone will submit and obtain PHMSA approval of the Keystone XL ERP.

In addition to cleaning up any smaller spills, in the unlikely event of a large spill, Keystone and its contractors will conduct emergency recovery and cleanup. The role of local emergency responders is to notify community members, secure the site, direct people away from the area, and address potential impacts to the community such as temporary road closings. See Section 6.3.4 for further information.

According to historical data (PHMSA 2008), only about 2 percent of reportable liquid pipeline spills are ignited. In the event of a fire, local emergency responders will execute the roles listed above and firefighters will take actions to prevent the crude oil fire from spreading to residential areas. Local emergency responders typically are trained and able to execute the roles described above without any additional training or specialized equipment. Keystone also will work with emergency response agencies to provide pipeline awareness education and other support.

Keystone is required by law to notify immediately the National Response Center (NRC) if the event: 1) violates water quality standards, 2) creates a sheen on water, or 3) causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines (40 CFR Part 112). In addition to the NRC notification, Keystone will make timely notifications to other agencies, including the appropriate local emergency planning committee, sheriff's department, South Dakota Department of Environment and Natural Resources (SDDENR), the USEPA, and affected landowners.

2.3.2.3 Remediation

In the event of a release, corrective remedial actions will be dictated by federal and state regulations and enforced by the USEPA, PHMSA, and SDDENR. Required remedial actions may range from the excavation and removal of contaminated soil, to allowing the contamination to recover through natural environmental fate processes (e.g., evaporation, natural attenuation). Decisions concerning remedial methods and extent of the cleanup will take into account state-mandated remedial cleanup levels, potential effects to sensitive receptors, the volume and extent of the contamination, potential violation of water quality standards, and the magnitude of adverse impacts that would be caused by remedial activities. The appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality. See Section 6.3.4 for further information.

3.0 Demand for Facility

The purpose of the Project is to transport crude oil production from the WCSB to meet growing demand by refineries and markets in the US. The Project will transport crude oil from the oil supply hub near Hardisty, Alberta, Canada and deliver it to existing oil storage terminal facilities near Nederland and Houston, Texas. Construction of the Project will provide US refineries and markets with access to a substantial and reliable supply of Canadian crude oil to meet increasing US demand for petroleum products.

The need for the Project is dictated by a number of factors including:

- Increasing crude oil demand in the US;
- Decreasing domestic crude supply in the US;
- Increasing WCSB crude oil supply;
- An opportunity to reduce US dependence on foreign offshore oil supply through further supply diversification to stable, secure Canadian crude supplies; and
- Binding shipper interest in the Project.

Delay or termination of the Project would delay or negate the positive economic impacts on the local and state economy identified in Chapter 6.0, including the significant local labor and services required for the pipeline and facilities construction, economic benefits to local commercial sectors, as well as local and state taxes. In addition, binding contracts have been executed for transportation on the Project, which demonstrate the need for additional pipeline capacity to deliver Canadian crude oil to US refineries. Delay or termination of the construction of the Project would prevent the Project from meeting the demand for additional capacity in the timeframe identified by Keystone shippers through these binding contracts.

3.1 Increasing WCSB Crude Oil Supply

Established crude oil reserves in the WCSB are estimated at 179 billion barrels (Canadian Association of Petroleum Producers (CAPP 2008a). The primary source of WCSB crude oil supply -- over 97 percent -- is comprised of Canada's vast oil sands reserves located in northern Alberta. The Alberta Energy and Utilities Board (AEUB) estimates there are 175 billion barrels of established reserves out of 315 billion barrels of bitumen ultimately recoverable in Canada's oil sands. Alberta has the second largest crude oil reserves in the world, second only to Saudi Arabia.

As a result of growing production from the oil sands, crude oil supplies from the WCSB are expected to increase by about 1.6 million bpd by 2017, from current production of about 2.4 million bpd (CAPP 2008b).

3.2 Increasing Crude Oil Demand in the US

According to the Energy Information Administration (EIA), US demand for petroleum products has increased by over 11 percent or 2 million bpd over the past 10 years and is expected to increase further (EIA 2007). The EIA estimates that total US petroleum consumption is projected to increase by

approximately 1.0 million bpd over the next 10 years (EIA 2008), representing average demand growth of about 100,000 bpd per year.

The Project's key delivery area, PADD III on the US Gulf Coast, represents the largest and most complex refining district in the US with 56 refineries comprising approximately 8.4 million bpd of total refining capacity.

3.3 Decreasing Domestic Crude Oil Supply

At the same time that domestic demand increases, domestic US crude supplies continue to decline. For example, over the past 10 years, domestic crude production in the US has declined at an average rate of about 135,000 bpd per year or 2 percent per year (EIA 2007).

3.4 Further Supply Diversification to Canadian Crude Oil

The US historically has compensated for decreases in domestic production through increased imports from Canada and foreign offshore sources. US imports of foreign crude and refined products continue to increase as a result of decreasing domestic production and increasing demand. Crude and refined petroleum product imports into the US have increased by over 3.3 million bpd over the past 10 years. In 2007, the US imported over 13.4 million bpd of crude oil and petroleum products or over 60 percent of total US petroleum product consumption (EIA 2007).

Canada is currently the largest supplier of imported crude oil and refined products to the US, supplying over 2.4 million bpd in 2007, representing over 11 percent of total US petroleum product consumption (EIA 2007).

The Project would provide an opportunity for US refiners in PADD III to further diversify supply away from traditional offshore foreign crude supply and to obtain direct access to secure and growing Canadian crude supplies. Access to incremental Canadian crude supply also would provide an opportunity for the US to offset annual declines in domestic crude production and, specifically, to decrease its dependence on other foreign crude oil suppliers, such as Mexico and Venezuela, the top two heavy crude oil exporters into the US Gulf Coast.

3.5 Binding Shipper Interest

Shippers – producers, marketers, or refiners – evaluate the merits of various pipeline proposals and ultimately decide which projects to support. Shippers have expressed material interest in the Project and in securing additional crude oil pipeline capacity. Shippers have already committed to long-term binding contracts, enabling Keystone to proceed with regulatory applications and construction of the pipeline once all regulatory, environmental, and other approvals are received. These long-term binding shipper commitments demonstrate a material endorsement of support for the Project, its economics, proposed route, and target market, as well as the need for additional pipeline capacity and access to Canadian crude supplies.

4.0 Proposed Route and Alternative Routes

4.1 Route Selection

The proposed route for the Project was developed through an iterative, multidisciplinary route selection process. This process involved the systematic evaluation and reevaluation of project routing and alternatives through the identification of objectives, collection of data, definition of control points, identification of routing constraints and opportunities, and the continual reassessment of these factors and refinement of the route supported by the acquisition of smaller scale data.

The process followed by Keystone is described in more detail in the following text.

4.1.1 Objectives

Several high-level objectives influenced the selection of the initial pipeline route. These include the following:

1. The Source: location of the source of the crude oil in Alberta, Canada;

2. The US/Canadian Border Crossing: location of planned border crossing facilities into the US (adjacent to the Northern Border pipeline border crossing at Morgan, Montana) that takes advantage of co-location opportunities in Canada and the US;

3. Use of Existing Pipe: use of Keystone Cushing Extension pipeline to carry the intended volumes of crude, which saved over 292 miles of new pipeline and associated new disturbance,; and

4. The Delivery Points: delivery points for the crude oil in Nederland, Texas, and Moore Junction in Texas.

4.1.2 Data Gathering

Based on these basic objectives, a general geographic region of interest was established. Data were then gathered for this region. These data included the following:

- Recent high resolution aerial photography;
- US Geological Survey (USGS) Topographic Quadrangle Maps;
- Delorme State Atlas and Gazetteers;
- Soil Survey Geographic Database;
- National Land Cover Database (2001);
- Geographic Information System (GIS) layers containing public data obtained from various county, state, and federal government websites; commercial background data provided by Environmental Systems Research Institute, Inc.; internal existing utility data; and confidential data provided by state and federal agencies;

- NWI Database and Mapping; and
- County soil surveys.

All these data were compiled into a GIS-based constraint data set of the area to support the identification and evaluation of route options.

4.1.3 Definition of Control Points

The following control points served to define the route:

- US/Canada border crossing near Morgan, Montana;
- The Fort Peck Reservoir, Montana;
- Crossing the Niobrara River at locations not designated as wild and scenic;
- Opportunity to connect with the Keystone Cushing Extension;
- Delivery point at Nederland, Texas; and
- Delivery point near Moore Junction.

4.1.4 Constraints and Opportunities

Once objectives and control points were identified and initial data gathered, the routing process considered constraints and opportunities. A number of primary and secondary constraints were identified to guide the route selection process. The routing exercise sought to avoid the constraints whenever possible and minimize extent of impact when unavoidable. The constraints include:

Primary

- HCAs;
- Large water bodies and water control structures;
- Lands with permitting processes that could negatively affect schedule;
- Extreme terrain;
- Large wetland complexes;
- Properties listed on the National Register of Historic Properties (NRHP);
- Wildlife refuges; and
- Public lands (federal and state).

Secondary

- Source water protection areas (SWPAs);
- Water crossings;
- Wetland crossings;
- Waterfowl production areas;

- Irrigated croplands;
- Bedrock;
- Rural communities;
- Shallow, unconfined aquifers;
- Extensive forested areas, including commercial forest lands; and
- Residences and associated features such as driveways, outbuildings, and wind breaks.

"Opportunities" refer to those features which are favorable for pipeline routing and generally serve to simplify construction and decrease disturbance. These include:

- Existing linear features such as pipelines (preferred), power lines, and roadways;
- Flat or gently rolling terrain;
- Soils that can be readily excavated; and
- Unforested areas.

4.1.5 Route Alternatives Identification and Evaluation

Based on the above information and objectives, a number of route alternatives and alternative route segments were developed. These routes and route segments met the basic Project objectives and respected the constraints and opportunities to varying degrees.

Each route alternative was evaluated with respect to the key criteria noted below:

- HCAs;
- SWPAs;
- Length;
- Percentage of co-location with existing linear facilities;
- Water body crossings;
- Road crossings;
- Rail crossings;
- Utility crossings;
- National parks;
- Conservation areas;
- Wildlife areas;
- Lands with fractionated interests; and
- Military lands.

During the course of the route evaluation process, Keystone held public meetings, open houses, and one-on-one meetings with stakeholders to discuss and review the proposed routing through South

Dakota. In addition, the DOS held a scoping meeting in February 2009 in Murdo, South Dakota, to solicit public and agency input with respect to the environmental issues to be considered during the EIS process. DOS scoping meetings had been scheduled for Faith and Buffalo, South Dakota, as well, but these meetings were cancelled due to adverse weather conditions on the day of the scheduled meetings.

4.2 Route Refinement

Several reroutes in South Dakota have been developed or evaluated in response to environmental, land use, and Project operational issues. The most significant reroutes developed or under consideration to date are depicted in **Exhibit 6** and described below.

4.2.1 Mellette County Reroute

The original route through South Dakota crossed the White River in Mellette County in a location with potential constructability concerns and where there was considerable land ownership with fractionated interests. Furthermore, in Nebraska, the initial route crossed the Niobrara River within a segment designated as "scenic" as defined in the Wild and Scenic Rivers Act (P.L. 90-542, as amended) (16 United States Code [USC] 1271-12870). Because all water crossings, and more specifically the crossing point of the Niobrara River, were considered control points, alternate routes were considered in this area to avoid the scenic designation. As a result, the Mellette County Reroute was developed to move an approximately 170-mile segment of the route eastward to accommodate a more desirable crossing of the White River, to avoid uncertainty associated with obtaining easements across lands with fractionated interests, and to allow a better alignment for a crossing of the Niobrara River below the reach designated as "scenic" (see **Exhibit 6**).

4.2.2 Colome Reroute

The Mellette County Reroute crossed directly through a groundwater Zone A SWPA near Colome, South Dakota. A reroute to the northeast will avoid, and be hydro logically down gradient from, the SWPA. As a result of the realignment, risk to the SWPA will be reduced to negligible levels.

4.2.3 Future Route Refinements

Keystone will continue to develop route adjustments throughout the pre-construction design phase. These route adjustments will accommodate environmental features identified during surveys, property-specific issues, and civil survey information. Keystone will file new aerial route maps that incorporate any such route adjustments prior to construction.

4.3 Extent to Which Reliance on Eminent Domain Powers Could be Reduced by Use of an Alternative Site

Keystone will acquire easements from landowners on a negotiated basis to the extent reasonably possible. Keystone intends to use eminent domain only as necessary where good faith efforts to acquire easements on a negotiated basis are unsuccessful. Use of an alternative route for the pipeline would not reduce the potential need to exercise eminent domain powers. While Keystone strives to acquire as much ROW as reasonably possible on a negotiated basis, it is impractical to route a pipeline across 314 miles in such a way that it only impacts landowners who are willing to grant easements voluntarily.

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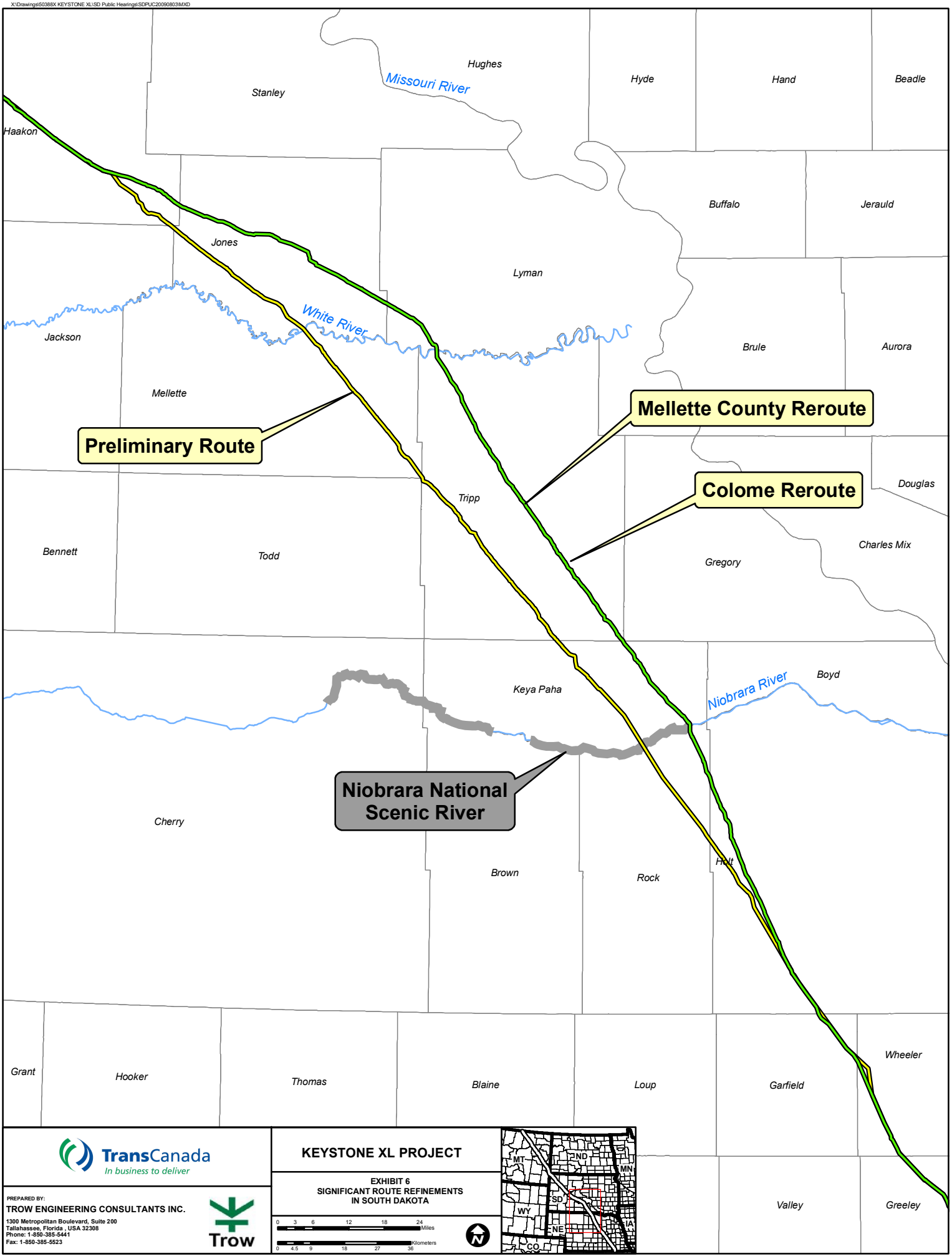

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TROW ENGINEERING CONSULTANTS INC.
1300 Metropolitan Boulevard, Suite 200
Tallahassee, Florida , USA 32308
Phone: 1-850-385-5441
Fax: 1-850-385-5523

Trow

KEYSTONE XL PROJECT

EXHIBIT 6
SIGNIFICANT ROUTE REFINEMENTS IN SOUTH DAKOTA

0 3 6 12 18 24 Miles
0 4.5 9 18 27 36 Kilometers

5.0 Environmental Information and Effect on Physical Environment

This section describes the existing environment of the Project route and the anticipated effects on the physical environment. Keystone has evaluated the potential environmental impacts and has designed its project to minimize those impacts to the extent practicable while still achieving the Project's objectives.

5.1 Environmental Information Filed with the US Department of State

In order to construct pipeline facilities across the international border, Keystone is required to obtain a Presidential Permit from the DOS. The proposed pipeline facilities will be the subject of an EIS being prepared by the DOS under NEPA, with the assistance of other cooperating agencies. It is anticipated that the Draft EIS for the Keystone Project will be issued by the DOS during the third quarter of 2009 and a Final EIS in the second quarter of 2010.

On September 19, 2008, Keystone filed its Presidential Permit application and supporting documents, including a preliminary Environmental Report. On November 20, 2008, Keystone filed its comprehensive Environmental Report, including field survey reports; and documentation of agency consultation regarding wetlands and cultural and biological resources; and electronic shape files for the refined centerline and pump station locations (filed with DOS separately). Keystone filed a supplemental Environmental Report in July 2009 and may make additional submittals as required.

5.2 Summary of Environmental Impacts

Table 6 provides a summary of the environmental impacts that are expected to remain after Keystone's CMR Plan is applied. This impact summary addresses the South Dakota portion of the Project. These impacts include impacts during construction, including short-term uses of renewable resources, such as water withdrawn for hydrostatic testing and then discharged back to the land. These impacts also include impacts during pipeline operations, including long-term changes in land use, such as the prohibition of residential structures on the permanent pipeline ROW.

5.3 Physical Environment

5.3.1 Land Forms and Topography

Aerial photography and USGS topographic maps showing the Project route in South Dakota are provided in **Exhibit A**. The pipeline is located in the Great Plains physiographic province (Fenneman 1928). In South Dakota, the Great Plains are divided into two major sections, the Glaciated Missouri Plateau and the Unglaciated Missouri Plateau. The South Dakota portion of the route is entirely within the Unglaciated Missouri Plateau. The Missouri Plateau is essentially a dissected plateau characterized by badlands, buttes, mesas, and exhumed mountain ranges such as the Black Hills. Elevations along the route range from just over 3,000 feet above mean sea level (amsl) in the northwestern part of the state to around 1,800 feet amsl in the White River Valley.

Table 6 Impact Summary

Resource	Impact Summary
Air Quality	• No impacts during construction or operation.
Geology, Minerals, and Paleontology	• Potential construction impacts to paleontological resources; recovery of important fossils identified during construction on private lands to occur only with landowner permission.
	• No significant impacts to geology, economic minerals, or paleontology during construction and operations. Impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.
Soils and Agricultural Production	• Temporary decreases in soil productivity and soil quality due to construction. Implementation of procedures within the CMR Plan will minimize these impacts.
	• Temporary disturbance of approximately 1,683.6 acres of prime farmland due to Project construction. Implementation of procedures within the CMR Plan will minimize these impacts.
	• Permanent loss of soil productivity and soil quality (approximately 36 acres) due to permanent access roads and locations of aboveground facilities.
	• There is a very low risk for operational impacts related to seismicity, ground motion, and surface rupture. Certain geologic hazards (swelling soils, slope instability) present low to moderate impact risk in limited areas that will be mitigated by appropriate pre-construction site assessment and design.
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of soils and their associated land uses.
Water Resources	• During construction, 15 perennial streams, 129 intermittent streams, 206 ephemeral streams, and 7 man-made ponds/reservoirs will be crossed. Three perennial streams will be crossed utilizing HDD, reducing impacts to possible temporary effects on water quality from the unlikely event of a frac-out. The remaining streams will be crossed utilizing the open cut method. In the event that stream flow is present during construction, temporary degradation of water quality in the form of short-term increased suspended solids concentrations and subsequent sedimentation (deposition of solids introduced into suspension by construction activities). Implementation of procedures within the CMR Plan will minimize these impacts.
	• Five streams segments listed by SDDENR as not supporting one or more designated beneficial uses are crossed by the Project. Of these, four are impaired for the fish propagation use due to total suspended solids (TSS) concentrations; two will be crossed by HDD, and one will be crossed by the open cut method. See the previous bullet for impact

Table 6 Impact Summary

Resource	Impact Summary
	discussion.
	• Hydrostatic test water will be withdrawn from 11 locations within South Dakota and discharged back into the originating water body. Water withdrawals at each location will be one-time volumes of approximately 15 to 20 million gallons or 46 to 61 acre-feet. Withdrawals and discharges will occur in accordance with SDDENR permit requirements.
	• During operations, impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of water resources and their associated uses.
Vegetation	• Temporary loss of pastureland/rangeland and agricultural vegetation will occur due to construction. To ensure impacts to vegetation are minimized, revegetation success along the pipeline ROW will be in accordance with their CMR Plan.
	• Approximately 3.3 acres of woody vegetation greater than 15 feet high and within 15 feet of either side of the pipeline centerline in forested areas will be kept clear for the life of the Project.
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of vegetation and their associated land uses.
Wildlife	• Approximately 4,101 acres of undeveloped wildlife habitat will be temporarily disturbed during pipeline construction. The ROW will be allowed to revegetate to previous conditions with the exception of woody vegetation in the permanent ROW and at aboveground facilities. Implementation of procedures within the CMR Plan will minimize these impacts.
	• Big game displacement during construction is expected to be short-term. No long-term displacement impacts from increased human activity are expected.

Table 6 Impact Summary

Resource	Impact Summary
	• Potential direct impacts to small game and non-game species could include nest or burrow abandonment or loss of eggs or young where construction occurs during the breeding season. Less mobile or burrowing species may be lost to construction vehicles and equipment. Other potential temporary impacts include habitat loss or alteration, habitat fragmentation, and animal displacement. Individuals may be permanently displaced due to increased competition or other effects of being forced into sub-optimal habitat. Loss of prairie grouse lekking habitat could have a significant effect on local related populations. Indirect impacts from increased noise and additional human presence also could lead to displacement and lowered fitness.
	• Wildlife habitat impacted will represent a small percent of available wildlife habitat on a regional basis. The effects of short-term and long-term habitat loss on native wildlife populations will be relatively small since the majority of habitat disturbance will be restored to the pre-disturbance condition.
	• There may be a potential loss of bird eggs and young from pipeline clearing activities or increased human presence, if these activities occur during the breeding season. Impacts will be mitigated by compliance with a Conservation Agreement with the US Fish and Wildlife Service (USFWS).
	• During operations, impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.
	• Power lines will be constructed to serve pump stations. These lines represent a collision potential for avian species, but impacts will be mitigated by compliance with avian protection measures.
	• Since raptors may perch on power poles, installation of power poles may increase predation risk to sage grouse in areas where raptor perches are infrequent. Potential impacts will be mitigated by the installation of anti-perch devices.
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of wildlife and their associated habitats.

Table 6 Impact Summary

Resource	Impact Summary
Aquatic Resources	• Eleven rivers and streams in South Dakota with beneficial use classifications of warm water fisheries will be crossed. These include one permanent warm water fishery (Cheyenne River), and three semi-permanent warm water fisheries (White, South Fork Grand, and Little Missouri rivers). All but the South Fork Grand River will be crossed utilizing HDD. The remaining streams are identified as marginal warm water streams.
	• Potential construction effects may consist of potential increases in TSS and sediment deposition downstream from channel excavation, which may increase benthic invertebrate mortality rates. Based on the implementation of mitigation measures at water body crossings within the CMR Plan, only short-term effects at streams crossed by the open-cut method will occur.
	• During operations, impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of aquatic biota and their associated habitats.
Sensitive Species	• Construction of the Project will cause temporary reductions in habitat for sensitive wildlife and aquatic species. With the exception of permanent vegetation disturbances associated with woody vegetation within the permanent ROW and at aboveground facilities, disturbed areas will be allowed to revegetate to their previous use. Implementation of procedures within the CMR Plan will minimize these impacts.
	• One sensitive plant species, 7 sensitive terrestrial wildlife species, and 4 aquatic sensitive species potentially occur within the Project area. Keystone has consulted with the USFWS and the SDGFP to identify potential habitat and potential mitigation measures (e.g., reroutes, construction procedures) to avoid or minimize construction impacts to sensitive species and their habitats. Through these consultations, 3 sensitive terrestrial wildlife species have been eliminated from further analysis.
	• Approximately 6.8 miles of western prairie fringed orchid habitat is crossed by the Project. Surveys conducted in 2009 found one individual plant present and only part of the surveyed area is considered suitable habitat.
	• Twenty-eight raptor nests were identified along the ROW in South Dakota. No bald eagle nest or roost sites were identified within 0.25 mile of the ROW. Surveys for winter roosting bald eagles, raptors, and grouse in the winter and spring of 2009 found individuals roosting along the White and Cheyenne Rivers. Additional nesting and roosting surveys

Table 6 Impact Summary

Resource	Impact Summary
	will be conducted in the event construction is scheduled during those periods.
	• No nesting interior least terns were identified in surveys along the Cheyenne River; however, suitable habitat was identified at the Cheyenne River crossing. The HDD crossing method will minimize impacts to this habitat.
	• Surveys for the presence of river otter and swift fox dens are planned prior to construction. Appropriate protection measures will be implemented in order to minimize potential impacts to these species.
	• American burying beetle habitat is crossed by the Project in Tripp County. Off-site mitigation will be required by the USFWS and SDGFP.
	• Suitable habitat for the sturgeon chub is found at the Cheyenne and White river crossings. The HDD crossing method will eliminate impacts to this habitat.
	• Surveys for black nose shiner, Northern red belly dace, and pearl dace will be conducted within tributaries of the Keya Paha River prior to construction.
	• Keystone will implement mitigation measures identified within the USFWS-approved Biological Assessment. As a result, construction and operation of the Project will not be likely to cause significant impacts to federally listed species.
	• Significant operational impacts to federally listed species are not anticipated. Routine maintenance activities will be infrequent, isolated, and limited in duration.
	• Pipeline incidents are uncommon and spill volume would likely consist of 3 barrels or less. If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of sensitive species and their habitats.
Land Use (including noise, transportation)	• Short-term impacts to approximately 4,070 acres of agricultural lands (pasturelands and rangelands; row and non-row crops in rotation) will occur during construction.
	• No homes or residents will be displaced by the construction or operation of the Project.
	• During construction, impacts to local transportation and noise disruptions to local residences will be short-term and localized. Implementation of procedures within the CMR Plan will minimize these impacts.
	• Significant operational impacts are not anticipated. Because normal maintenance activities will be intermittent, isolated, and limited in duration, impacts to construction noise and traffic will be localized, minimal, and short-term.

Table 6 Impact Summary

Resource	Impact Summary
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards, which are protective of land uses.
Cultural Resources	• After consultation with the South Dakota State Historic Preservation Officer (SHPO), Keystone has committed to conducting cultural resources surveys for 100 percent of the Project's footprint. Keystone will conduct cultural resource surveys following this protocol to identify significant cultural resources.
	• To date, approximately 239 miles of the Project in South Dakota have been surveyed. Keystone has identified 38 cultural resource sites. Keystone will avoid known cultural resource locations where possible and, in the event that these sites cannot be avoided, a Treatment Plan will be developed to mitigate adverse effects. If necessary, the Treatment Plan will be submitted to the DOS and South Dakota SHPO for review and approval.
	• Routine operations will occur within the existing ROW and, therefore will not result in additional impacts to cultural resources.
	• Pipeline incidents are infrequent and if a spill occurred, the volume would likely be 3 barrels or less. Most spills would be retained within the pipeline trench and therefore would not affect cultural resources. If the spill margin extended beyond the construction ROW, potential impacts can occur to cultural resources.
Socioeconomic Conditions	• Keystone will compensate landowners for easements to place pipeline facilities on private lands.
	• Keystone will compensate landowners for damages resulting from construction or operational impacts.
	• An estimated 1,100 to 1,400 construction workers will be employed each year (2011 and 2012) for the South Dakota section of the pipeline. Pipeline employees will increase retail sales in local areas along the pipeline route. Demands on local infrastructure may cause short-term increases in demand for temporary housing. However, it is anticipated that workers will commute from larger population centers to the pipeline work sites. Other community services will be largely unaffected by construction.
	• Construction and operation of the Project will increase revenues to the state and counties crossed by the pipeline. It is estimated that, if the pipeline had been placed into service on January 1, 2008, Keystone would have paid approximately $15.4 million in ad valorem property taxes in the 9 counties and 13 school districts transited by the pipeline. In addition, because of the increase in the school districts' assessed valuations, state aid to education payments would be reduced by approximately $5.2 million, with a corresponding savings to the State

Table 6 Impact Summary

Resource	Impact Summary
	Education Foundation Payment Fund. During construction, Keystone also will pay sales and use tax and contractor's excise tax on materials and construction activities, subject to rebates allowed by SDCL Ch. 10-45A.
Public Health and Safety	• During construction, Keystone will prohibit public access, along the ROW to protect public safety. Paved road and railroad crossings will be bored to minimize impacts on public safety and traffic flow. Keystone will control traffic at road crossings that are open cut. Implementation of the CMR Plan procedures will mitigate construction hazards to workers and to the public.
	• PHMSA prescribes pipeline design and operational requirements that limit the risk of accidental crude oil releases from pipelines. Over the operational life of the Project, there will be a very low likelihood of a crude oil release from the pipeline that could injure people, or adversely affect drinking water supplies or ecologically sensitive areas. Keystone's SCADA, valves, and leak detection systems will mitigate the extent of a release.
	• If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Appropriate remedial measures would be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

5.3.2 Geology and Paleontology

The surficial deposits are primarily composed of Quaternary alluvium, colluvium, alluvial terraces, and eolian deposits (sand dunes). The alluvium primarily occurs in modern stream channels and floodplains, but also is present in older river terraces.

The bedrock geology consists of Upper Cretaceous and Tertiary rocks. The Upper Cretaceous units include the Pierre Shale, Fox Hills Formation, and the Hell Creek Formation. The Pierre Shale was deposited under marine conditions. The Fox Hills Formation is marginal marine sandstone with widespread distribution throughout the Northern Rocky Mountain basins from northeast Colorado to Montana. Overlying the Fox Hills Formation is the Hell Creek Formation, which was deposited under non-marine conditions in depositional environments of river channels, floodplains, and lakes.

The Ludlow Formation of the Tertiary Fort Union Group was deposited under non-marine conditions similar to the Hell Creek Formation in river channels, floodplains, and lakes. Both the Hell Creek and Fort Union Formations appear to have been sourced by uplift and erosion of emerging Rocky Mountains to the west and south of the Project area (McDonald 1971).

The Ogallala Group was deposited as a result of uplift and erosion of the Rocky Mountains. Material that was eroded from the mountains was transported to the east by streams and wind.

No unique geological features protected by federal, state, or local governments will be disturbed by the Project. Major structural features crossed by the route include the Williston Basin, the Sioux Arch or Ridge, and the Salina Basin. In the northwestern portion of the state, the route crosses the southern part of the Williston Basin, a major structural basin that covers northeast Montana, most of North Dakota, and northwest South Dakota (Peterson and MacCary 1987). The Williston Basin also extends north into Saskatchewan and Manitoba in southern Canada. The basin contains Paleozoic through Tertiary age sedimentary rock layers to a depth of about 15,000 feet. The center of the basin is located in western North Dakota so the rocks dip gently towards the north in the Project area. Near Midland, South Dakota, the route leaves the Williston Basin and crosses the Sioux Arch to around the White River. The Sioux Arch is a buried ridge formed on the Precambrian basement rocks that extends east to west from Minnesota across southeast South Dakota (Gries 1996). South of the White River to the Nebraska state line, the route crosses into the northern portion of the Salina Basin, a sedimentary basin that underlies most of eastern Nebraska.

The fossil potential of the various formations crossed by the Project was evaluated by information derived from published sources and information obtained by ROW surveys conducted on federal lands in an adjacent state. The Hell Creek Formation and the Ludlow Member of the Fort Union Formation have high fossil potential in the Project area. In northwest South Dakota, the Hell Creek Formation has yielded valuable dinosaur bones including from a triceratops, the South Dakota State fossil (Bjork 1995). The Ludlow Member also has high fossil potential and may yield mammals, plants, and invertebrates (SWCA Environmental Consultants 2008). The Fox Hills Formation has moderate potential and in the Project area has been found to contain invertebrates and plants (Lange 1967). Concretions containing invertebrates were found in the Pierre Shale.

Construction Impacts

The effects of construction will include disturbances to the topography along the ROW and at aboveground facilities due to grading and trenching activities. Upon completion of construction, Keystone will restore topographic contours and drainage patterns as closely as possible to the pre-construction condition. There is the potential for discovery of fossils on private land during pipeline construction which will be provided to the appropriate landowner.

Blasting has the potential to impact the geologic and physiographic environment. Limited blasting could be required in areas where shallow bedrock or boulders are encountered that can not be removed by conventional excavation with a track hoe trencher, ripping with a bulldozer followed by track hoe excavation, or hammering with a track hoe-mounted hydraulic hammer followed by excavation. Blasting is not anticipated because the largely sandstone-composed formations can be disaggregated by using hydraulic hammers. In the event blasting is necessary, Keystone will prepare a Blasting Plan for the Project.

Operation Impacts

There will be no significant impacts to geology from pipeline operation. Impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.

5.3.3 Rock, Sand, Gravel, and Economic Mineral Deposits

Sand and gravel are mined in every county in South Dakota and deposits are found in alluvium and terraces (South Dakota Geological Survey/USGS 2005). In northwest South Dakota, scoria (rock baked from burned coal beds) is mined locally. A gravel pit was identified about 0.5 miles from the route northeast of Milepost 551.5.

Most of the oil and gas production in South Dakota is in the Williston Basin. The Williston Basin is a major oil and gas producing basin. In the US portion of the basin, total production to the end of 2007 was approximately 2.5 billion barrels of oil and 470 billion cubic feet of gas (Burke 2006; Montana Board of Oil and Gas 2007; North Dakota Industrial Commission 2007; South Dakota Oil and Gas Section 2008). In the South Dakota portion of the Williston Basin, cumulative oil and gas production is 40.5 million barrels of oil and 192 million cubic feet of gas, primarily from Paleozoic rocks. The route passes through the Buffalo Field in Harding County.

There are no coal mines on the route, but there are coal-bearing formations including the Fort Union Formation (primarily lignite) in the northwest corner of the state (Averitt 1963) and the Hell Creek Formation. The route crosses approximately 2.4 miles of the coal-bearing Ludlow Member of the Fort Union Formation. The coal in the Fort Union Formation is generally lignite in the project area. The proposed route only crosses a couple miles of the Ludlow Member of the Fort Union Formation; however, there are coals in the Hell Creek Formation. However, the Hell Creek coals appear to be limited in extent and there is low potential for the presence of mineable coal seams (Erickson 1956). There are no coal mines along the proposed route.

In northwest South Dakota, uranium-bearing lignites are present in the Fort Union Formation in an area called the Cave Hills (Pipiringos et al. 1965). Lignites were mined in the 1950s and 1960s at South Cave Hills, North Cave Hills, and Slim Buttes, but no mining has taken place since 1964 (Stone et al. 2006). The route does not cross previously mined areas. The area was strip mined to obtain access to the lignite. The mined areas were not reclaimed and as a result, sediment-bearing runoff deposited spoil material in drainages immediately adjacent to the buttes where mining took place. Tributaries of Spring Creek head in an area of Slim Buttes in the vicinity of lignite mine workings. Recent sampling in a study conducted by the South Dakota School of Mines and Technology indicates that there is limited concern for contaminated sediments in the Spring Creek drainage (Stone 2008). The route passes a few miles south of Slim Buttes where uranium-bearing lignite mining took place. The route crosses the Spring Creek drainage at Milepost 348.0 to Milepost 348.9.

Construction Impacts

Construction will have very minor and short-term impact on current mineral extraction activities due to the temporary and localized nature of pipeline construction activities. Several oil and gas wells were identified within or close to the Project construction ROW. Prior to construction, Keystone will identify the exact locations of active, shut-in, and abandoned wells and any associated underground pipelines in the construction ROW and take appropriate precautions to protect the integrity of such facilities. Keystone also will utilize the One Call system to locate underground utilities and conduct due diligence to identify and contact all oil and gas well operators and pipeline gathering system owners prior to construction activities.

It is anticipated that the pipeline trench will be backfilled with materials derived from the trench excavation. Occasionally, it might be necessary to obtain construction sand and gravel from local, existing commercial sources for use as pipe padding, road base, or surface facility pads. These short term and localized demands for sand and gravel will not substantially affect the long-term availability of construction materials in the area.

Operation Impacts

There will be no significant impacts to economic mineral deposits from pipeline operation. Impacts from maintenance activities will not be significant because disturbances will be isolated, short-rem, and infrequent.

5.3.4 Soils

Soil maps for the route in South Dakota are provided in **Exhibit A**. The Project route in South Dakota will be located within the Northern Great Plains Spring Wheat Land Resource Region and the Western Great Plains Range and Irrigated Land Region (US Department of Agriculture [USDA] Natural Resource Conservation Service [NRCS] 2006b). The typical freeze-free period ranges from 135 to 165 days (USDA NRCS 1981).

The Northern Great Plains Spring Wheat Region is located in the northernmost portion of the route in Montana and South Dakota. The soils typically have thick, dark topsoils with mixed or smectitic mineralogy. Ustolls occur on uplands; Aquolls occur in low wet areas and along streams. Some of the Ustolls have a high content of sodium, and some of the Aquolls have a high content of sodium and lime. Orthents occur on the steeper slopes. The soils in the region dominantly have a frigid soil temperature regime, an ustic or aquic soil moisture regime.

The Western Great Plains Range and Irrigated Region includes portions of Montana, South Dakota, and northern Nebraska. This region is an elevated piedmont plain dissected by numerous rivers flowing to the east. Slopes generally are gently rolling or rolling. Flat-topped, steep-sided buttes and badlands also occur in this region. The soils are varied and range from very deep organic soils to shallow soils with thin topsoil horizons. Most have mixed or smectitic mineralogy, but some have carbonatic mineralogy. Most of the soils in the region have a mesic or frigid soil temperature regime and an ustic or aridic soil moisture regime.

In the northwestern portions of South Dakota, the soils are shallow to very deep, generally well drained, and loamy or clayey. Soils such as the Assiniboine series formed in fluvial deposits that occur on fans, terraces, and till plains. Soils such as the Cabbart, Delridge, and Blackhall series formed in residuum on hills and plains.

Fertile soils and smooth topography dominate Meade County. The soils generally are shallow to very deep, somewhat excessively drained to moderately well drained, and loamy or clayey. Cretaceous Pierre Shale underlies almost all of Haakon, Jones, and portions of Tripp counties. This shale weathers to smectitic clays. These clays shrink as they dry and swell as they get wet, causing significant problems for road and structural foundations. See Section 5.3.6 for further discussion on the landslide-prone and clay soils prone to shrink-swell in South Dakota.

From central Tripp County to the Nebraska state line, soils typically are derived from shale and clays on the flatter to moderately sloping, eroded tablelands. Steeper slopes occur on the sides of ridges and along drainages. Soils commonly located in the tablelands include the Anselmo, Lakoma, Manter, Millboro, Okaton, Opal, Ree, Reliance, Sansarc, and Witten series. Most of these soils have thick, dark, organically enriched topsoil layers. Most of the soils are clayey and have shale at varying depths. These soils are scattered throughout Tripp County, occupying almost half the ROW length. The route also crosses deep, sandy deposits on which the Doger, Dunday, and Valentine soils formed. These are dry, rapidly permeable soils. Topsoil layers are thin and droughty, and wind erosion and blowouts are a common hazard.

Approximately 80 percent of the route in South Dakota is occupied by soils that are compaction prone. Compaction prone soils include soils with clay loam or finer textures. High moisture content can increase the susceptibility to compaction. Soils that are compaction prone also are prone to rutting or displacement when saturated. Rutting is most likely to occur on moist or wet fine textured soils, but may also occur on dry sandy soils due to low soil strength. Sandy soils commonly occur along the

route in Harding, Butte, Perkins, Meade, and Tripp counties in South Dakota and include soils such as the Valentine fine sand that occur on dunes, interdunes, and valley sides of sand hills.

Other sensitive soils crossed include 43 percent with low reclamation potential. Low reclamation potential soils include soils with chemical or physical characteristics that may inhibit reclamation. Successful restoration and revegetation is important for maintaining agricultural productivity and to protect the underlying soil from potential damage, such as erosion. Scattered areas of saline and/or sodic soils are known to occur in the Project region specifically around Butte County.

Prime farmland soils occupy approximately 33 percent of the route in South Dakota. Prime farmland soils are defined by the USDA as those that are best suited for food, feed, forage, fiber, and oilseed crops. These soils have properties that favor the economic production of sustained high yields of crops (USDA NRCS 2006a). Prime farmland is represented by many soil associations and series and does not need to be actively cultivated to be classified as prime farmland. Any undeveloped land with high crop production potential can be included in this classification.

The route in South Dakota crosses 1.6 percent with hydric soils. A hydric soil is defined by the USDA as soil that formed under conditions of saturation, flooding, or ponding for a long enough period during the growing season to develop anaerobic conditions in the upper part. These soils, under natural conditions, are either saturated or inundated for a sufficient period during the growing season to support the growth and reproduction of hydrophytic vegetation (USDA NRCS 2006a).

Stony or rocky soils will be crossed in Butte County. Soil limitations for the potential of depth to bedrock within 60 inches of ground surface were obtained from the SSURGO database. The presence of bedrock in the top 7 feet of soil (anticipated depth of pipeline trench) could result in a need for blasting during construction. Shallow lithic (hard) bedrock occurs on only approximately 0.4 percent of soils crossed by the pipeline route.

Construction Impacts

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

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

Scattered areas of low reclamation potential soils, such as soils that are saline, sodic, or strongly alkaline are known to occur in the Project region. Saline and/or sodic soils often have drainage limitations and may undergo compaction impacts similar to the hydric or compaction-prone soils. In addition, the success of stabilization and restoration efforts in these areas may be limited unless

additional treatments and practices are employed to offset the adverse physical and chemical characteristics of the soils.

In stony or rocky soils, revegetation recovery rates may be slow. Similarly, in areas of shallow bedrock (relative to the trench excavation depth), excavation may result in rock fragments remaining on the surface or within the trench backfill at levels that will limit the success of restoration efforts. Where the pipeline route crosses soils with lithic bedrock blasting or rock saws may be required for trenching.

Short-term impacts such as excavation and handling, and small isolated spills of fuels or lubricants may temporarily alter the capability of Prime Farmland following construction. Where facilities, such as pump stations, are located on prime farmland permanent impacts to soil productivity would occur.

Keystone plans to minimize or mitigate potential impacts to soils by implementing the soil protection measures identified in the CMR Plan (**Exhibit B**). The measures include procedures for segregating and replacing topsoil, trench backfilling, relieving areas compacted by heavy equipment, removing surface rock fragments, and implementing water and wind erosion control practices. In addition, Keystone will work closely with landowners and soil conservation agencies to identify and implement recommended soil conservation practices in specific areas where they are needed. Damaged irrigation and tile drainage systems will be repaired in accordance with the CMR Plan.

To accommodate potential discoveries of preexisting contaminated soils during construction, Keystone will develop unanticipated contaminated soil discovery procedures in consultation with relevant agencies. These procedures will be added to the CMR Plan. If hydrocarbon contaminated soils are encountered during trench excavation, the appropriate federal and state agencies will be contacted immediately. A remediation plan of action will be developed in consultation with that agency. Depending on the level of contamination found, affected soil may be replaced in the trench or removed to an approved landfill for disposal.

Operation Impacts

Where facilities, such as pump stations, are located on prime farmland permanent impacts to soil productivity would occur. Impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.

Pipeline incidents are uncommon. Keystone has conservatively estimated (i.e., over-estimated risk) that the chance of a pipeline incident is no more than one spill in 7,400 years for any given mile of pipe. If a spill did occur, the volume is likely to be relatively small (i.e., 3 barrels or less). Because pipelines are buried, soil absorption of spilled crude oil could occur, thus impacting the soils. However, subsurface releases to soil tend to disperse slowly and generally are located within a contiguous and discrete area, often limited to the less consolidated soils (lower soil bulk density) within the pipeline trench. Effects to soils can be quite slow to develop, allowing time for emergency response and cleanup actions to mitigate effects to potential receptors.

If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Keystone would clean up contaminated soils and would be required to meet applicable cleanup levels in accordance with federal and state regulations. Once remedial cleanup levels were achieved in the soils, no adverse or long-term impacts would be expected.

5.3.5 Erosion and Sedimentation

Erosion is defined as the wearing away of the land surface by water, wind, ice, or other geologic events (USDA NRCS 2006a).

Approximately 21 percent of soils crossed by the route in South Dakota are droughty. Droughty soils will be prone to wind erosion during construction and will be more difficult to successfully stabilize and revegetate following construction.

Approximately 34 percent of the overall Project surface disturbance in South Dakota will affect soils that are highly erodible by water.

Construction Impacts

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

Potential impacts to soils during construction will be minimized or mitigated by the soil protection measures identified in the CMR Plan. The measures include procedures for implementing water and wind erosion control practices.

Operation Impacts

Impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent. Keystone will routinely monitor the ROW to identify areas where erosion occurs. Keystone will address surface erosion issues in accordance with its Integrity Management Program (IMP).

5.3.6 Seismic, Subsidence, and Slope Stability Risks

Ground motion hazards result when the energy from an earthquake is propagated through the ground. The USGS ground motion hazard mapping indicates that potential ground motion hazard in the Project area is low. The hazard map used estimates peak ground acceleration expressed as a percentage of the acceleration of gravity with a 2 percent probability of exceedence in 50 years (Frankel et al. 1997; Peterson et al. 2008). South Dakota historically has little earthquake activity (USGS 2008). The route does not cross identified faults (Crone and Wheeler 2000; Martin et al. 2004).
No ground subsidence or karsts hazards are present in the vicinity of the route (National Atlas 2008).

Cretaceous and Tertiary rocks in the Missouri River Plateau have high clay content and upon weathering can be susceptible to instability in the form of slumps and earth flows. Landslide potential is enhanced on steeper slopes. Formations that are especially susceptible are the Cretaceous Hell Creek and Pierre Shale as well as shales in the Tertiary Fort Union Formation (Radbruch-Hall et al. 1982) mainly were found on river banks and steep slopes. These units can contain appreciable amounts of bentonite, a rock made up of montmorillonite clay that has deleterious properties when exposed to moisture.

The bentonite layers in the Pierre Shale may present hazards associated with swelling clays (Olive et al. 1989). These formations are considered to have “high swelling potential.” Bentonite has the property whereby when wet, it expands significantly in volume. When bentonite layers are exposed to successive cycles of wetting and drying, they swell and shrink, the soil fluctuates in volume and strength.

Much of the areas underlain by the Pierre Shale have high susceptibility to landslides if they are found on slopes or river and stream banks. The Pierre Shale can become quite unstable, especially during periods of anomalous periods of precipitation when the swelling clays in the shale cause severe instability along ravines and drainages (Iles 2008).

Construction Impacts

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

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

Structures built on soils with high shrink-swell potential can be damaged as soils expand and shrink. Pipelines are less susceptible to damage by swelling soil, but surface structures may be vulnerable. The risk from swelling soils can be mitigated by excavating the susceptible soil and back filling with select non-swelling material. Keystone will design facilities to current Uniform Building Code standards and will account for swelling soils .

Operation Impacts

Impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.

Once installed and the ROW reclaimed, the ROW should not contribute to slope instability.

Slope instability poses a threat of ground movement responsible for approximately 1 percent of liquid pipeline incidents (PHMSA 2008). Keystone will monitor slope stability during routine surveillance. Areas where slope stability poses a potential threat to the pipeline will be incorporated into Keystone's Integrity Management Plan.

If ground movement is suspected of having caused abnormal movement of the pipeline, federal regulations (49 CFR Part 195) require Keystone to conduct an internal inspection. Consequently, damage to the pipeline would be detected quickly and spills would be averted or minimized.

5.4 Hydrology

5.4.1 Surface Water Drainage

Water resources along the Project route in South Dakota are located in the Missouri River water resource region, as identified by its major river system (Seaber et al. 1994). A total of 15 perennial streams and rivers, 129 intermittent streams, 206 ephemeral streams, and 7 man-made ponds will be crossed in South Dakota during the construction of the Project. Perennial stream crossings in Harding County include the Little Missouri River, South Fork Grand River, and Clark's Fork Creek. Additionally, the North Fork Moreau River in Butte County, the South Fork Moreau River in Perkins County, and Pine and Sulphur creeks in Meade County are all crossed by the route. The Cheyenne River, with a channel approximately 1,000 feet wide, will be crossed at the Meade and Pennington county line. The Project will cross West Plum Creek and Mitchell Creek in Haakon County. The Bad River is crossed in Haakon County as well, at a point where the river is a relatively small pool-riffle type river with an ordinary high water mark width of 25 feet and a floodplain width of 200 feet. The White River will be crossed at the Lyman and Tripp county line where the river has a braided channel approximately 500 feet wide from bank to bank at its crossing. See **Exhibit C** for a listing of all water body crossings and Section 5.8, Water Quality, for further information.

Construction Impacts

Depending upon the construction technique used, the installation of the pipeline across water bodies can cause the following impacts:

- Temporary degradation of water quality in the form of increased suspended solids concentrations;
- Sedimentation (deposition of solids introduced into suspension by construction activities); and
- Channel and bank modifications.

Where intermittent or ephemeral streams are dry at the time of construction, and suitable topographic conditions exist, Keystone may use conventional upland construction through those streams. Keystone will utilize one of the following water crossing techniques at each crossing, which are standard in the industry:

- HDD;
- Open Cut Wet Crossings;
- Open Cut Dry Flumed Crossings; and
- Open Cut Dry Dam and Pump Crossings.

Keystone plans on using HDD at three crossings in South Dakota, with the remainder being crossed utilizing the open cut wet crossing method. These two methods are discussed in further detail below. Details of the two open cut dry crossing methods can be found in the CMR Plan (**Exhibit B**).

The HDD method involves drilling a pilot hole under the water body and banks, then enlarging the hole through successive reamings until the hole is large enough to accommodate a prefabricated segment of pipe. Throughout the process of drilling and enlarging the hole, slurry consisting mainly of water and bentonite clay will be circulated to power and lubricate the drilling tools, remove drill cuttings, and provide stability to the drilled holes. Pipe sections long enough to span the entire crossing will be

staged and welded along the construction work area on the opposite side of the water body and then pulled through the drilled hole.

Geotechnical explorations have been initiated to define the subsurface conditions in areas to be crossed by HDD. Preliminary site-specific crossing plans are provided in **Exhibit C**. Keystone is proposing to utilize HDD at three river crossings in South Dakota: the Little Missouri River, the Cheyenne River, and the White River. Additional HDD or dry crossing procedures may be considered at some of these proposed open cut crossings pending determination of crossing-specific resources (aquatic life), which may warrant extraordinary mitigation.

Since HDD does not involve any intended direct contact with the water body, channel bed, or banks, no impact is expected at these crossings. It is possible that a frac-out (drilling lubricant release) or inadvertent return of drilling lubricant could enter the water body. Keystone has prepared a contingency plan containing preventative and response measures to control and limit the effects of frac-outs.

At present, Keystone is proposing open cut wet crossings at the remainder of the crossings. Open cut wet crossings involve the direct excavation of the channel and banks in contact with any flow present. At open cut wet crossings, the extent of increased suspended solids concentrations and downstream sedimentation impacts will depend on the flow conditions at the time of construction and the channel substrate. Measures related to managing spoil, timing, access, and equipment are included in the CMR Plan. These measures will limit impacts of increased suspended solids concentrations and downstream sedimentation. Most open cut crossings will be completed in 48 hours or less. Larger open cut crossings may take upwards of 7 to 10 days.

During construction, runoff and the resulting erosion of lands adjacent to water bodies can lead to the introduction of solids into suspension and the deposition of sediment in-stream. The CMR Plan includes extensive procedures to limit the extent of disturbed land adjacent to water bodies, to control erosion, and methods to prevent sediments from entering water bodies or wetlands. These measures include BMPs, such as clearing limits, buffer strips, drainage diversion structures, and sediment barrier installations. In accordance with the CWA, Keystone will comply with the general permit issued under the National Pollutant Discharge Elimination System (NPDES) permit process with respect to pipeline construction. Keystone will develop a Storm Water Pollution Prevention Plan to have at the construction site as part of the NPDES permitting effort. This plan will include BMPs to minimize soil erosion and sedimentation.

Open cut crossings will involve disturbance of stream banks and channel bottoms. The CMR Plan includes procedures for limiting the extent of this disturbance and the restoration of disturbed areas. Restoration includes grading, stabilization, and revetment BMPs. These BMPs embrace bioengineering concepts, which encourage the restoration of natural stream banks. After the installation of the pipeline, the disturbed ROW will be backfilled and restored to its pre-construction grade thus avoiding any change to the pre-existing surface water drainage patterns.

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

Operation Impacts

During operations, maintenance activities will not result in long-term substantive alterations of stream banks or channel morphology. Impacts from maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent.

Potential impacts to water resources resulting from a pipeline incident are discussed in Sections 5.4.2 and 5.4.3.

5.4.2 Groundwater

The Project crosses portions of nine counties and two main aquifer systems in South Dakota. South Dakota lies within the Great Plains physiographic province (Thornbury 1965) and is mostly underlain by the Northern Great Plains aquifer system (Whitehead 1996). The Project will cross the upper Cretaceous part of the Northern Great Plains aquifer system in Harding, Perkins, and Meade counties in South Dakota. The route crosses the Cheyenne River, between Meade and Haakon counties, entering an area underlain by the impermeable upper Cretaceous Pierre Shale. Pierre Shale also underlies the route in Jones and Lyman counties. In Tripp County, the route will enter the northernmost part of the High Plains aquifer system, which is underlain by upper Tertiary aquifers (Whitehead 1996). The route in South Dakota will cross the Little Missouri River, the Moreau River, the Cheyenne River, the Bad River, and the White River. Each of these major rivers has alluvium associated with the river channel and terraces composed of Pleistocene alluvial material that may contain water and be a local source of domestic or agricultural water.

While the total dissolved solids (TDS) limits applicable to agricultural water can vary, and be very high (up to 10,000 milligrams per liter [mg/L] in South Dakota), the federal limit for potable water is 500 mg/L (USEPA 2003). Water quality in the upper Cretaceous aquifers has a TDS in the range of 1,000 to 3,000 mg/L, and the water is mostly dominated by sodium bicarbonate. Groundwater in the Tertiary aquifers generally has a TDS below 1,500 mg/L, while the TDS in river alluvium and Pleistocene river terrace groundwater can vary from 100 to 4,000 mg/L (Hammond 1994).

Depth to groundwater ranges up to 800 feet in the upper Cretaceous aquifers and is often less than 50 feet in the Tertiary aquifers. Depth to groundwater in the river alluvium and the Pleistocene terraces can be from a few feet to around 150 feet.

Identified municipal water supplies along the ROW in South Dakota are withdrawn from groundwater sources. Municipal wells in the vicinity of the route that have associated SWPAs were identified through consultation with SDDENR. No groundwater SWPAs are crossed by the Project in South Dakota.

Construction Impacts

Reductions in groundwater quality from spills, leaks, or disposal practices are not anticipated during construction. Most of the aquifers along the route will be at least temporarily isolated from any spills on the land surface and attending personnel would be able to respond to an incident before contaminants migrate into groundwater. Additional procedures and measures will be implemented as presented in the CMR Plan.

Operation Impacts

Groundwater will not be used during operation of the Project and routine operation will not affect groundwater resources. Maintenance activities will be infrequent, short-term, and localized and will not affect groundwater.

The majority of the route is not very susceptible to groundwater contamination from a pipeline release due to the depths of most aquifers and presence of confining materials. Most aquifers are more than 50 feet deep, which significantly reduces the chance of contamination reaching the aquifer. Additionally, the majority of the pipeline is underlain by confining materials (e.g., clays, shales) that inhibit the infiltration of released crude oil into aquifers. Keystone consulted with the SDDENR during the routing process to identify and subsequently avoid sensitive aquifers and recharge areas (e.g., SWPAs) in order to minimize risk to important public groundwater resources.

In those areas where shallow, unconfined aquifers exist, the likelihood of adverse impacts to groundwater resources remains low due to the small probability of pipeline incident. Keystone will employ multiple safeguards to prevent pipeline incidents, including route selection, engineering design, material selection, pre-operational testing, and continuous monitoring during operations. Keystone conservatively estimates that the chance of a pipeline incident is no more than one spill in 7,400 years for any given mile of pipe. PHMSA data indicate that the spill volume would be relatively small (3 barrels or less).

If a spill were to occur, Keystone would immediately implement its ERP and pre-positioned emergency responders would mobilize to the spill site with equipment and begin containment and cleanup. Infiltration rates into most soil types found along the Project route will be slow, allowing Keystone sufficient time to detect, contain, and clean up the crude oil spill before long-term environmental contamination has occurred.

If impacts to groundwater occurred, despite Keystone's precautions and cleanup efforts, groundwater would be monitored to assess the level and extent of the contamination. Unlike some compounds that do not significantly degrade in the environment, the aerial extent of the dissolved crude oil constituents will stabilize over time due to natural attenuation processes (i.e., microbial degradation). Groundwater contamination from crude oil spills tend to be highly localized. Field investigations of spill sites indicate the migration of dissolved constituents typically stabilizes within several hundred feet of the crude oil source area and the constituents will naturally dissipate with time. Removal of overlying crude oil contamination will eliminate the source of dissolved constituents impacting the groundwater.

If groundwater supplying private or public wells is affected, Keystone will implement appropriate remedial actions including the provision of an alternative water supply. Decisions concerning remedial methods and extent of the cleanup will be based on state-mandated remedial cleanup levels, potential effects to sensitive receptors, volume and extent of the contamination, potential violation of water quality standards, and the magnitude of adverse impacts that would be caused by remedial activities. In coordination with federal and state agencies, the appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

5.4.3 Water Use and Sources

5.4.3.1 Hydrostatic Testing

Construction Impacts

Hydrostatic testing is a significant use of water during the final phases of construction. Water used for hydrostatic testing of the pipeline will be obtained from surface water resources. Depending on locations, state requirements, and availability, water will be obtained and withdrawn from nearby

streams or privately owned reservoirs. Water withdrawal at each location will be approximately 15 to 20 million gallons or 46 to 61 acre-feet. Recycling water between test sections will be maximized to reduce overall withdrawal volumes.

Currently, Keystone has preliminarily identified 11 surface water sources in South Dakota (listed in **Table 7** below see also CMR Plan) that could provide hydrostatic test water, depending on the flows at the time of testing and the sensitivity of the individual water bodies for other uses. Alternative water sources may be identified.

Table 7 Proposed Withdrawal Locations for Hydrostatic Test Water

Water Source	County	Milepost
Little Missouri River	Harding	291.8
South Fork Grand River	Harding	317.8
Clarks Fork Creek	Harding	323.2
North Fork Moreau River	Butte	356.2
South Fork Moreau River	Perkins	364.2
Cheyenne River	Pennington	425.3
Bad River	Haakon	480.9
Dry Creek	Jones	493.1
White River	Tripp	535.5
Cottonwood Creek	Tripp	541.4
Buffalo Creek	Tripp	594.2

The maximum hydrostatic test section will be approximately 60 miles in length. The volume for a 60-mile test section of 36-inch pipeline is approximately 17 million gallons or 51 acre-feet. Withdrawal rates and volumes will be designed to avoid impacts to aquatic life and downstream water users. Hydrostatic test water typically will be discharged back into its watershed.

Hydrostatic test water withdrawals from surface water bodies will be made at controlled rates and with equipment that will minimize impacts on stream beds and aquatic life, and in accordance with applicable permit limitations. The water is likely to be withdrawn from water sources during summer and fall months. Keystone will coordinate with federal and South Dakota agencies to further identify such water sources and seasonal concerns. Compared to stream base flow, relatively small one-time withdrawals will occur from the streams or rivers designated for hydrostatic test water in accordance with withdrawal permits. Similarly, water quality will not be negatively affected during construction as the pipe is new and all discharged water is required to meet water quality standards imposed by the discharge permits issued by SDDENR for the permitted discharge locations. Water discharge rates will not exceed the daily discharge criteria referenced in the permits. Withdrawal rates and volumes will be designed to avoid impacts to aquatic life and downstream water users.

Water withdrawal can entrain small fish and drifting macro invertebrates. The expected numbers of organisms removed during entrainment is considered to be relatively small in relation to the overall numbers in the stream or river. In summary, hydrostatic testing will result in minor impacts to aquatic biota. The discharge of hydrostatic test water will follow state permit requirements, which will reduce

potential effects on water quality or aquatic organisms. Energy dissipaters also will be used to prevent erosion at discharge locations.

Hydrostatic test water will be discharged to the land surface at an approved location or be returned to the source with an approved energy dissipation device. Discharge controls will include restrictions on pipeline dewatering rates, velocity control devices (such as splash pups or diffusers) and/or temporary synthetic channel linings. Discharged water may evaporate or infiltrate into the soil or drainage where the water is released. Hydrostatic test water will be returned to the same watershed.

Water may be withdrawn for dust control in areas where the work approaches dwellings, farm buildings and other areas occupied by people and when the route parallels an existing road or highway. This also shall apply to access roads where dust raised by construction vehicles may irritate or inconvenience local residents. The speed of all contractor vehicles shall be controlled while in these areas. Water trucks and sprinklers may be employed to distribute the water as necessary to reduce dust to acceptable levels.

Groundwater will not be used as a source of hydrostatic test water. Heated water will not be generated or discharged. Deep well injection will not be used.

Operation Impacts

Keystone has no plans to conduct hydrostatic testing during operations. Keystone does not anticipate any impacts to water uses by communities, agriculture, recreation, or fish and wildlife.

5.4.3.2 Spill Prevention

Construction Impacts

Refueling and lubricating of construction equipment will be restricted to upland areas at least 100 feet away from the edge of any streams, wetlands, ditches, and other water bodies and at least 150 feet away from groundwater wells. Wheeled and tracked construction equipment will be moved to an upland area more than 100 feet away from streams, wetlands, ditches, and other water bodies for refueling when necessary. Fuels and lubricants will be stored in designated areas and in appropriate service vehicles. Whenever possible, storage sites for fuels, other petroleum products, chemicals, and hazardous materials, including wastes will be located in uplands or at least 100 feet from water bodies and wetlands. Spill Prevention, Control, and Countermeasure (SPCC) procedures are described in the CMR Plan and will be implemented in compliance with 40 CFR 112 (for oil spills) and corresponding state regulations.

In a few cases, such as for pumps or directional drill equipment located within or near a water body or wetland, refueling will be completed within or near a water body or wetland. In these situations, the specific measures identified in the SPCC portion of the CMR Plan will be followed.

Operation Impacts

Normal operations will not adversely affect water resources in the future. Minor surface disturbance activities within water bodies from pipeline inspection and maintenance may occur infrequently and at widely spaced locations.

While a release of crude oil directly into surface waters leading to a drinking water intake would likely cause an exceedence of drinking water standards, the frequency of such an event will be extremely low. As discussed previously, the chance of a pipeline incident is low, most spills are relatively small (3

barrels or less), and contamination often remains confined to the pipeline trench. To affect surface drinking water resources, a series of low probability events must occur: 1) a pipeline release must occur, 2) the release would need to be of sufficient volume to escape the pipeline trench, and 3) it would need to reach a flowing stream or perennial water body within close proximity prior to containment and cleanup.

Nevertheless, streams and rivers with downstream drinking water intakes represent sensitive environmental resources that could be temporarily impacted by a crude oil release. The PHMSA, in cooperation with various federal and state agencies, has identified surface water resources that are particularly vulnerable to contamination, such as public drinking water intakes. Portions of the pipeline that have the potential to affect these PHMSA-designated high consequence areas are subject to higher levels of regulation under the Integrity Management Rule.

Keystone utilized PHMSA maps throughout the routing process to identify and avoid drinking water HCAs. Additionally, Keystone consulted with the SDDENR to identify and subsequently avoid surface water Source Water Protection Areas in order to minimize risk to important South Dakota public drinking water resources.

Keystone's ERP contains provisions for protecting and mitigating potential impacts to drinking water, such as the notification of downstream municipal water users. Spill prevention and response procedures for abnormal pipeline operation are discussed in Section 2.3.

5.5 Terrestrial Ecosystems

5.5.1 Vegetation Communities

5.5.1.1 General Vegetation

Vegetative types that occur along the Project route were identified and delineated based on review of literature, internet database resources, aerial photography, general observations made during field reconnaissance activities, and detailed information collected during wetland and waters of the US delineation activities. The Project route traverses six vegetation types in South Dakota. The vegetation types include grassland/rangeland, agriculture, riverine/open water, previously disturbed, palustrine emergent/scrub-shrub wetlands, and upland forest. **Table 8** is a tabulation of the vegetative communities crossed. The predominant vegetation community is grasslands/rangeland followed by agriculture. Minimal amounts of the other vegetative types are encountered along the route. Riverine/open water is discussed in Section 5.4.1.

Table 8 Vegetative Communities Crossed by the Project ROW [1]

State	Vegetative Communities Crossed (miles)								
	Agriculture	Previously Disturbed	Grassland/ Rangeland	Upland Forest	Riverine/Open Water	Palustrine Forested Wetlands	Palustrine Emergent Wetlands	Scrub-Shrub Wetlands	Total[2]
South Dakota	82.5	2.9	222.9	0.9	3.6	0.0	1.2	<0.1	314.1

[1] Delineations were based on field surveys wherever possible. Where surveys were not conducted, a combination of national data coverage (e.g., NWI) and aerial interpretation was used. Workspace locations do not reflect environmental survey results.

[2] Discrepancies in totals are due to rounding; workspace locations do not reflect environmental survey results.

Grassland/Rangeland

The vegetative type grassland/rangeland is composed of vegetation that has been or is being grazed by livestock, because in South Dakota it is likely that grassland communities have been grazed. Grassland communities are composed of mixed grass prairie and sand hills dune prairie community types. The mixed grass prairie typically is composed of a mix of tall, short and intermediate grass species such as blue grama (*Bouteloua gracilis*), green needlegrass, thick spike wheatgrass (*Elymus lanceolatu*), and western wheatgrass (USGS 2006a). The Sand Hills Dune Prairie is a perennial grassland found on sand or gravel soils. These grasslands are found on wind formed sand dunes, with groundwater lakes and marshes between the dunes. Typical species are sand bluestem (*Andropogon hallii*), hairy grama (*Bouteloua hirsuta*), prairie sandreed (*Calamovilfa longifolia*), and little bluestem (*Schizachyrium scoparium*) (Nebraska Game and Parks Commission 2005).

The Sand Hills are an extensive and biologically significant eco-region encompassing many square miles in south-central South Dakota. The Project crosses the Sand Hills in southern Tripp County. This arid eco-region is an important ecosystem that consists of predominantly native prairie landscapes and supports a variety of uses such as livestock grazing, wildlife habitat and recreational opportunities. The Sand Hills consist of a collection of diverse habitats that vary from highly erosive windswept ridges and blowouts, to wet meadows and alkali lakes in valley bottoms.

Agriculture

Agricultural lands are characterized by herbaceous vegetation that has been planted or is intensively managed for the production of food, feed, or fiber; or is maintained in developed settings for specific purposes. Herbaceous vegetation accounts for 75 percent to 100 percent of the vegetative cover (USEPA 2008a). In South Dakota spring wheat and alfalfa have replaced large portions of native grasslands (USGS 2006b).

Riverine/Open water

The Riverine/Open water areas include all rivers, streams, creek, ponds, and lakes. Aquatic vegetation is often sparse. See Section 5.4.1 for a description of surface waters crossed.

Wetlands

Within the region, wetlands and riparian areas are limited in extent and usually found along shallow to deeply incised landforms associated with drainages. Riparian areas as defined by the NRCS and USDA (GM 190.411-Part 411) as areas with unique soil and vegetation characteristics between terrestrial and aquatic ecosystems. Included in this definition are wetlands, and those portions of floodplains and valley bottoms that support riparian vegetation (USDA NRCS 2006b). The riparian areas provide critical vegetation and transportation corridors for mammals, birds, and amphibians; maintain water quality, stabilize stream banks, provide flood control and aesthetic values (USDA NRCS 2008a). Please see Section 5.6.1 for further discussion.

Forest

Upland forests in South Dakota are natural or semi-natural woody vegetation, generally greater than 6 meters tall where tree canopy accounts for 25 to 100 percent of the cover (USEPA 2008a). Most upland forests are found along stream and rivers, in rugged topography or where rolling hills are dissected by drainages. Upland forest communities are deciduous forest communities with typical species consisting of green ash (*Fraxinus pennsylvanica*), quaking aspen (*Populus tremuloides*), bur oak (*Quercus macrocarpa*), and hickory (*Carya* spp.) (Boldt et al. 1983).

Previously Disturbed Lands

Previously disturbed areas can include residential, commercial, industrial, ROW corridors and barren areas. Vegetation in previously disturbed areas is frequently little to none, and is often composed of introduced weedy species. The previously disturbed areas crossed by the Project have been identified through land-use classification as ROW corridors, with a very small portion (<0.1 mile) identified as rural residence. ROW corridors include roads, utility corridors and railroads. These areas have often been replanted with a mixture of grasses and forbs.

Construction Impacts

Keystone will implement the procedures outlined in the CMR Plan (**Exhibit B**), as summarized for each vegetative community described below. In addition Keystone will monitor revegetation success along the pipeline ROW in accordance with applicable permits and agency guidance.

Reclamation and revegetation of grassland/rangeland will include relieving soil compaction and reseeding areas crossed by the Project as necessary. Seed mixes will be based on input from the local NRCS and the availability of seed at the time of reclamation. With the exception of proposed facilities within existing industrial sites, pump stations will be located on grassland/rangeland or agricultural lands.

Due to the sensitive nature of the Sand Hills eco-region, Keystone will carry out additional mitigation procedures during construction and reclamation within the region. These further measures are included in the CMR Plan.

A relatively small, temporary loss of crops will occur in many agricultural areas during construction. Some agricultural land may be terraced and/or have subsurface drainage systems installed. In areas where drainage tile is present, the tiles can be damaged by the installation of the pipeline. Keystone will attempt to identify drain tiles in coordination with landowners prior to construction. Keystone will repair or restore drain tiles, fences, and land productivity that are temporarily disturbed during pipeline construction or compensate landowners for the repair of such damages.

Construction of the pipeline will necessitate clearing of the ROW and permanent conversion of the affected wooded areas for the permanent ROW. Within that permanent ROW, a 30-foot-wide corridor, centered on the pipeline, will be maintained free of trees. Trees and shrubs will be removed during clearing activities and converted to early successional herbaceous and grassland communities. Trees and shrubs eventually will infiltrate the temporary easement area after construction. However, shrubs will not become reestablished in the temporary easement area naturally for approximately 5 years or more and trees will require a minimum recovery period of 20 years or more, depending on species and age of woodlands cleared.

Additional mitigation measures for wooded areas include selective cutting of mature shrubs and trees in the construction ROW to preserve such vegetation where possible, and cutting of vegetation flush to the surface of the ground outside the ditch line, where practical, so that root stock is left in place to promote re-growth after construction.

In previously disturbed lands the width of the construction ROW will be reduced where practicable as well as preserving mature trees and landscaping while ensuring the safe operation of construction equipment.

Operation Impacts

The majority of the ROW will revert to pre-construction vegetative conditions. Exceptions include maintenance of an herbaceous corridor over the centerline through wooded areas and the permanent loss of vegetation at aboveground facilities (pump stations, valve sites, permanent access roads).

Maintenance activities will not result in long-term substantive alterations of vegetation since disturbances will be isolated, short-term, and infrequent.

Release of crude oil could result in the contamination of soils and could produce subsequent localized effects on plant populations. Pipeline incidents are uncommon. Keystone has conservatively estimated (i.e., over-estimated risk) that the chance of a pipeline incident is no more than one spill in 7,400 years for any given mile of pipe. If a spill did occur, the volume is likely to be relatively small (i.e., 3 barrels or less). Subsurface releases to soil tend to disperse slowly and generally are located within a contiguous and discrete area, often limited to the less consolidated soils within the pipeline trench. Effects to vegetation can be quite slow to develop, allowing time for emergency response and cleanup actions to mitigate effects to potential receptors.

If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Keystone would clean up contaminated soils and would be required to meet applicable cleanup levels in accordance with federal and state regulations. Once remedial cleanup levels were achieved in the soils, no adverse or long-term impacts to vegetation would be expected.

5.5.1.2 Noxious Weeds

After disturbances to soil, vegetative communities may become susceptible to the colonization of invasive and noxious plant species. These species are most prevalent in areas of prior surface disturbance, such as agricultural areas, roadsides, and existing utility ROWs. The prevention of the introduction or spread of noxious and invasive weeds is a high priority for nearby communities. Under Executive Order 13112 of February 3, 1999 – Invasive Species, federal agencies shall not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the US or elsewhere unless it has been determined that the benefits of such actions outweigh the

potential harm caused by invasive species and that all feasible and prudent measures to minimize the risk of harm will be taken in conjunction with the actions.

The term “noxious weed” is legally defined under both federal and state laws. Under the Federal Plant Protection Act of 2000 (formerly the Noxious Weed Act of 1974 [7 USC SS 2801-2814]), a noxious weed is defined as “any plant or plant product that can directly or indirectly injure or cause damage to crops, livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the US, the public health, or the environment” (USDA Animal and Plant Health Inspection Service 2000; Institute of Public Law 1994). Under Executive Order 13112 of February 3, 1999, an “invasive species” is defined as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health” (Unites States of America 1999). The Federal Plant Protection Act contains a list of 137 federally restricted and regulated federal noxious weeds, including 19 aquatic and wetland weeds, 62 parasitic weeds, and 56 terrestrial weeds (7 CFR Chapter III, Part 360). South Dakota is required to comply with the rules and regulations set forth by this Act and to manage its lands accordingly.

In addition to the more general federally listed noxious weeds, South Dakota maintains a list of regulated and prohibited noxious and invasive weed species specific to the state. Noxious weeds in South Dakota are classified as perennial weeds that are capable of decreasing crop and livestock production. Weeds can either spread by seeds or rhizomes. Noxious weeds were originally introduced to South Dakota as a crop seed contaminant. **Table 9** contains the state-listed noxious weeds found during 2008 and 2009 field surveys in South Dakota.

Construction Impacts

To prevent the spread of noxious weeds Keystone will implement the procedures outlined in the CMR Plan, as summarized below.

Construction equipment will be cleaned prior to use on the construction spread. Erosion control measures such as straw bales used will be free of noxious weeds. Areas infested with noxious weeds will be clearly marked. Prior to disturbing the soil, soil handling procedures and treatments to infested areas such as herbicides and mowing prior to seed development may be used to help prevent the spread of noxious weeds. Herbicides will not be used in or within 100 feet of a wetland or water body. In areas containing isolated weed populations, topsoil from the full-width of the construction ROW will be stripped and stored separately from other top soil and subsoil.

After construction, Keystone will maintain weed densities on land disturbed during construction to a level that does not exceed adjacent undisturbed land to limit the potential spread of weeds onto adjacent agricultural lands.

Table 9 Noxious and Invasive Weed Species Documented During Field Surveys

Common Name	Scientific Name	Milepost Enter	Milepost Exit	Total Miles
Saltcedar	*Tamarix Ramosissima*	415.19	415.29	0.10
Giant Knotweed	*Polygonum Sachalinense*	425.95	426.06	0.11
Giant Knotweed	*Polygonum Sachalinense*	426.06	426.55	0.49
Canada Thistle	*Cirsium Arvense*	429.49	429.54	0.05
Giant Knotweed	*Polygonum Sachalinense*	429.65	429.78	0.13

Table 9 Noxious and Invasive Weed Species Documented During Field Surveys

Common Name	Scientific Name	Milepost Enter	Milepost Exit	Total Miles
Canada Thistle	*Cirsium Arvense*	451.95	451.97	0.02
Crested Wheatgrass	*Agropyron Cristatum*	446.07	447.24	0.17
Crested Wheatgrass	*Agropyron Cristatum*	447.24	447.39	0.15
Unk Wheat Grass	*Unk Wheat Grass*	447.51	448.30	0.79
Smooth Brome	*Bromus Inermis*	448.24	448.26	0.02
Canada Thistle	*Canada Thistle*	450.71	450.76	0.05
Canada Thistle	*Canada Thistle*	457.33	457.37	0.04
Giant Knotweed	*Polygonum Sachalinense*	467.01	467.05	0.04
Common Crupina	*Crupina Vulgaris*	467.54	467.86	0.32
Canada Thistle	*Cirsium Arvense*	497.19	497.24	0.05
Canada Thistle	*Cirsium Arvense*	499.90	499.99	0.09
Plumless Nodding Thistle	*Carduus Nutans*	519.86	519.94	0.08
Field Bindweed	*Convolvulus Arvensis*	532.55	532.57	0.02
Canada Thistle	*Canada Thistle*	533.43	533.47	0.04
Canada Thistle	*Canada Thistle*	533.54	533.67	0.13
Canada Thistle	*Canada Thistle*	533.82	533.95	0.13
Canada Thistle	*Canada Thistle*	536.14	536.34	0.20
Field Bindweed	*Convolvulus Arvensis*	552.59	553.01	0.42
Canada Thistle	*Cirsium Arvense*	553.04	553.16	0.12
Canada Thistle	*Cirsium Arvense*	553.63	553.63	<0.01
Canada Thistle	*Cirsium Arvense*	559.58	559.90	0.02
Canada Thistle	*Cirsium Arvense*	560.15	560.37	0.22
Diffuse Knapweed	*Centaurea Diffusa*	564.84	565.19	0.35
Bull Thistle	*Cirsium Vulgare (Savi) Ten.*	573.81	573.95	0.14
Bull Thistle	*Cirsium Vulgare (Savi) Ten.*	574.16	574.16	<0.01
Bull Thistle	*Cirsium Vulgare (Savi) Ten.*	574.52	574.52	<0.01
Giant Knotweed	*Polygonum Sachalinense*	574.81	574.81	<0.01

Species-specific noxious weed assessments will continue during the growing season to identify known noxious weed populations within the Project area. Noxious weed treatments may include mechanical, biological or chemical methods, , and will be implemented as needed. Keystone will confer with applicable county weed boards to ensure that noxious weed management practices enacted for the ROW are in compliance with South Dakota Codified Law (SDCL) 38-22, and Administrative Rule of South Dakota (ARSD) 12:62.

Operation Impacts

Maintenance activities will not exacerbate noxious weed conditions since disturbances will be isolated, short-term, and infrequent. Keystone will maintain weed densities on land disturbed by maintenance

activities to a level that does not exceed adjacent undisturbed land to limit the potential spread of weeds onto adjacent agricultural lands.

5.5.2 Wildlife

5.5.2.1 Biological Consultations

Coordination with SDGFP and the USFWS was initiated in March 2008. Meetings were then arranged to discuss wildlife impacts specifically. Agencies were given survey protocol packages consisting of a Special Status Screening Table to discuss potential species occurrence data obtained from agency websites and other applicable websites (e.g., NatureServe).

A meeting with the USFWS field offices in South Dakota was held on June 10, 2008, in compliance with the consultation requirements under Section 7 of the Endangered Species Act. SDGFP also attended that meeting to identify concerns for special status species and to develop appropriate mitigation for any impacts to wildlife. In addition USFWS Wetland Management Districts and Refuges were contacted to identify federally owned lands and/or easements crossed by the Project.

Keystone also initiated wetland surveys in 2008 along the pipeline as support for the US Army Corps of Engineers (USACE) Section 404 permit applications and to identify wildlife habitat crossed by the Project. Prior to construction, Keystone will continue to collect additional biological data on proposed South Dakota pump station sites, pipeline route adjustments, proposed access roads, and on mainline pipeline segments for which access was denied.

5.5.2.2 Wildlife Habitat

Wildlife habitats along the Project consist of grassland/rangeland, agriculture, palustrine emergent/scrub-shrub wetlands, previously disturbed, riverine/open water, and upland forest. Descriptions of vegetative communities that will be crossed by the Project are discussed in Section 5.5.1. The Project is dominated by grasslands/rangeland and agriculture. Although agricultural land represents open space, it has limited value as wildlife habitat since vegetative cover and food sources are present primarily on a short-term basis due to seasonal harvesting and cultivation. The primary value of agricultural land as wildlife habitat is that it contributes seasonal food sources for small mammals and avian species during the growing season. Crop residue remaining after harvest provides a food source for small mammals, pheasants, songbirds, and waterfowl.

Undeveloped wildlife habitat that will be crossed in South Dakota includes approximately 222.9 miles of grassland/rangeland, 82.5 miles of agricultural land, 0.9 mile of upland forest, 3.6 miles of riverine or open water habitat, 1.2 miles of emergent wetlands, and less than 0.1 mile of scrub-shrub wetlands. No forested wetland habitat is crossed by the Project in South Dakota.

5.5.2.3 Big and Small Game Species

Mule deer, white-tailed deer, and antelope are the principal big game species occurring along the Project. The Project does not cross any sensitive seasonal big game ranges in South Dakota.

Small game species that can occur along the Project and possible alternatives include upland game birds, waterfowl, furbearers, and small mammals. Specific species can include mourning dove, northern bobwhite, ring-necked pheasant, greater sage-grouse, greater prairie chicken, sharp-tailed grouse, ruffed grouse, gray partridge, wild turkey, eastern fox squirrel, eastern gray squirrel, red

squirrel, eastern cottontail, sand hill crane, and a number of migratory waterfowl. Furbearers include beaver, bobcat, red fox, gray fox, swift fox, raccoon, badger, ermine, least weasel, long-tailed weasel, and mink. Two sage and/or sharp-tailed-grouse leks were found within 2 miles of the pipeline ROW in Harding County on private property.

Nongame Species

The Project traverses various regions which are inhabited by a diversity of nongame species (e.g., small mammals, raptors, songbirds, amphibian, and reptiles). Nongame mammals include shrews, bats, squirrels, prairie dogs, pocket gophers, pocket mice, voles, and mice. These small mammals provide an important prey base for the region's predators including, coyote, badger, skunk, raptors (eagles, buteos, accipiters, owls), and snakes.

Nongame birds include a variety of songbirds and raptor species, most being species associated with open, grassland habitat, although woodland species also are represented along woodland riparian corridors as well as in what little upland forests exist along the route. Raptors likely to be present in open habitats include turkey vulture, burrowing owl, golden eagle, red-tailed hawk, Swainson's hawk, northern harrier, ferruginous hawk, American kestrel, short-eared owl, and great horned owl. Woodland associated raptor species likely to be present include the northern goshawk, Cooper's hawk, broad-winged hawk, long-eared owl, and eastern screech owl. The northern harrier, short-eared owl, and ferruginous hawk are the only ground nesters. Surveys for raptor nests within 0.25 miles of the pipeline ROW found 25 raptor nests and no bald eagle nests.

The majority of the songbirds inhabiting the region, particularly in woodland areas, are neo-tropical migrants. These are birds that breed in North America but winter in neo-tropical regions of Central and South America. Examples of neo-tropical migrants in the area of the route include lark bunting, kingbird, and various vireos and warbler species. Eastern kingbird, American crow, western and eastern meadowlark, horned lark, and sparrows are common open-country inhabitants, while woodpeckers, blue jay, chickadees, wrens, vireos, warblers, and cardinals are typical summer or year-long residents of shrub lands and woodlands.

5.5.2.4 Potential Impacts to Wildlife

Potential impacts to terrestrial wildlife species from the Project can be classified as short-term, long-term, and permanent. Short-term impacts consist of activities associated with Project construction and changes in wildlife habitats lasting less than 5 years. This will include impacts to species dependent on herbaceous habitats. Long-term impacts will consist of changes to wildlife habitats lasting 5 years or more and will include species dependent on habitats with woody species components. Permanent impacts will result from construction of aboveground facilities that convert natural habitat to an industrial site. The severity of both short- and long-term impacts will depend on factors such as the sensitivity of the species impacted, seasonal use patterns, type and timing of construction activities, and physical parameters (e.g., topography, cover, forage, and climate).

Construction Impacts

Impacts to big game species will include the temporary loss of potential forage (native vegetation and croplands) and will result in temporary habitat fragmentation within the surface disturbance areas during construction. However, these temporary impacts to vegetation will represent a small percentage (far less than 1 percent) of the overall available habitat within the Project region. Construction during the fall hunting seasons will create conflicts with hunter use of these areas. In addition, the creation of access roads associated with the Project could increase hunting pressure on game species. No

sensitive habitats for big game have been identified along the route. Indirect impacts will result from increased noise levels and human presence during surface disturbance activities. Because the big game species mentioned above have adapted to human activities and land uses, displacement from construction areas are likely to be short-term.

Potential direct impacts to small game and non-game species can include nest or burrow abandonment or loss of eggs or young where construction occurs during the breeding season. Less mobile or burrowing species may be lost to construction vehicles and equipment. Other potential temporary impacts include habitat loss or alteration, habitat fragmentation, and animal displacement. Individuals may be permanently displaced due to increased competition or other effects of being forced into sub-optimal habitat. Loss of prairie grouse lekking habitat can have a significant effect on local related populations. Indirect impacts from increased noise and additional human presence also can lead to displacement and lowered fitness. However, the habitat adjacent to the construction zone will support displaced animals, due to the small scale amount of disturbance compared to the surrounding available habitat.

Due to the linear nature of the Project over a large geographic area, the area impacted will represent a small percent of available wildlife habitat on a regional basis. The effects of short-term and long-term habitat loss on native wildlife populations will be relatively small since the majority of habitat disturbance will be restored to the pre-disturbance condition. Agricultural lands will continue to be used for pre-construction uses while other undeveloped habitats will be reclaimed to primarily herbaceous communities using appropriate seed mixes prescribed by state and federal agencies. Loss of shrub communities will be long-term (5 to 20 years or more) within reclaimed areas of the construction ROW since these communities will become reestablished through the natural reinvasion of woody species. Loss of woodland vegetation will be permanent since trees will not be allowed to reestablish within 15 feet of either side of the pipeline centerline. Habitat losses also will be permanent at aboveground pipeline facility locations such as pump stations and access roads.

To mitigate impacts to big game, small game, migratory birds, and raptors, seasonal buffers and timing restrictions are recommended by the SDGFP and USFWS as listed in **Table 10**. Construction activities will be limited during the seasonal timing restriction within each buffer. Keystone will work with agencies to define activities allowed during construction in buffer zones. Location information, timing restrictions, and buffer distances for these species were obtained from the SDGFP and USFWS.

Table 10 Recommended Seasonal Timing Restrictions and Buffers of Greater Sage Grouse, Sharp-tailed Grouse, and Greater Prairie Chicken[1]

Species / Habitat Type	Buffer (miles)	Seasonal Timing Restrictions
Greater Sage Grouse (Lek and Nesting Habitat)	Within 4 miles of an active lek	March 1 – June 15
Sharp-tailed Grouse (Lek and Nesting Habitat)	Within 2 miles of an active lek	March 1 – June 15
Greater Prairie Chicken (Lek and Nesting Habitat)	Within 4 miles of an active lek	March 1 – June 15

[1] Source: SDGFP 2008 – Correspondence from C. Switzer 8/20/08.

Power lines constructed to serve pump stations create collision potential for avian species. Impacts may be mitigated by compliance with avian protection measures by the power providers. Since raptors may perch on power poles, installation of power poles may increase predation risk to sage grouse, particularly in areas where raptor perches are infrequent. Potential impacts may be mitigated by the installation of anti-perching devices by the power providers.

Operation Impacts

Maintenance activities will not significantly impact wildlife populations since disturbances will be isolated, short-term, and infrequent.

Spilled crude oil can affect organisms directly and indirectly. Direct effects include physical processes, such as oiling of feathers and fur, and toxicological effects, which can cause sickness or mortality. Indirect effects are less conspicuous and include habitat impacts, nutrient cycling disruptions, and alterations in ecosystem relationships. The magnitude of effects varies with multiple factors, the most significant of which include the amount of material released, the size of the spill dispersal area, the species assemblage present, and the spill response tactics employed.

Unlike aquatic organisms that frequently cannot avoid spills in their habitats, the behavioral responses of terrestrial wildlife may help reduce potential adverse effects. Many birds and mammals are mobile and generally will avoid oil-impacted areas and contaminated food (Sharp 1990; Stubblefield et al. 1995). Most terrestrial species have alternative, un-impacted habitat available. Since pipeline spills are highly localized (in contrast to large-scale oil spills in marine systems), mortality of wildlife generally is limited (Stubblefield et al. 1995).

Indirect environmental effects of spills can include reduction of suitable habitat or food supply. Adverse effects to vegetation tend to be localized and short-term. Consequently, a decreased food supply is not considered to be a major chronic stressor to herbivorous organisms after a spill.

Table 11 Potential Western Prairie Fringed Orchid Habitat Along the Project in South Dakota

County	Milepost (Enter)	Milepost (Exit)	Miles Crossed[1]
Tripp	561.5	561.6	<0.1
	564.2	564.2	<0.1
	564.6	564.6	<0.1
	570.9	571.1	0.2
	571.8	571.9	<0.1
	572.0	572.0	<0.1
	572.4	572.6	0.1
	574.9	575.0	<0.1
	575.0	575.1	0.2
	576.0	576.1	<0.1
	578.1	578.1	<0.1
	578.5	578.5	<0.1
	579.3	579.4	0.1
	586.8	586.8	<0.1

Table 11 Potential Western Prairie Fringed Orchid Habitat Along the Project in South Dakota			
County	Milepost (Enter)	Milepost (Exit)	Miles Crossed[1]
	587.4	587.5	0.1
	589.3	589.7	0.4
	590.2	590.3	<0.1
	591.2	591.2	<0.1
	591.4	591.4	<0.1
	591.6	591.6	<0.1
	591.8	591.8	<0.1
	591.9	592.0	0.1
	592.3	592.4	0.1
	592.5	592.5	<0.1
	592.7	597.8	5.0
	594.1	594.2	0.1
	594.9	595.0	0.1
		Total Miles Crossed [1]	**6.8**

[1] Discrepancies between milepost ranges, miles crossed, and total mileage are due to rounding errors.

Because the likelihood a pipeline release is low, direct and indirect impacts to wildlife will be localized, and adverse effects to habitat will be mitigated, the Project will not pose a significant threat of long-term severe injury to wildlife populations.

5.5.3 Threatened and Endangered Species

The information presented in this section reflects responses received from appropriate state and federal agencies at the time this document was prepared. This information will continue to be updated throughout the pre-construction period based on continued consultations.

5.5.3.1 Plant Sensitive Species

5.5.3.2 Information on plant sensitive species potentially found along the ROW was obtained from the USFWS, the South Dakota Natural Heritage Programs, and the SDGFP. Based on correspondence and consultation on June 10, 2008, with SDGFP and USFWS, species-specific surveys will be required for Western prairie fringed orchid. Surveys are recommended in wet meadows in Tripp County along the route south of Highway 18 during the flowering period, June 15 through July 15. The 2008 biological field surveys identified approximately 6.8 miles of potential Western prairie fringed orchid habitat crossed by the Project (**Table 11**). Surveys undertaken in 2009 identified one Western prairie fringed orchid. No other plant species of concern are known to occupy the Project route in South Dakota.**Terrestrial Wildlife Sensitive Species**

Initial analysis of terrestrial wildlife sensitive species focused on those species identified as potentially occurring in the Project area (**Table 12**), as derived from species lists and agency websites (e.g., USFWS and SDGFP). This list identified nine terrestrial wildlife sensitive species. As a result of the meeting with the SDGFP and USFWS held on June 10, 2008, two species (peregrine falcon and piping plover) were eliminated from further analysis. Following consideration of agency comments and compilation of available data, a total of seven terrestrial wildlife sensitive species (river otter, swift fox, black-footed ferret, bald eagle, whooping crane, interior least tern, and American burying beetle) can potentially occur within suitable habitat along the route in South Dakota. Out of the seven terrestrial wildlife sensitive species identified as potentially occurring within the Project area, the USFWS and SDGFP recommended pre-construction surveys for the river otter, swift fox, bald eagle, and interior least tern.

The USFWS indicated that the entire state has been block cleared for black-footed ferrets and that surveys are not needed. No further surveys or mitigation requirements are necessary.

Surveys for the presence of river otter and swift fox dens are planned prior to construction. Once these surveys are complete and if critical habitat or populations are identified, appropriate protection measures will be implemented in order to minimize potential impacts to these species.

Surveys for raptor nests and nesting and roosting bald eagles occurred along the entire route in April 2008. A total of 28 raptor nests were identified along the ROW in South Dakota. No bald eagle nest or roost sites were identified within 0.25 mile from the ROW. Additional nesting (February 1 to August 15) and roosting (November 1 to April 1) surveys are anticipated prior to construction in 2011 should construction be scheduled during those periods. Surveys for winter roosting bald eagles in February 2009 found several individuals along the White and Cheyenne Rivers. Raptor surveys in April 2009 found no nesting bald eagles and 25 raptor nests within 0.25 miles of the ROW.

Surveys for nesting interior least tern were conducted in July 2008 along the Cheyenne River as recommended by the USFWS. Surveys did not identify any nesting interior least terns but did identify suitable habitat within the Cheyenne River crossing. Further nesting surveys for the interior least tern are proposed prior to construction should construction be scheduled during the breeding season (April 15 to August 15). In addition, Keystone plans to cross the Cheyenne River using HDD methods, minimizing impacts to nesting interior least tern habitat.

Both USFWS and SDGFP will require off-site mitigation to enhance American burying beetle habitat in southern Tripp County. Recommended mitigation options include purchasing land for SDGFP

management (e.g., waterfowl protection areas, areas for hunting), setting up private conservation easements, or USFWS easements (e.g., grassland easement).

5.5.3.3 Aquatic Sensitive Species

Initial analysis of aquatic sensitive species focused on those species identified as potentially occurring in the Project area (**Table 12**), as derived from species lists and agency websites (e.g., USFWS and SDGFP). This list identified five aquatic sensitive species. As a result of the meeting with the SDGFP and USFWS held on June 10, 2008, one species (long nose sucker) was eliminated from further analysis. Following consideration of agency comments and compilation of available data, a total of four aquatic sensitive species (sturgeon chub, black nose shiner, Northern red belly dace, and pearl dace) can potentially occur within suitable habitat along the route in South Dakota.

Table 12 Sensitive Species Identified for the Project in South Dakota

Species	Status	Habitat	Potential for Occurrence Within Project ROW	Eliminate from Detailed Analysis	References
Mammals					
Black-footed Ferret *Mustela nigripes*	FE; SD-E	Suitable habitat consists of large prairie dog colonies or complexes (80 acres or greater for black-tailed prairie dog towns and 200 acres or greater for white-tailed prairie dog towns) with towns no further than 3 miles apart to sustain a viable population of ferrets.	Low – The entire State of South Dakota has been block cleared for black-footed ferret surveys. No further surveys or mitigation requirements.	Yes.	SDGFP/USFWS 2008 – Meeting Notes. SDGFP/USFWS 2009 – Meeting Notes.
Swift Fox *Vulpes velox*	SD-T	This species is found in short-, mid-, and mixed-grass prairies with gently rolling hills. Den sites are typically located on flat areas or along slopes or ridges that provide a good view. Dens are typically on sites dominated by blue grama or buffalo grass. Denning season: April to August.	Moderate – Reintroduction sites have occurred in the badlands, Lower Brule Reservation, and Turner Ranch. SDGFP notes that an area triangulated between these locations should be surveyed for swift fox den sites. Surveys are planned prior to construction.	No.	SDGFP/USFWS 2008 – Meeting Notes. Nebraska Game and Parks Commission (NGPC) 2007.
River otter *Lontra Canadensis*	SD-T	Key habitats are rivers, streams, lakes, ponds, marshes, estuaries, and beaver flowages, especially near water bodies with wooded shorelines or nearby wetlands. When inactive, occupies hollow logs, spaces under roots, logs, or overhangs, abandoned beaver lodges, dense thickets near water, or burrows of other animals; such sites also are used for rearing young. Denning season: February 15 to June 15.	Low – Recommended survey locations from SDGFP include the Bad River, White River, and Cheyenne River. Surveys are planned prior to construction.	No.	SDGFP/USFWS 2008 – Meeting Notes. NGPC 2008.

Table 12 Sensitive Species Identified for the Project in South Dakota

Species	Status	Habitat	Potential for Occurrence Within Project ROW	Eliminate from Detailed Analysis	References
Birds					
Bald eagle *Haliaeetus leucocephalus*	SD-T	This species typically occurs near large bodies of water that support suitable roosting and foraging habitat. Nest sites are located in proximity to open water and generally are found in mature heterogeneous stands of multi-storied trees, but also may nest on cliffs. Winter habitat typically includes areas of open water, adequate food sources, and sufficient diurnal perches and night roosts. Nesting period: February 1 to August 15. Winter roost period: November 1 to April 1.	Low – No bald eagle nest/roost sites were identified along the route in South Dakota during the April 2008 aerial raptor surveys.	No.	ENSR 2008 – Aerial Surveys.
Peregrine falcon *Falco peregrinus*	SD-E	This species is found over a wide variety of habitats, but generally are located near open water or marshes that support high concentration of shorebirds or waterfowl. Nest sites occur on tall steep-walled cliffs, bridges, or buildings. Preferred foraging habitat includes lakes, rivers, and wet meadows. Breeding season: April 15 to July 15.	Low – Migrant only throughout the Project area.	Yes.	SDGFP/USFWS 2008 – Meeting Notes.
Whooping crane *Grus americana*	FE; SD-E	During migration, this species feeds and roosts in a variety of habitats including croplands, large and small freshwater marshes, the margins of	Low – The Project crosses the western most edge of the whooping crane migration corridor. This species will be a migrant only along	No.	USFWS – Whooping Crane Migration Route Map.

Table 12 Sensitive Species Identified for the Project in South Dakota

Species	Status	Habitat	Potential for Occurrence Within Project ROW	Eliminate from Detailed Analysis	References
		lakes and reservoirs, and submerged sandbars in rivers. Spring and fall migration through the Project regions generally occurs from February through April and from October through November, respectively.	the Project area.		
Piping plover *Charadrius melodus*	FT; SD-T	This species inhabits open sandy areas and saline flats with little vegetation along rivers, lakes, ponds, and marshlands. It nests on sandbars and sand and gravel beaches with short, sparse vegetation along inland lakes, on natural and dredge islands in rivers, on gravel pits along rivers, and on salt-encrusted bare areas on interior alkali ponds and lakes. Sparse clumps of grass or herbaceous vegetation are important habitat components. Nesting period: April 15 to August 15.	None – there are no records of breeding piping plovers along the route in South Dakota.	Yes.	SDGFP/USFWS 2008 – Meeting Notes.
Interior least tern *Sterna antillarum athalassos*	FE; SD-E	Nesting habitat consists of sparsely vegetated sandy, gravelly, or silty, beaches and sandbars within wide, unobstructed river channels or salt flats along lake shorelines and irrigation reservoirs. Nest locations generally are away from the water's edge since nesting typically begins while river flows are high and relatively small amounts of sandy	Low – This species was not identified during the July 2008 Piping Plover / Interior Least Tern Surveys along the route in South Dakota. Surveys are planned prior to construction.	No.	ENSR 2008 – Interior Least Tern / Piping Plover Surveys.

Table 12 Sensitive Species Identified for the Project in South Dakota

Species	Status	Habitat	Potential for Occurrence Within Project ROW	Eliminate from Detailed Analysis	References
		habitat is exposed. Nesting period: April 15 to August 15.			
Fish					
Long nose Sucker *Catostomus catostomus*	SD-T	This species is found in cool, spring-fed streams. Also, this species spawns in lakes or shallow flowing streams. Spawning period: spring	None – Route is out of current range listed in the South Dakota Comprehensive Wildlife Conservation Plan (SDCWCP) and as discussed during agency meeting on June 10, 2008.	Yes.	SDCWCP; SDGFP/USFWS 2008 – Meeting Notes. NatureServe 2007.
Black nose shiner *Notropis heterolepsis*	SD-E	This species prefers clean weedy lakes and streams. Spawning period: spring and summer.	Low – SDGFP would like surveys for these species within all tributaries of the Keya Paha River crossed by the Project. Surveys are planned prior to construction.	No.	SDGFP/USFWS 2008 – Meeting Notes. NatureServe 2007.
Northern red belly dace *Phoxinus eos*	SD-T	This species occurs in a variety of habitats ranging from streams to bog lakes. Spawning period: mid-June to mid-August.	Low – SDGFP would like surveys for these species within all tributaries of the Keya Paha River crossed by the Project. Surveys are planned prior to construction.	No.	SDGFP/USFWS 2008 – Meeting Notes. NatureServe 2007.
Sturgeon chub *Macrhybopsis gelida*	SD-T	This species prefers large turbid sandy rivers over substrate of small gravel and coarse sand. It is often found in areas swept by currents especially at heads of islands or exposed sandbars. Spawning period: late spring to mid-summer.	Moderate – Suitable habitat is found at the Cheyenne and White rivers. HDD crossings of these rivers will eliminate impacts.	No.	SDGFP/USFWS 2008 – Meeting Notes. SDGFP/USFWS 2009 – Meeting Notes. NatureServe 2007.
Pearl dace	SD-T	This species occurs in cool bogs, ponds, beaver ponds, lakes, creeks,	Low – SDGFP would like surveys for these species within all tributaries of	No.	SDGFP/USFWS 2008 – Meeting Notes.

Table 12 Sensitive Species Identified for the Project in South Dakota

Species	Status	Habitat	Potential for Occurrence Within Project ROW	Eliminate from Detailed Analysis	References
Margariscus margarita		and clear streams. This species spawns in clear streams with a weak to moderate current over a sand and gravel. Spawning period: spring.	the Keya Paha River crossed by the Project. Surveys are planned prior to construction.		NatureServe 2007.
Invertebrates					
American burying beetle *Nicrophorous americanus*	FE	This species inhabits upland grasslands or near the edge of grassland/forest. Sandy/clay loam soils and food (carrion) availability also are important. The species appears to prefer loose soil in which to bury carrion. Reproduction occurs from late-April through mid-August. Reproductive activity includes the burial of a carcass, building of a chamber, and laying eggs.	High – Known populations occur in Tripp County, South Dakota. Off-site mitigation will be required for impacts to suitable habitat.	No.	SDGFP/USFWS 2008 – Meeting Notes. SDGFP/USFWS 2009 – Meeting Notes.
Plants					
Western prairie fringed orchid *Platanthera praeclara*	FT	Occurs in mesic upland tall grass prairie in the southern part of its range, often in swales, and wet-mesic tall grass prairie and sedge meadows in the northern part of its range. Also known from prairies and swales in sand dune complexes that are fed by shallow underground water. Flowers June-July.	Low – Documented occurrences are found in Tripp County, South Dakota. .	No.	USFWS – Map of Distribution. SDGFP/USFWS 2008 – Meeting Notes.

5.5.3.4 Potential Impacts to Sensitive Species

Construction Impacts

Terrestrial Wildlife Species

In coordination with federal and state agencies, Keystone is developing threatened and endangered species specific mitigation to reduce impacts to sensitive terrestrial resources. Based on those consultations, Keystone will work with the relevant regulatory authorities to determine any avoidance, minimization, or mitigation measures required.

Potential impacts to sensitive wildlife resources parallel those discussed in Section 5.5.2.4, Potential Impacts to Wildlife. Direct impacts to sensitive species from surface disturbance activities include the long-term loss or alteration of potential breeding and/or foraging habitats (wooded habitats) and increased temporary habitat fragmentation until native vegetation has become reestablished. Potential impacts also can include mortalities of less mobile species as the result of exposure to vehicle and construction equipment traffic, and the potential abandonment of a nest or den site or territory, including the loss of eggs or young (e.g., raptors, interior least tern, and swift fox). Other impacts will include short-term displacement of some of the more mobile species from the disturbance areas as a result of increased noise and human presence.

For terrestrial wildlife, most are relatively mobile species that can avoid short-term construction disturbance with no resulting long-term adverse effects on local populations. Increased mortality rates can occur in species that are less mobile as the result of exposure to vehicles and construction traffic. This will result in the loss of some individuals but the relatively narrow and linear disturbance area that will be associated with pipeline construction is unlikely to have measurable adverse effects on local populations of sensitive species. Surface disturbance activities along the pipeline ROW will result in the long-term disturbance of portions of rangeland (sagebrush), scrub-shrub wetland, and woodland habitats which may contain potentially suitable habitat for sensitive species.

Aquatic Species

Two water bodies (Cheyenne and White rivers) crossed by the route in South Dakota contain known or potential habitat for the state threatened sturgeon chub (SDGFP 2006). The Cheyenne and White rivers are included in the list of water bodies that will be crossed using HDD methods. Therefore, no impacts to the sturgeon chub are anticipated. Surveys for the other three special status aquatic species are recommended within tributaries of the Keya Paha River. Once surveys are completed, specific construction design measures can be implemented.

The types of impacts that can affect sensitive fish species are similar to those discussed below for all fisheries crossed by the Project. Construction-related impacts on sensitive species living in streams that will be crossed by the Project using HDD will be minor, since directional drilling will eliminate disturbance within the channel. In contrast, open-cut trenching at other streams will result in alteration of bottom substrates, temporary increased sedimentation, and possible removal of riparian vegetation. The degree of impact will depend upon whether important fish spawning or rearing habitat is altered. Adult fish are likely to temporarily move away from the construction area. Generally, impacts to habitat and fish populations will be short-term.

Potential sources for hydrostatic testing and dust control water include the Cheyenne and White rivers, which contain sensitive fish species. Specific water volumes that will be withdrawn from these streams are not known at this time but will be quantified as details of the hydrostatic test plan are finalized. Nevertheless, water use from any of these streams will result in a relatively small one-time flow reduction. Water withdrawal is expected to represent a relatively small percentage of base flow conditions. Therefore, impacts on fish and fish habitat will be considered minor in the mid-size to large streams. The discharge of

hydrostatic test water will follow state permit requirements, which will eliminate potential water quality effects on sensitive species. The CMR Plan contains BMPs that work to avoid or mitigate potential impacts.

Operation Impacts

Operational impacts to sensitive species parallels those identified for wildlife and aquatic biota.

5.6 Aquatic Ecosystems

5.6.1 Wetlands

Wetlands and riparian areas were identified along the Project by completing field surveys and reviewing aerial photographs for areas where reroutes were developed. Wetlands and waters of the US along the route were delineated in accordance with the direction provided by the USACE – Omaha District.

Wetlands within the Project area were classified into three categories: palustrine emergent wetlands (PEM), palustrine scrub-shrub wetlands (PSS), and palustrine forested wetlands (PFO) (Cowardin et al. 1979). Wetlands within the Project area in South Dakota are limited to 1.2 miles of PEM wetlands and less than 0.1 mile of PSS wetlands. No PFO wetlands will be affected.

PEM wetlands generally are dominated by fowl blue grass (*Poa palustris*) and fox tail (*Hordeum jubatum*) in areas that typically contain water for several weeks after spring snowmelt.

Shallow-marsh vegetation such as spike rush (*Eleocharis palustris*) and wheat sedge (*Carex antherodes*) dominate areas where water typically persists for a few months each spring, and deep-marsh vegetation like cattails (*Typha latifolia*), and hardstem bulrush (*Scirpus acutus*) occupies areas where water persists throughout the year (USDA NRCS 2008b; USEPA 2008a; USGS 2006b).

PSS wetlands are dominated by woody vegetation less than 5 meters in height. The species present can be true shrubs, young trees, or trees that are stunted due to environmental conditions. Common PSS species may include greasewood (*Sarcobatus*), winter fat (*Krascheninnikovia lanata*), four wing saltbush (*Atriplex canescens*), and shadscale saltbush (*Atriplex confertifolia*) (USDA NRCS 2008b; USEPA 2008a; USGS 2006b).

Construction Impacts

Effects on wetland vegetation will be greatest during and immediately following construction. To mitigate the potential for these impacts, Keystone will implement specific procedures as outlined in the CMR Plan (**Exhibit B**) and summarized in this report. Keystone will restore or mitigate impacts to wetlands affected by construction activities, to the extent practicable.

Smaller streams and ephemeral or intermittent drainages will likely be open cut and wetlands located in these areas will be crossed by trenching. However, no installation of surface facilities will occur in wetlands and no permanent loss of wetlands will occur as a result of this Project. Herbaceous and scrub shrub vegetation in PSS and PEM wetlands are expected to reestablish to preconstruction levels within 1 to 5 years following the completion of reclamation, resulting in a short-term loss of vegetation and available habitat for some wildlife species.

The CMR Plan contains mitigative procedures to be followed in wetlands. All work shall be conducted in accordance with applicable permits.

Operation Impacts

Over the operational life of the pipeline, vegetation will be allowed to reestablish in emergent and scrub-shrub wetlands. However, woody vegetation greater than 15 feet in height will be removed periodically above the pipeline (approximately 15 feet on each side of the centerline) to maintain visibility of the area

above the pipeline for aerial pipeline observation and to permit access to areas along the pipeline for maintenance activities and in the event of an emergency.

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

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

Crude oil released from the pipeline within a wetland could reach the soil surface. If the water table reaches the surface, the release would manifest as floating crude oil. The general lack of surface flow within a wetland would restrict crude oil movement. Where surface water is present within a wetland, the spill would spread laterally across the water's surface and be readily visible during routine ROW surveillance. The depth of soil impacts likely would be minimal, due to shallow (or emergent) groundwater conditions. Groundwater impacts within the wetland are likely to be minimal and confined to the near-surface, enhancing the potential for biodegradation.

The chance of a spill occurring at any specific wetland along the pipeline is very low. Based on survey data and aerial interpretation, wetlands comprise approximately 1.2 miles of the Project in South Dakota. Based on Keystone's conservative estimation of spill frequencies for the Project, no more than one spill would occur in South Dakota wetlands in approximately 6,200 years. If any release did occur, it is likely that the total release volume of a spill likely would be 3 barrels or less based on historical spill volumes.

If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Keystone will utilize the most appropriate cleanup procedures as determined in coordination with the applicable federal and state agencies. Keystone would clean up contaminated wetland soils and would be required to meet applicable cleanup levels in accordance with federal and state regulations. Once remedial cleanup levels were achieved in wetlands, no adverse or long-term impacts would be expected.

5.6.2 Aquatic Biota

Aquatic biota are defined as fish and invertebrate communities that inhabit perennial streams and pond/lake environments. The description of aquatic communities focuses on important fisheries, which are defined as species with recreational or commercial value or threatened, endangered, or sensitive status (i.e., special status). This section describes recreationally or commercially important fisheries that occur at or immediately downstream of the proposed crossings. Special status aquatic species are discussed in Section 5.5.3. The study area for aquatic resources includes the perennial streams, rivers, and ponds/lakes that will be crossed by the Project. Other water bodies are included if they are located within approximately 0.5 mile of the proposed crossing and support recreationally or commercially important game fish or special status aquatic species.

Invertebrate communities that occur in water bodies along the Project include worms, immature and adult insect groups, shellfish, and other forms of aquatic life. The composition can vary depending on flowing or standing water and other physical characteristics of the water body. Invertebrates function in the aquatic environment through their food web dynamics and are valued as indicators of water quality. They represent important food sources for fish and also are used as indicators of water quality conditions. For the purpose of describing aquatic resources, it is assumed that invertebrates are present in all Project area water bodies.

The Project will cross 10 rivers and streams in South Dakota that have beneficial use classifications of warm water fisheries (**Table 13**). These include two larger rivers, the Cheyenne River and the White River.

Table 13 Fisheries Crossed or Downstream of the Project in South Dakota

Waterbody[1]	County	Fishery Class[2]
Little Missouri River	Harding	WW Semi-permanent
South Fork Grand River	Harding	WW Semi-permanent
Clark's Fork Creek	Harding	WW Marginal
North Fork Moreau River	Butte	WW Marginal
South Fork Moreau River	Perkins	WW Marginal
Sulfur Creek	Meade	WW Marginal
Red Owl Creek	Meade	WW Marginal
Cheyenne River	Pennington	WW Permanent
Bad River	Haakon	WW Marginal
White River	Tripp	WW Semi-permanent

[1] All streams in South Dakota are assigned the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering (SDDENR 2008a).

[2] Fishery classifications, as part of surface water classifications, are defined as: WW Permanent - Warm water permanent fish life propagation waters, WW Semi-permanent - Warm water semi-permanent fish life propagation waters, and WW Marginal - Warm water marginal fish life propagation waters.

Representative game fish that occur within the Project area in South Dakota include a variety of warm water species such as catfish, sauger, walleye, bass, and bullhead. Typical non-game species include burbot, freshwater drum, carp, buffalo fish, suckers, and goldeye.

5.6.2.1 Potential Construction Impacts

Stream Crossing Methodology

Since Keystone plans to use the HDD construction method at three water body crossings in South Dakota, construction-related impacts on aquatic biota and their habitat will be minor at these rivers. Drilling at these rivers will minimize impacts to important game and commercial fish species and special status species. Directional drilling will not alter or remove aquatic habitat because construction within the channel will not be required. It is possible that mud from the directional drilling could inadvertently enter the active stream along the drilling path. Measures would be undertaken to reduce additional seepage and clean up seepage. If any seepage enters the stream, increased turbidity or physical impact to the covering substrate would be localized and short-term (less than 1 day). All preventative and response measures to frac-outs will be located in a contingency plan. Open cut trenching is proposed on the remaining perennial streams, all of which contain at least one or more game fish species.

In-stream Habitat

In the vicinity of the trench line, trenching and backfilling can result in alteration of in-stream habitat and the mortality of benthic invertebrates inhabiting that reach of the watercourse. Studies done to monitor the effects on benthic invertebrates have indicated that the impacts are short-term. The disturbed area typically is re-colonized by benthic invertebrates to near pre-construction levels by the spring or summer following construction (Tsui and McCart 1981; Schubert and Vinikour 1987).

Backfilling the in-stream trench can either improve or lessen the quality of habitat available. This habitat quality change will depend largely on the nature of the soil materials from the lower depths of the trench with

respect to those near the surface. If backfilling results in a different material on the stream bed surface than the adjacent areas, a local habitat modification may have occurred. However, the limited extent of the disturbed area (trench-width) and the active bottom substrate sorting by a river suggest any such habitat modification will be small and of short duration in most stream environments.

Bank Cover

Vegetative cover along the stream banks of a water body provides cover for fish, shading, bank stability, erosion control, and an increased food and nutrient supply due to the deposition of insects and vegetative matter into the watercourse. Loss of bank cover can result in increased water temperatures, reduced food supply, impaired aesthetics, and reduced productivity. The potential for channel migration also can be increased since the removal of vegetation destabilizes the banks at discrete locations. Given the relatively small width of disturbance associated with a pipeline crossing, the above impacts tend to be negligible relative to an entire stream system. The CMR Plan provides stream bank restoration measures that will ensure both short-term bank stability and also natural or bioengineering procedures that support rapid permanent vegetation recovery.

Interruption of Fish Movement

Most water crossing methods allow movement of fish across the ROW; however, some techniques such as dry crossing procedures, may block or delay normal movements. Long-term interruption of fish movement in a watercourse or a delay in spawning migration can have adverse impacts. Interruptions during sensitive periods typically are not a concern since in-stream construction generally can be performed outside of sensitive periods. Blockage of non-spawning-related fish movement for limited periods (less than 7 days) should not affect fish growth and behavior. Delays of less than 3 days will not adversely affect spawning migrations (Dryden and Stein 1975).

Direct Disturbance of Spawning

In-stream construction activities can displace spawning fish from preferred habitat and result in the utilization of lower quality spawning habitat. Generally, this is of limited concern for water crossing construction since in-stream activities generally are not scheduled during spawning period, which for most fish species extend from April through June.

Water Quality Effects

It is widely recognized that in-stream excavation activities result in short-term increases in TSS levels and turbidity. These levels decrease with distance from the source as particles settle. The levels also decrease with time following cessation of in-stream activities.

The impact to aquatic organisms by increase in suspended solids levels is a function of the duration of exposure and the concentration of suspended solids. While relatively high levels of TSS can occur immediately downstream of a crossing, the effects are very short-term with construction across most streams being completed in 1 day. Additionally, the water bodies in the Project area experience wide ranges in seasonal flow rates, large peak flows due to precipitation events, and drain through areas with relatively fine grained soils. These factors cause sudden temporary natural peaks in suspended solids concentrations. The aquatic systems supported by these water bodies are adapted to temporary increases in suspended sediments.

The extent of the increase in TSS levels will be mitigated by Keystone through the use of BMPs that include: measures to reduce the period of in-stream activity, spoil handling techniques, and equipment access installation procedures. Standard industry BMPs also address upland erosion and sediment control procedures to limit the potential for runoff from disturbed areas to contribute to increased in-stream TSS levels.

Sedimentation Effects

Solids introduced into suspension in a water body ultimately will settle on the streambed downstream of the crossing. The distance from the crossing is dependent upon the depth of flow, flow velocity, particle diameter and flow characteristics. Coarser materials (sands and gravels) tend to settle relatively close to the crossing location and tend to be distributed uniformly across the stream section. Fine silts and clays can stay in suspension for considerable periods of time and will tend to settle in natural depositional areas downstream of the crossing. Suspended sediment can prevent the successful incubation and hatching of fish eggs or the emergence of fry. This is an issue only when construction occurs during a spawning period.

The channel substrates of the streams and rivers that will be crossed by the Project consist primarily of fine grained materials (clay, silt, and sand). Fine-grained excavated material that is deposited downstream is expected to be similar to the existing substrate. Stream flows will suspend and re-deposit excavated materials during higher flow periods.

Young and Mackie (1991) found that benthic invertebrates inhabiting the upper surface of the substrate may be more adaptable to sedimentation than are taxa occupying the interstitial spaces of the substrate. Post construction studies have shown that benthic invertebrate populations generally have recovered to normal within 1 to 2 months of construction. Tsui and McCart (1981) reported benthic invertebrate populations downstream of a water crossing had recovered to near pre-construction levels shortly after construction.

The BMPs adopted for the Project as described in the CMR Plan will mitigate the short-term effects of downstream sedimentation, as discussed under Water Quality Effects.

Hydrostatic Testing

The CMR Plan lists 11 streams or rivers as potential water sources for hydrostatic testing for the Project. See Section 5.4.3 and **Table 13** for further information.

5.6.2.2 Operational Impacts

Maintenance activities will be infrequent, short-term, isolated, and will not affect aquatic biota or their habitat. Because there is no forested riparian habitat crossed by the route, long-term impacts associated with tree clearing within the permanent ROW will not occur. In riparian areas with shrub-scrub wetlands, woody vegetation greater than 15 feet in height will be removed periodically above the pipeline (approximately 15 feet on each side of the centerline) to maintain visibility of the area above the pipeline for aerial pipeline observation and to permit access to areas along the pipeline for maintenance activities and in the event of an emergency. Impacts associated with this vegetation maintenance will be highly localized and will not result in significant impacts to aquatic biota.

Keystone will employ multiple safeguards to prevent a pipeline release. The chance of a spill occurring is very low and if a spill occurred, the volume is likely to be relatively small. Contamination often remains confined to the pipeline trench. To affect aquatic biota, a series of low probability events must occur: 1) a pipeline release must occur, 2) the release would need to be of sufficient volume to escape the pipeline trench, and 3) it would need to reach a flowing stream or perennial water body within close proximity prior to containment and cleanup.

Aquatic biota in some streams and rivers represent sensitive environmental resources that can be temporarily impacted by a crude oil release. The PHMSA, in cooperation with various federal and state agencies, has identified ecologically sensitive resources that are particularly vulnerable to contamination. Portions of the pipeline that have the potential to affect these PHMSA-designated high consequence areas are subject to higher levels of regulation under the Integrity Management Rule. Keystone utilized PHMSA maps throughout the routing process to identify and avoided ecologically sensitive HCAs, when practical.

If a spill occurred and entered a surface water body, the crude oil and its constituents could adversely affect aquatic biota. Acute toxicity could potentially occur if substantial amounts of crude oil were to enter rivers and streams. Relatively small spills (less than 50 barrels) released into moderate and large rivers would not pose a major toxicological threat. In small to moderate sized streams and rivers, some toxicity might occur in localized areas, such as backwaters where concentrations would likely be higher than in the mainstream of the river. If crude oil entered a small stream, aquatic species in the immediate vicinity and downstream of the rupture could be adversely affected. Chronic toxicity also could potentially occur in small and moderate sized streams and rivers.

In the unlikely event of a pipeline release, Keystone will initiate its ERP and emergency response teams will contain and clean up the spill. To minimize impacts to aquatic resources, appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of aquatic biota.

5.6.3 Aquatic Sensitive Species

Four aquatic sensitive species (sturgeon chub, black nose shiner, Northern red belly dace, and pearl dace) have been identified as potentially occurring in water bodies crossed by the Project (SDGFP 2006). See Section 5.5.3.3 for further discussion. Impacts to aquatic sensitive species parallel those described for aquatic biota above.

5.7 Land Use and Local Land Controls

5.7.1 Existing Land Use

Of the approximately 314-mile route in South Dakota, 21.5 miles are state-owned and managed by the Commissioner of School and Public Lands. **Table 14** provides the locations of those lands. The remainder of the lands crossed are privately owned. No Tribal or federal lands are crossed by the route in South Dakota.

Table 15 provides the overall miles of various land uses that will be crossed by the Project in South Dakota. These land use categories are consistent with those outlined in the PUC guidelines. Land uses were quantified by analysis of high quality aerial photography, wetland field delineations, and field reconnaissance of grasslands. The boundaries of the various land uses within the pipeline corridor were incorporated as polygons in the Project GIS database. The land uses crossed are illustrated on maps at a scale of 1:24,000 in **Exhibit A**. The land use table and explanation below address each of the PUC land use categories. The explanation includes Keystone's interpretation of the land use category, the relative amount of the land use crossed, and other information.

Construction Impacts

The majority of the route in South Dakota is used for agricultural land uses. Construction of the Project will result in limited and temporary impacts as described in Section 6.1.2. Impacts to state-owned or state-managed lands will be short-term since these lands are classified as rangeland and pasturelands. Hunting activities may be affected for one season, since access across the construction ROW will be prohibited to ensure public safety and successful reclamation of the ROW.

Operation Impacts

Impacts to land uses during operations will be limited. Maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent. The primary long-term impact is the prohibition of permanent structures (e.g., homes, barns) within the 50-foot permanent ROW. The majority of existing land uses, such as use for rangeland, pastureland, and cropland, will not be affected. Additional discussion of operational impacts to agricultural lands is provided in Section 6.1.2.

Table 14 School and Public Lands Managed Properties Crossed by Project Route

County	Milepost	Miles Crossed
Harding	302.2 – 303.0	0.9
	304.1 – 304.2	0.1
	308.3 - 308.6	0.3
	308.9 - 309.4	0.5
	323.5 - 323.7	2.2
	326.5 - 327.0	0.5
	327.5 - 328.3	0.8
	329.9 - 330.2	0.3
	330.7 - 333.3	2.5
	336.1 - 336.1	<0.1
	337.9 - 338.2	0.3
	339.1 - 339.4	0.3
	339.4 - 340.8	1.4
	343.6 - 344.4	0.9
	345.7 - 346.2	0.5
	346.3 - 347.0	0.7
	347.6 - 347.8	0.2
	347.9 - 348.2	0.3
	349.4 - 350.4	1.1
	350.8 - 351.2	0.4
	351.6 - 352.8	1.2
	353.2 - 353.8	0.7
Perkins		
	364.5 - 365.2	0.7
	367.2 - 368.5	1.3
	368.7 - 370.6	1.9
Meade	376.7 - 376.9	0.3
	420.9 – 421.0	0.1
Pennington	425.6 – 425.6	< 0.1
Haakon	437.7 - 438.7	1.0
Lyman	464.8 – 464.9	0.1
	Total	**21.5**

Discrepancies between milepost ranges, miles crossed and total mileage are due to rounding.

Table 15 Land Uses Affected by Project

Land Use	Pipeline		Pump Stations	Pipeline and Pump Station
	Miles Crossed	Acreage Disturbed During Construction	Acreage Disturbed During Construction	Acreage for Operations
1. Land used primarily for row and non-row crops in rotation	84.3	1166	17.5	528.3

Table 15 Land Uses Affected by Project

Land Use	Pipeline		Pump Stations	Pipeline and Pump Station
	Miles Crossed	Acreage Disturbed During Construction	Acreage Disturbed During Construction	Acreage for Operations
2. Irrigated lands	0	0	0	0
3. Pasturelands and rangelands	226.8	3208.5	22.4	1396.1
4. Hay lands	0.2	3.2	0	1.4
5. Undisturbed native grasslands	0	0	0	0
6. Existing and potential extractive nonrenewable resources	0	0	0	0
7. Other major industries	0	0	0	0
8. Rural residences and farmsteads, family farms, and ranches	0	0.1	0	0
9. Residential	0	0	0	0
10. Public, commercial, and institutional use	2.8	44.1	0.4	17.3
11. Municipal water supply and water sources for organized rural water systems	0	0	0	0
12. Noise sensitive land uses	0	0	0	0

This table does not reflect lands affected by pipe and contractor yards or potential recreational vehicle park expansion/development.

1. Land used primarily for row and non-row crops in rotation. This land use is interpreted as farmlands that may be tilled. Primary row crops include alfalfa, corn, and cereal grains.

2. Irrigated lands. Lands included in this category are irrigated with center pivots, furrows, and flood from water received from lateral ditches. The Project does not cross irrigated lands.

3. Pasturelands and rangelands. This land use includes lands that may have been plowed at some time in the past and replanted to pasture grasses, wetlands, and lands that are currently or have evidence to suggest being grazed. Open water also is included in this category.

4. Hay lands. This category includes lands that have crops which have not been rotated, and that have evidence to suggest hay production such as the presence of bales.

5. Undisturbed native grasslands. No county, South Dakota, or federally designated native grasslands are crossed by the Project in South Dakota.

6. Existing and potential non-renewable resources. Coal, uranium lignite, and oil resources are in the vicinity of the Project. No active mines are crossed by the Project and it is unlikely based on today's economics that new mines will be created. Currently no oil wells are located directly in the path of the Project. However, with current technologies, oil discovered within the Project foot print will still be accessible. Sand and gravel deposits are widely distributed within areas crossed by the Project. No detailed analysis was conducted on potential sand and gravel sources because the effect of constructing the Project on the availability of the resources is expected to be very small.

7. Other major industries. The Project will not cross, or be co-located with any major industrial sites.

8. Rural residences and farmsteads, family farms and ranches. This category includes in the individual farmsteads and outbuildings, as well as farmstead windbreaks. Buildings were identified wherever they fell within the construction corridor; however, many buildings are uninhabited, and in some cases, abandoned. To the extent possible, the pipeline will not cross active farmsteads, but will cross near these sites (see noise sensitive areas [NSA] below).

9. Residential. This category includes suburban and urban residential areas. None of this land use occurs along the Project route in South Dakota.

10. Public, commercial, and institutional use. This category includes county road, highway, and railroad ROWs, commercial developments, schools, and churches. The Project only crosses transportation ROWs in this classification.

11. Municipal water supply and water sources for organized rural water districts. This category includes surface water reservoirs and groundwater wells that withdraw water for public water supplies. No public water supply Zone A or Zone B SWPAs are crossed by the Project.

12. Noise sensitive land uses. Noise sensitive land uses are considered to be rural residences and farmsteads, and other residential areas. One possible residence is within 500 feet of the centerline in Meade County.

5.7.2 Displacement

No homes or residents will be displaced by the construction or operation of the Project.

5.7.3 Compatibility with Existing Land Use and Measures to Ameliorate Adverse Impacts

The Project will be compatible with the predominant land use, which is rural agriculture, because the pipeline will be buried to a depth of four feet in fields and will not interfere with normal agricultural operations. Keystone will work with landowners to identify drain tile prior to construction. In most locations, the pipeline will be placed below agricultural drain tiles. Drain tiles that are damaged by Project construction activities will be repaired. The only aboveground facilities will be pump stations and block valves located at intervals along the pipeline. The pipeline will be located away from existing rural residences and farmsteads, reducing the likelihood of interference with construction of future structures and installation of buried utilities.

Pump stations will be located in rural agriculture or pastureland/rangeland areas. Sites for five of the seven pump stations located in South Dakota will be acquired from private landowners. Of the other two locations, one is on state-owned land and the other is owned by Harding County. The land for these two pump stations is in the process of being acquired. The pumps will not be enclosed in buildings and will be connected via aboveground piping and valves. Other facilities will include an electrical transformer; a small control building to house electrical, measurement, and control system components; and communications equipment. The pump station site will be enclosed by a chain link fence approximately 6 feet high. **Exhibit 4** in Chapter 2.0 presents a drawing of a typical pump station. A small utility building, aboveground piping, and communications equipment will be evident at each site. The pump stations will be located near existing county roads, which will minimize interference with agricultural operations on adjacent land and facilitate access by Keystone maintenance crews as needed.

The pump stations will require electrical service provided by power lines constructed by local power providers. The poles and conductors will be similar to existing electrical service distribution lines that already parallel many section line, township and county roads throughout South Dakota. Although the specific locations of electrical power lines will be provided by the local power providers, it is anticipated that these facilities will be located along county roads, and along section lines to the extent practicable to

minimize interference with existing farming operations. The electrical pump motors represent the noise sources at the pump stations. See Section 6.4.3 for further information.

The Project passes through two rural water system districts, the West River/Lyman – Jones Rural Water District, and the Tripp Rural Water District. Keystone met with these rural water districts in December 2008 to discuss the Project and will continue to coordinate with them.

Prior to initiating grading or construction activities, Keystone will determine the exact location of rural water system pipelines by notifying the "One-Call" locate system and coordinating physical location of the existing water lines. Typically, existing utilities, including water lines, are crossed by installing the pipeline with a minimum of 12 inches separation beneath the existing utility, as required by federal regulation, while the existing utility remains in operation. These crossings will be installed at the expense of Keystone.

5.7.4 Local Land Use Controls

Keystone will design, construct, operate, and maintain the pipeline, pump stations, and valve stations in compliance with applicable zoning and county permit requirements. In some cases Keystone may request variances or special use permits.

Keystone notes the existence of SDCL 49-41B-28, regarding local ordinances and their application to the project, and reserves the right to request the Commission to invoke its provisions during the proceedings on this application should the need arise.

Table 16 summarizes the permit requirements by county for the Project facilities.

5.8 Water Quality and Uses

The CWA, Section 303(c), requires each state to review, establish, and revise water quality standards for all surface waters within the state. To comply with this requirement, South Dakota has developed its own beneficial-use classification system to describe state-designated uses. Regulatory programs for water quality standards include default narrative standards, non-degradation provisions, a Total Maximum Daily Load regulatory process for impaired waters, and associated minimum water quality requirements for the designated uses of listed surface water bodies within the state.

Table 16 County Permit Requirements for Project

County	Permits Required
Harding	Pipeline Construction Permit; Building Permit; Zoning Permit
Butte	Building Permit
Perkins	None
Meade	Special Use Permit; Building Permit; Bond; Weed Control; Dust Control
Pennington	Construction Permit; Building Permit; Zoning Permit; Haul Road Agreement; Conditional Use Permit; Bond
Haakon	Road Agreement; Dust Control
Jones	Building Permit; Zoning Permit; Road Agreement; Noise Attenuation; Weed Control; Dust Control
Lyman	Building Permit; Zoning Permit; Road Agreement; Noise Attenuation; Weed Control; Dust Control
Tripp	Special Use Permit; Road Agreement; Weed Control

Designated beneficial uses of surface water bodies at proposed crossings in South Dakota are indicated in **Exhibit C**, which also indicates if major uses are supported or not as listed by SDDENR and approved by the USEPA. Stream segments listed by SDDENR with uses not supported, and the reasons for such listing, are further identified in **Table 17**.

Construction Impacts

Of the four impaired stream segments crossed by the Project, three are impaired for the fish propagation use due to TSS concentrations. Two will be crossed by HDD, eliminating impacts. One will be crossed by the open cut method. An impact of open cut stream crossing construction on water quality is temporary degradation in the form of short-term increased suspended solids concentrations and subsequent sedimentation (deposition of solids introduced into suspension by construction activities). Implementation of procedures within the CMR Plan will minimize these impacts.

The general discharge permit for hydrostatic test water discharges will impose pollutant limits on those discharges that will be protective of the designated uses of the receiving water bodies. In addition, construction methods for stream crossings (detailed in the CMR Plan) also will protect those streams and water bodies from exceedence of water quality standards. The one-time construction and hydrostatic test water use will not result in appreciable short- or long-term impacts to water quality.

Operation Impacts

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

Table 17 Impaired Water bodies Crossed by Project in South Dakota

County	Approx. Milepost	Water body Name	State Water Quality Classification [1]	Supports Use Designation	Impairment	Priority [2]
Harding	318.1	South Fork Grand River	Warm water semi-permanent fish life propagation	Nonsupport	TSS	2
			Limited-contact recreation	Full Support		
			Fish/Wildlife Prop, Rec, Stock	Full Support		
			Irrigation	Nonsupport	Salinity	
Perkins	364.4	South Fork Moreau River	Warm water marginal fish life propagation	Full Support		2
			Limited-contact recreation	Full Support		
			Fish/Wildlife Prop, Rec, Stock	Full Support		
			Irrigation	Nonsupport	Specific Conductance	
Pennington	425.9	Cheyenne River	Warm water permanent fish life propagation	Nonsupport	TSS	2
			Immersion recreation	Nonsupport	Fecal Coliform	
			Limited-contact recreation	Full Support		
			Fish/Wildlife Prop, Rec, Stock	Full Support		
			Irrigation	Full Support		
Tripp	536.9	White River	Warm water semi-permanent fish life propagation	Nonsupport	TSS	2
			Limited-contact recreation	Nonsupport	Fecal Coliform	
			Fish/Wildlife Prop, Rec, Stock	Full Support		
			Irrigation	Full Support		
Tripp	576.6	Ponca Creek [3]	Warm water semi-permanent fish life propagation	Nonsupport	TSS	2
			Limited-contact recreation	Nonsupport	Fecal Coliform	
			Fish/Wildlife Prop, Rec, Stock	Full Support		
			Irrigation	Full Support		

Table 17 Impaired Water bodies Crossed by Project in South Dakota

County	Approx. Milepost	Water body Name	State Water Quality Classification [1]	Supports Use Designation	Impairment	Priority [2]

[1] All streams in South Dakota are assigned the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering.

[2] Priority 2 waters meet the following criteria:

- Waters with an increasing trend towards eutrophy or enrichment, with consideration given to the rapidity of the declining water quality;
- Waters listed for three or less listing criteria;
- Waters where local support for Total Maximum Daily Load development is expected but not documented;
- Waters listed for aquatic life impairment;
- Waters with no evident local support for water quality improvements; or
- Waters where impairments are believed to be due largely to natural causes.

[3] The reach of Ponca Creek that is not supporting the beneficial uses is greater than 15 miles downstream from the crossing of the Project, but has been included in this table because of the impairment to warm water semi-permanent fish life propagation due to TSS.

Source: SDDENR 2008b.

If a spill occurred and entered a surface water body, the crude oil and its constituents could adversely affect various water uses, including aquatic biota and drinking water. Affects to aquatic biota are discussed in Section 5.6. While a release of crude oil directly into a water body could cause an exceedence of drinking water standards, Keystone will employ multiple safeguards to prevent a pipeline release. As part of project planning and in recognition of the environmental sensitivity of water bodies, the Project routing process attempted to minimize the number water bodies crossed. Additionally, valves have been strategically located along the Project route to help reduce the amount of crude oil that could potentially spill into water bodies, if such an event were to occur. SDDENR was consulted in determinations of SWPA locations, both surface water intakes and groundwater wells. The nearest surface water Zone B SWPA is approximately 30 miles downstream from the Project.

The chance of a spill occurring is very low and if a spill occurred, the volume is likely to be relatively small with contamination often remaining confined to the pipeline trench. To affect water quality, a series of low probability events must occur: 1) a pipeline release must occur, 2) the release would need to be of sufficient volume to escape the pipeline trench, and 3) it would need to reach a flowing stream or perennial water body within close proximity prior to containment and cleanup.

Nevertheless, certain streams and rivers with downstream drinking water intakes represent sensitive environmental resources and could be temporarily impacted by a crude oil release. The PHMSA, in cooperation with various federal and state agencies, has identified unusually sensitive resources (including drinking water intakes and ecologically sensitive areas) that are particularly vulnerable to contamination. Portions of the pipeline that have the potential to affect these PHMSA-designated high consequence areas are subject to higher levels of regulation under the Integrity Management Rule. Keystone utilized PHMSA maps throughout the routing process to identify and avoided HCAs, when practical.

In the unlikely event of a pipeline release, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. To minimize impacts to various water uses (including drinking water and aquatic resources), appropriate remedial measures will be implemented to meet federal and state water quality standards designed to ensure protection of human health and aquatic life.

5.9 Air Quality

Potential sources of emissions along the proposed pipeline route can be classified as one of three types: stationary, mobile, or fugitive.

Construction Impacts

Mobile sources of emissions are the commuter vehicles and construction equipment to be used during construction of the pipeline, pump stations, and other ancillary facilities. Fugitive sources of emissions include particulate emissions from paved and unpaved roadways; particulate emissions from soil disturbance during construction activities; fugitive tailpipe emissions from the operation of earthmoving equipment and commuter vehicles; and leaks or programmed releases of volatile constituents in fuels and crude oil from pipeline components such as valves, pumps, flanges, and connections.

The quantity of fugitive dust emissions will depend on the moisture content and texture of the soils that will be disturbed, along with the frequency and duration of precipitation events. The majority of pipeline construction activities will pass by a specific location within a 30-day period; therefore, fugitive dust emissions during construction will be restricted to the brief construction period along each segment of the Project route, with construction impacts diminishing once construction activities end and after disturbed areas are reclaimed. Fugitive particulate emissions from roadways consist of heavier particles and tend to settle out of the atmosphere within a few hundred yards. Therefore, fugitive

particulate emissions will be limited to the immediate vicinity of the Project and the surrounding region will not be significantly impacted.

Keystone will limit dust impacts in residential and commercial areas adjacent to pipeline construction by utilizing dust minimization techniques (primarily watering disturbed surfaces) in accordance with the CMR Plan (**Exhibit B**). Wind-generated dust after construction will be controlled using land surface reclamation measures outlined in the CMR Plan.

Operation Impacts

Because the proposed pump stations on the Project are to be electrically driven, the pump stations will not be potential sources of stationary emissions. The pump stations may include a source of backup power supply; however, this will not consist of an emergency generator engine or other combustion sources. Therefore, the pump stations will not have combustion emissions. Operational emissions from each of the pump stations will exclusively consist of fugitive emissions such as volatile organic compounds released during pigging operations.

5.10 Solid Wastes

Construction Impacts

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

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

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

Operation Impacts

No solid waste operational impacts are anticipated.

6.0 Community Impact

The route lies in predominantly rural and sparsely populated areas, with population densities generally ranging from approximately 3 to 50 people per square mile for the majority of the route.

6.1 Economic Impacts

6.1.1 Employment/Labor Market

6.1.1.1 Construction Labor

Labor Overview

The Project construction work will be temporary. The pipeline and facilities will be constructed utilizing organized labor from union locals whose geographic jurisdictions include South Dakota for the United Association, Teamsters, Operators, and Laborers. Each of these labor unions has requirements for joining their unions and also provides training and apprenticeship programs for new members.

Local Labor Needs and Benefits

Approximately 500 to 600 construction personnel (Keystone employees, contractor employees, construction inspection staff, and environmental inspection staff) are expected to be associated with each construction spread. The current construction plan involves 2 full construction spreads in 2011 in South Dakota with a total of approximately 1,000 to 1,200 pipeline construction personnel, and 1 full and 2 partial construction spreads in 2012. Construction of pump stations will require an additional 20 to 30 workers per station, resulting in a total of approximately 1,100 to 1,400 workers in the State at the peak of construction. Not all pump stations will be constructed simultaneously. Construction of pump stations is to commence in 2011 and be completed in 2012.

The job classifications and number of personnel estimated for construction of the pipeline in South Dakota based on two construction spreads in 2011 are provided in **Table 18**.

The net economic effect on local communities should be positive for the duration of the construction period.

Food and lodging expenditures are anticipated to be approximately $20 million. Temporary workers' estimated retail purchases with added state and local government taxes will add approximately $6 to 8 million of additional revenue.

Keystone will purchase some construction materials and other supplies for the Project from local businesses. Local purchases for construction will include consumables, fuel, equipment maintenance, equipment rental, space leasing, miscellaneous construction-related materials such as office supplies, and some medical/dental needs. It is estimated that local materials purchase costs will exceed $14 to 16 million.

Construction of the Project will result in short-term benefits to the local communities.

Table 18 Pipeline Construction Labor Need Estimate

Position Type	Total Workers for Two Construction Spreads	Construction Labor Costs Two Construction Spreads* ($ Million)
Supervision (superintendents, foremen, office manager, clerical, etc.)	50	11.7

Table 18 Pipeline Construction Labor Need Estimate

Position Type	Total Workers for Two Construction Spreads	Construction Labor Costs Two Construction Spreads* ($ Million)
United Association (welders, welder helpers, pipe fitters, etc.)	310	50.8
Teamsters (truck drivers)	110	9.9
Operators (equipment operators)	310	32.9
Laborers	310	24.8
Construction management, surveyors, inspectors, etc.	130	24.3
Total	**1,220**	**154.4**

* Direct labor wages are approximately 50 percent of labor costs shown.

Local Labor Resources

Keystone expects that its construction contractors will hire temporary construction personnel from the local communities where possible. It is estimated that approximately 10 to 15 percent of the total construction work force could be hired locally, with the remaining portion (85 to 90 percent or more) consisting of non-local personnel.

Utilization of available labor in South Dakota for pipeline construction will be limited to persons that are current union members or join the referenced labor unions. Since pipeline construction is very specialized, it is likely most local hiring will be for office staff, general labor or truck drivers.

The number of construction workers that will be hired locally will vary by contractor and by the availability of residents who are specifically trained and available for pipeline construction employment.

6.1.1.2 Operations Labor

A limited number of contract employees will be required for operations and maintenance activities. The total number of permanent employees will not result in significant additions to the total work force of the region.

6.1.2 Agriculture

6.1.2.1 Pastureland and Rangeland

As described in Section 5.7, pastureland and rangeland are the predominant land use along the route in South Dakota.

Construction Impacts

Construction of the pipeline and pump stations will disturb approximately 223 linear miles of pastureland and rangeland. Please see Sections 5.5.1.1 and 5.7.1 for further information.

The Project will impact pastureland and rangeland areas by temporarily clearing vegetation in the ROW. These areas are expected to recover in one to three growing seasons after construction is completed. Long-term or permanent impacts are not expected (except at those limited locations where aboveground facilities are situated). Keystone will promote recovery of these areas by removing and then restoring topsoil and

reseeding disturbed areas with seed mixtures approved by the local NRCS office and based on availability at the time of reclamation.

Ranches and rangeland will be mainly affected during construction by restrictions on livestock movement across construction areas, which may result in the prohibition of grazing on those lands required for pipeline construction, which may result in obstacles to livestock movement across construction areas. Once construction is completed and the ROW has been restored, grazing and livestock movement over the permanent ROW may resume. Landowners will be compensated for the temporary loss of land use. Grazing is expected to return to normal after vegetation is re-established.

To minimize the impacts to grazing and movement, the Project will implement measures outlined in the CMR Plan (**Exhibit B**). Access to and work on pasture and farmlands will be in accordance with applicable permits and regulations. Temporary gates used for access will remain closed at all times. The temporary gates will be replaced with permanent fence once construction is complete.

Keystone prohibits feeding or harassment of livestock or wildlife, and the possession of firearms and pets on the construction ROW. Food and food wastes will be stored securely and removed from the ROW.

Operation Impacts

Impacts to land uses during operations will be limited. Maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent. The primary long-term impact is the prohibition of permanent structures (e.g., homes, barns) within the 50-foot permanent ROW. The majority of existing land uses for rangeland and pastureland will not be affected. While no significant operational impacts are anticipated, Keystone will compensate landowners for losses if the operation of the Project results in demonstrated agricultural impacts.

Pipeline incidents are infrequent. Keystone has conservatively estimated (i.e., over-estimated risk) that the chance of a pipeline incident is no more than one spill in 7,400 years for any given mile of pipe. If a spill did occur, the volume is likely to be relatively small (i.e., 3 barrels or less). Potential affects to soils and vegetation which impact grazing are described in previous sections.

If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Keystone would clean up contaminated soils and would be required to meet applicable cleanup levels in accordance with federal and state regulations. Once remedial cleanup levels were achieved in the soils, no adverse or long-term impacts would be expected.

6.1.2.2 Cropland

Construction Impacts

Construction of the pipeline and pump stations will disturb approximately 82.5 linear miles of croplands. Keystone will implement mitigation measures included in the CMR Plan to minimize short-term impacts on agricultural productivity. Please see Sections 5.5.1.1 and 5.7.1 for further information.

Reclamation and revegetation will be in accordance with the CMR Plan and applicable ROW agreements. Land will be re-contoured to approximate pre-existing conditions and disturbed structures, ditches, bridges, culverts, fences, and slopes will be restored. Rocks that are exposed during construction activities, warning signs, and other construction materials will be removed. Temporary gates will be replaced with permanent fences unless the landowner requests otherwise. Temporary losses due to crop disturbance will be compensated.

Operation Impacts

Permanent impacts on agricultural production are not expected since the pipeline will be buried deep enough to allow continued use of the land. Agricultural production across the permanent ROW will be allowed to resume following final clean-up of pipeline construction. Keystone will be responsible for reclaiming all lands to a level of capability equivalent to adjacent off-ROW lands and will provide compensation for crop loss, diminished productivity, and other damages to farmland.

Impacts to land uses during operations will be limited. Maintenance activities will not be significant because disturbances will be isolated, short-term, and infrequent. The primary long-term impact is the prohibition of permanent structures (e.g., homes, barns) within the 50-foot permanent ROW. The majority of existing land uses for croplands will not be affected.

Pipeline incidents are infrequent. Keystone has conservatively estimated (i.e., over-estimated risk) that the chance of a pipeline incident is no more than one spill in 7,400 years for any given mile of pipe. If a spill did occur, the volume is likely to be relatively small (i.e., 3 barrels or less). Potential affects to soils and vegetation which impact farming are described in previous sections.

If a spill occurred, Keystone would initiate its ERP and emergency response teams would contain and clean up the spill. Keystone would clean up contaminated soils and would be required to meet applicable cleanup levels in accordance with federal and state regulations. Once remedial cleanup levels were achieved in the soils, no adverse or long-term impacts would be expected.

6.1.2.3 Irrigated Land

The route, in South Dakota, does not cross land irrigated by pivot systems or flood irrigation.

6.1.3 Commercial and Industrial Sectors

Construction Impacts

The local economies are expected to benefit from temporary hiring of local employees and from the influx of non-local construction workers. Economic benefits to local businesses are expected to increase through the sales of food, goods, services, and lodging that will be generated by the temporary non-local work force. See Section 6.1.1.1 for more information. This increase in consumer demand can temporarily boost the local economies through hiring of additional temporary employees or longer work hours for the existing employed work force.

There will be no significant negative impacts to the industrial sector.

Operation Impacts

No significant affects to the commercial or industrial sectors are anticipated.

6.1.4 Land Values

Construction Impacts

The Project will be constructed in predominantly rural, agricultural areas. Property values typically are not affected by the installation or presence of a pipeline in rural areas. Keystone will acquire pipeline ROW easements from landowners and will provide landowners with monetary compensation for the conveyance of those easements. Construction activities will create the potential for damage to land and property, including drainage tiles, irrigation systems, and fences. Keystone will restore damage or disturbance to lands. Keystone also will repair or restore drain tiles, irrigation systems, fences, and other items and

features that are damaged or temporarily disturbed during pipeline construction or compensate the landowner for repairs.

Operation Impacts

Certain land use restrictions will be put into place for the duration of the pipeline's operation. These include restrictions on the placement of dwellings or other structures on the permanent pipeline ROW for the duration of the ROW easement. The 50-foot-wide operational ROW will be maintained in an open condition for the life of the pipeline facilities.

Property values typically are not affected by the installation or presence of a large diameter pipeline in rural areas.

6.1.5 Taxes

SDCL Ch. 10-13 requires that the Department of Revenue annually determine the assessed value of the pipeline for ad valorem property tax purposes. Assessed value must be determined using the cost, market, and income approaches to appraisal, SDCL 10-37-91. Because income and market value information will not be available until after the pipeline is in full operation, initially ad valorem property tax assessments will be based on construction costs.

The pipeline will not increase the cost of county government, nor add to the student census or increase the cost of education in the host school districts. It will add substantially to the total assessed valuation of real property in each county and school district it crosses, in some cases more than doubling the total assessed valuation of the county and school district.

If the pipeline was in service on January 1, 2008, and assessed at its expected cost of construction, Keystone would have paid approximately $10.3 million in ad valorem property taxes in the 9 counties and 13 school districts transited by the pipeline. In addition, because of the increase in the school districts' assessed valuations, state aid to education payments would be reduced by approximately $5.2 million, with a corresponding savings to the State Education Foundation Payment Fund.

In 2009 the method of determining assessed valuation of agricultural property will change from a market approach to a productivity approach. Keystone's contribution to ad valorem tax revenue will change depending on changes in assessed valuation of agricultural property. If agricultural assessments go down, Keystone's tax contribution will increase.

During construction, Keystone also will pay sales and use tax and contractor's excise tax on materials and construction activities, subject to rebates allowed by SDCL Ch. 10-45A.

6.2 Infrastructure Impacts

The limited number of permanent employees associated with the Project will result in negligible long-term impact on public services.

6.2.1 Housing

Construction Impacts

It is expected that most Project workers will use temporary housing, such as rental units, hotels/motels, campgrounds, and existing recreational vehicle parks. In the South Dakota counties that the pipeline corridor crosses, there are approximately 1,552 available rental units, 5,577 motel rooms, and 2,860 campground/recreational vehicle spaces. These accommodations are all within approximately 50 to 75 miles of the pipeline corridor. During the construction months between May and August 2011, it is estimated that up to approximately 1,400 pipeline construction workers and pump station workers will be in

South Dakota. It is anticipated that most of the temporary workers will seek housing in the more populated, service-oriented towns located within a reasonable commuting distance to the work site.

Due to the remoteness of the Project area and the limited availability of temporary housing in the northwestern part of South Dakota, Keystone is planning to build temporary worker camps. It is anticipated that two such developments will be needed in South Dakota consisting of approximately 80 acres (of which 30 acres would be used for a contractor yard) each near Winner and Union Center. Each of these will be designed for approximately 600 workers. Keystone has been in contact with local officials to discuss the availability of water, sewer, and electrical utilities to determine the adequacy of existing infrastructure in these areas. Keystone will continue to work with local officials and private landowners to develop this possibility.

Operation Impacts

The limited number of permanent employees associated with the Project will result in negligible long-term impact on housing.

6.2.2 Energy

Construction Impacts

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

As construction camps are developed, Keystone will work with local power providers to ensure electricity needs are addressed. See Section 6.2.1 for further information.

Operation Impacts
Long-term electrical service requirements for the Project are not expected to have a detrimental impact on the local power providers.

6.2.3 Sewer and Water

Construction Impacts

There will be increased utilization of water and sewage facilities due to the pipeline construction offices and influx of temporary construction workers. It is not expected that workers will overtax these facilities during construction or operations and the local communities should not see any impact on their public utilities as a result of the Project.

As construction camps are developed, Keystone will work with local utilities to ensure water and sewer needs are addressed. See Section 6.2.1 for further information.

Operation Impacts

No significant effects from operation of the Project are anticipated.

6.2.4 Solid Waste Management

Construction Impacts

There will be increased utilization of solid waste management facilities due to the pipeline construction offices and influx of temporary construction workers utilizing local lodging and services and solid wastes from pipeline construction (stumps, rock, spacer ropes, end caps, welding rods, pipe shavings, and other trash/debris). See Section 5.10 for further information.

Operation Impacts

No significant effects from operation of the Project are anticipated.

6.2.5 Transportation

Construction Impacts

Transportation routes to be utilized during construction will be established prior to construction as necessary to support state and local permitting.

The following state agency has jurisdiction over the federal and state highway system in South Dakota and is responsible for issuing transportation-related permits to accommodate construction vehicles and traffic.

Department of Commerce and Regulation
Division of Highway Patrol
500 E. Capital Avenue
Pierre, SD 57501-5070
(605) 773-4578 (information)
(605) 698-3925 (permit center)

In addition, Keystone expects local road permitting to be conducted at the county and township level. Keystone has initiated contacts with local permitting authorities for the purpose of establishing timelines for road approvals.

During construction, traffic on highways and secondary roads will be increased due to the construction activities and due to the influx of construction workers. Hauling of line pipe and most construction equipment will be within state road and bridge weight limits. There will be isolated hauling of equipment that will require special permits for weight and/or width. There may be an increased temporary demand for permits for vehicle load and width limits. The primary impact will be deterioration of gravel or stone surfaced roads requiring grading and/or replenishment of the surface materials. Keystone will be responsible for repairing damage to roads and restoring them to pre-construction condition or better.

State and local road approval processes related to traffic will commence in 2011 and continue throughout construction in 2012. Input from the pipeline construction contractors and pipe suppliers will be required to obtain appropriate approvals. Any required traffic studies will be completed at that time.

Operation Impacts

No significant effects from operation of the Project are anticipated.

6.3 Community Services

6.3.1 Health Services and Facilities

Local health facilities will provide health services to Keystone workers during the construction and operation phases of the Project. Because of TransCanada's health and safety policies and procedures, and the limited number of permanent employees, there will be limited use of or need for heath care facilities during construction. Both of these factors will result in limited use of and impact to the local health care facilities as a result of this Project. Due to the limited number of employees required for operations, no affect on health services and facilities are anticipated during operation of the Project. There will also be a first aid clinic at each construction camp manned 24 hours/day, 7 days/week.

6.3.2 Schools

Most temporary construction workers do not travel with their families or enroll their children in the local schools. Because of this limited potential for new students, local schools should be capable of providing more than adequate opportunities and accommodations for any new students. Due to the limited number of employees required for operations, no material affect on schools are anticipated during operation of the Project.

6.3.3 Recreation

South Dakota has extensive recreational opportunities including but not limited to swimming, boating, open water fishing, ice fishing, hiking, camping, hunting, exploring, biking, sightseeing, and photography. The most heavily used areas will most likely occur where public access exists. Hunting is a popular activity throughout the state due to its public accessibility and quality management of its diverse game species. Walk-in access areas are found throughout the State of South Dakota, allowing public access on private lands. The program is managed by the SDGFP which determines habitat quality and population densities each year on these tracts of land. Walk-in access areas available to hunters are variable on a yearly basis due to strict management of these tracts of land. The area lakes provide year-round recreational opportunities to residents and visitors alike.

Construction Impacts

Construction of the Project may temporarily limit access to certain areas used for recreation. Because of the SDGFP's walk-in access areas, it is difficult to determine the location and how many of these designated areas may be impacted by the Project.

It is possible that some temporary workers will buy hunting and fishing licenses and utilize them during the Project construction period; however, long work days, 6-day work weeks, and a schedule that will keep pipeline workers moving from community to community will curtail such impacts to state parks and local recreation areas.
There may be short-term recreational impacts in limited areas from the Project and it is not expected that workers will overtax the many recreational facilities in the area of the Project.

Operation Impacts

Due to the limited number of employees required for operations, no affect on recreation is anticipated during operation of the Project.

6.3.4 Public Safety

Construction Impacts

Law enforcement agencies in the communities adjacent to the Project should not experience a significant impact from the pipeline workers. Local law enforcement agencies should have adequate full- and part-time law enforcement officers to accommodate the additional labor personnel as a result of the Project although the Project can result in a minor short-term increase in workloads for those agencies.
During construction, response times to highway- or construction-related accidents may be lengthy given communication, dispatch, and travel time considerations. In these areas, it may be necessary to provide

on-site first responder services; however, Keystone will work with the local law enforcement, fire departments, and emergency medical services to determine the best course of action and coordinate for effective emergency response.

Traffic impacts are discussed in Section 6.2.5.

Operation Impacts

During operations, Keystone will utilize both employees and contractors as emergency responders within its initial response efforts in the event of a pipeline spill. In the case of contractors and other spill response organizations, Keystone will have agreements in place identifying the number, qualifications, and availability of the specified personnel, consistent with industry practice and in compliance with the applicable regulations, including 49 CFR Parts 194 and 195.

In the unlikely event of a spill, the usual role of local emergency responders is to notify community members, direct people away from the hazard area, and address potential impacts to the community such as temporary road closings. If the crude oil were ignited, local emergency responders will execute the roles listed above and firefighters will take actions to prevent the crude oil fire from spreading. Local emergency responders typically are trained and capable to execute the roles described above without any additional training or specialized equipment.

Keystone will proactively work with emergency response agencies to provide pipeline awareness education and other support. Keystone will implement a comprehensive Integrated Public Awareness (IPA) program, consistent with that employed by TransCanada on all its pipelines in the US. This program will commence in advance of the Project in-service date.

The purpose of the IPA is to inform key members of the public of the location of Keystone facilities and activities in order to protect the public from injury, to protect or minimize effects on the environment, to protect Keystone facilities from damage by the public, and to provide an opportunity for on-going public awareness. Program objectives include:

- Reducing and minimizing third-party damage to wholly owned and/or operated Keystone facilities;
- Informing stakeholder audiences who may be affected by Keystone facilities about:
  - The location of the facility;
  - The transported products;
  - Contact information for the company;
  - Purpose and need of the facilities;
  - Encroachment prevention;
  - Integrity programs;
  - Maintenance and construction; and
  - Steps to take in the event of an emergency.
- Ensuring emergency response officials fully understand Keystone's emergency response procedures and how Keystone will work together with them during an emergency;
- Informing excavators of the requirements for work on or near Keystone facilities; and
- Seeking formal feedback on effectiveness of actions related to above objectives and updating program plans, templates, and tools annually.

Public Awareness includes maintaining contact with affected public, public officials, Native American communities, excavators, one-call centers, land developers, and emergency officials, who may interact with TransCanada personnel, or are directly impacted by TransCanada facilities or operations. Public awareness activities are risk based.

Keystone also will involve other members of the response community, including local emergency responders within its emergency response exercise program, which will commence in advance of the pipeline in service date. Keystone's exercise program is designed to meet the exercise requirements, as outlined in the National Preparedness for Response Exercise Program Guidelines developed by the US Coast Guard and adopted by the PHMSA, the Minerals Management Service, and the USEPA. Participation in this program ensures that Keystone meets all federal exercise requirements mandated by Oil Pollution Act of 1990.

6.4 Cultural and Historical Resources

Protection of cultural and historical resources is defined by a series of federal laws designed to manage and protect these national assets from damage or loss due to federally funded or permitted activities. These laws include, but are not limited to, the Antiquities Act of 1906, Historic Sites Act of 1935, Executive Order 13007, Executive Order 11593, Archaeological and Historic Preservation Act of 1974, Archaeological Resources Protection Act of 1979, Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, and the National Historic Preservation Act of 1966, Section 106. Together, these federal guidelines provide necessary guidance on both protection and utilization of cultural resources. The primary obligation for compliance with these statues falls upon Keystone and the DOS as the lead federal agency.

In compliance with the mandates listed above, cultural resource investigations began in May 2008 and are ongoing. The description and results of the investigations in South Dakota to date are summarized below.

Results of Record Search

Keystone conducted a Level I files search on May 7 and 8, 2008, with the South Dakota SHPO, utilizing online and on file records at the South Dakota Archaeological Resource Center. The intent of the files search is to identify previously recorded cultural resources within a 2-mile-wide corridor along the centerline. This Level I inventory also includes a review of the General Land Office maps to identify potential historic sites associated with the late 1800s through the early 1900s. As a result of this records review, 52 previous archaeological inventories had been performed along the centerline. These inventories yielded a total of 49 archaeological sites and 15 historic structures within the 2-mile search corridor. A summary of both the archaeological sites and the historic structures are provided below:

- 10 historic sites, mainly building foundations, farmsteads, and non-farm ruins;
- 33 prehistoric sites, consisting of stone circle sites, and artifact scatters;
- 6 sites of unknown affiliation; and
- 15 historic structures.

Of the 10 historic sites, none are listed as eligible for the NRHP. One prehistoric site is recommended as eligible for the NRHP; however, the South Dakota SHPO has not evaluated this recommendation. None of the sites with unknown cultural affiliations are considered eligible and only one (prehistoric stone circle site) of the total 49 previously recorded sites falls within the 300-foot-wide pedestrian survey corridor.

The 15 historic structures consist of 6 historic bridges and 9 historic buildings, which include several barns, a school house, and a ranch. Three of the structures, two barns and the ranch, are considered as eligible for listing on the NRHP.

Results of Field Investigations

Prior to the commencement of field surveys, Project archaeologists met with the South Dakota SHPO and discussed survey protocol and methodology. As a direct result of these conversations Keystone will complete a 100 percent pedestrian survey of the entire Project footprint and identify all locations which may be considered eligible or potentially eligible for listing on the NRHP. To date, 238.7 miles of the route have been surveyed since field surveys for the Project began in South Dakota between June 25, 2008 and May 2009. Surveys are currently ongoing.

During the course of these surveys, Keystone archaeologists discovered or re-identified a total of 38 sites. Of these 38 sites, 9 are newly recorded. One newly recorded site is classified as prehistoric, seven newly recorded sites are classified as historic, and one newly recorded site is of unknown age. The remaining previously recorded site was prehistoric. Additionally, 15 isolated finds were cataloged during the course of the survey.

Of the two prehistoric sites, the newly recorded site is recommended as ineligible for the NRHP and the previously recorded site is recommended for Native American Consultation, as it may be determined to be a Traditional Cultural Property. Five of the newly recorded historic sites are recommended as not eligible under NRHP guidelines, and two newly recorded sites are recommended as eligible for the NRHP. The remaining newly recorded site remains unevaluated.

Due to the likelihood of buried cultural material in the subsurface strata, the South Dakota SHPO has recommended that a qualified archaeologist be present during construction in predetermined locations as a trench monitor in the event of any subsurface discovery.

Construction Impacts

Those areas in which construction activity is planned or where impacts are likely to occur are referred to as the "area of potential effect" or APE. Specifically, the APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of NRHP-eligible sites, if any such sites exist. For the Project, the APE is the 300-foot-wide survey corridor centered on the pipeline, the footprint of proposed pump stations, access roads to be used and/or upgraded during construction, pipe yards, contractor yards, and any other temporary use or staging areas plus a 50-foot buffer. Only those cultural resources located in the APE were reviewed to determine if any will be subject to impacts that can affect their eligibility for the NRHP based on NRHP criteria for evaluation.

Construction and operation of the Project can potentially affect NRHP eligible sites. These can include prehistoric or historic archaeological sites, districts, buildings, structures, objects, and locations with traditional cultural value to Native Americans or other groups. Project impacts can include: the physical disturbance during construction of archaeological sites located within the construction ROW; the demolition, removal, or alteration of historic or architecturally significant structures/features; and the introduction of visual or audible elements (e.g., pump stations) that can alter a site's setting. Impacts to NRHP-eligible sites will be mitigated through avoidance or data recovery techniques approved by DOS in consultation with the South Dakota SHPO. Mitigation may include, but will not be limited to, one or more of the following measures: 1) avoidance through the use of realignment of the pipeline centerline, relocation of pump stations, or changes in the construction and/or operational design; 2) data recovery, which may include the systematic professional excavation of an archaeological site or the preparation of photographic and/or measured drawings documenting standing structures; and 3) the use of landscaping or other techniques that will minimize or eliminate effects on the historic setting or ambience of standing structures.

Whenever feasible, Keystone will avoid NRHP-eligible sites identified within the construction ROW. Keystone will consult with DOS and South Dakota SHPO to identify measures to avoid adversely affecting these sites. If adverse effects to any NRHP eligible sites cannot be avoided, Keystone will develop

treatment plans for mitigating those effects. Keystone will file avoidance or treatment plans, with the DOS and South Dakota SHPO.

Construction activities can adversely affect undiscovered archaeological sites. If previously undocumented sites are discovered within the construction corridor during construction activities, work that might adversely affect the discovery will cease until Keystone, in consultation with the appropriate parties, can evaluate the site's eligibility and the probable effects. If the previously unidentified site is recommended as eligible to the NRHP, impacts will be mitigated through the steps outlined in the Unanticipated Discovery Plan, which will be included in the cultural resources survey reports prepared for DOS.

If construction or other Project personnel discover what they believe to be human remains, funerary objects, or items of cultural patrimony on federal land, construction will cease within the vicinity of the discovery and the appropriate agency and tribal representatives will be notified of the find. Treatment of any discovered human remains, funerary objects, or items of cultural patrimony found on federal land will be handled in accordance with applicable federal laws and/or the NAGPRA. Construction will not resume in the area of the discovery until the authorized agency has issued a notice to proceed.

If human remains and associated funerary objects are discovered on state or private land during construction activities, construction will cease within the vicinity of the discovery and the county coroner or sheriff will be notified of the find. Treatment of any discovered human remains and associated funerary objects found on state or private land will be handled in accordance with the provisions of applicable South Dakota state laws.

Operation Impacts

The primary impact of the operation phase of the Project is the potential introduction of visual or audible elements (e.g., pump stations), which can alter the setting associated with historic properties. If applicable Keystone will mitigate these operational impacts to NRHP-eligible sites by the use of landscaping or other techniques that will minimize or eliminate effects on the historic setting or ambience of standing structures.

6.5 Other Impacts

6.5.1 Population and Demographics

Work on the Project in South Dakota is proposed to commence in 2011 and to be completed in 2012. Approximately 1,100 to 1,400 construction personnel at peak construction are expected for the pipeline construction spreads and associated pump station construction in South Dakota. It is estimated that approximately 10 to 15 percent of the total construction work force could be hired locally, with the remaining portion (85 to 90 percent or more) consisting of non-local personnel. Thus, the local population may be increased by up to approximately 1,300 workers for up to 1 year.

The Project construction period will be relatively short in any given area and most non-local workers will not be accompanied by their families during their work tenure. The pump station construction period also will be relatively short, however will span both 2011 and 2012, but due to its small work force will not have a notable affect on local populations or demographics.

During construction of the Project, there is likely to be a positive impact on income. Keystone does not believe construction of the Project will have a significant impact on cohesion of local communities. During operations, the small number of potential permanent jobs suggests that the Project will not have long-term impact on income, occupational distribution, or cohesion of the local communities.

6.5.2 Protection of Human Health and Safety

Construction Impacts

During construction, Keystone will implement precautions for refueling as described in the CMR Plan to reduce the impacts of an accidental spill during construction. Contractors will be trained in refueling procedures. Site-specific documents describing or supporting material and equipment that will be on hand to control and recover fuel spills will be developed with the construction contractor prior to construction. The Project-specific SPCC Plan will contain a list of the supporting material and equipment that will be on hand to control and recover fuel spills. It also will identify clean up and spill reporting procedures.

Operation Impacts

The US has the world's largest petroleum pipelines network. Pipelines are the safest, most reliable, and efficient mode of transporting large volumes of crude oil. Pipeline transportation of crude oil involves some risk to the public despite its excellent safety record. The risks include the potential for fire and toxic exposure from the ingestion or inhalation of crude oil or its constituents.

Compliance with federal regulations, the location of valves, spill containment measures, and Keystone's ERP will minimize adverse effects to public safety and to the environment. PHMSA promulgates and enforces federal pipeline safety standards for hazardous liquids pipelines at 49 CFR Parts 194 and 195. These regulations are intended to ensure public protection and to prevent accidents and failures. 49 CFR Part 195 specifically addresses petroleum pipeline safety issues and specifies material selection, qualification, minimum design requirements; and protection from internal, external, and atmospheric corrosion. As noted, PHMSA administers the national regulatory program to ensure safe transportation of crude oil and other hazardous materials by pipelines. PHMSA develops safety regulations and risk management approaches to encompass safety in pipeline design, construction, testing, operation, maintenance, and pipeline facilities emergency response.

Operational Spill Prevention and Risk Minimization

PHMSA prescribes pipeline design and operational requirements that limit the risk of accidental crude oil releases from pipelines. Over the operational life of the Keystone pipeline, there will be a very low likelihood of a crude oil release (leak or spill) from the pipeline that could enter surface water resources and drinking water supplies. As discussed in Section 2.3.2.2, Keystone will submit a Project specific ERP to PHMSA for approval prior to operation.

Keystone will use multiple overlapping and redundant systems and methods to reduce the probability of a crude oil release, including a Quality Assurance program for pipe manufacture and pipe coating, FBE coating, cathodic protection, non-destructive testing of 100 percent of the girth welds, hydrostatic testing to 125 percent of the MOP, periodic cleaning, regular use of high resolution "in-line" inspection tools, depth of cover exceeding federal standards, periodic inspections

and aerial patrols, SCADA system, and a OCC (with complete redundant backup) providing monitoring of the pipeline every 5 seconds, 24 hours a day, every day of the year.

Third-party excavation damage and corrosion are the major causes of pipeline releases. Keystone will implement specific preventative measures with respect to both of these issues. Keystone will implement the following measures to mitigate risk from third-party excavation:

- High strength steel;
- Cathodic protection;
- Leak detection;
- Burial depth of 4 feet;
- Installation of signage;

- Public awareness and damage prevention programs;
- Participation in South Dakota One Call Program; and
- Aerial inspections (26 times per year).

To mitigate risk from external corrosion, Keystone will coat the pipe with FBE. TransCanada has not experienced a failure due to external corrosion on this type of pipe with FBE coating in over 29 years of experience. During HDD or thrust-boring operations, an additional topcoat of plant-applied FBE, formulated for abrasion resistance (i.e., the abrasion-resistant coating), will be applied to protect the primary FBE coating from damage.

In addition to the FBE coating, Keystone will implement additional measures to reduce corrosion potential, including an impressed cathodic protection system, tariff specifications that limit sediment and water content, and operation of the pipeline under turbulent flow conditions to minimize the risk of water stratification. Further, the entire pipeline and all appurtenances will be protected from corrosion by an impressed current cathodic protection system. Keystone will electrically interconnect and catholically protect its pipeline and aboveground facilities, including pump stations, as a single unit. The criteria for cathodic protection that will be used for this pipeline will correspond with the requirements of 49 CFR Part 195 Subpart H and National Association of Corrosion Engineers Recommended Practice 0169. The cathodic protection system, including the deep well ground beds, junction boxes and rectifiers, will be installed simultaneously with the pipeline and pump stations construction.

Valves aid in minimizing the amount of material that could be released into the environment in the unlikely event of a spill. Keystone will utilize a combination of remotely controlled isolation valves and manual/check valve sets along the route. The placement of valves also involved consideration of the following factors:

- Leak detection and pipeline shutdown capabilities;
- Physical properties of crude oil transported;
- Potential spill volumes and rates of release;
- Elevation profile and drain down potential;
- Proximity to power sources;
- Location of nearest response personnel;
- Environmental fate and transport of a spill; and
- Proximity and transport routes to sensitive resources, particularly HCAs.

In the event that a leak is confirmed through verification, Keystone will initiate a pump station shutdown, which requires 9 minutes to effectuate. Next, the remotely controlled isolation valves, which are operable from the OCC, would be closed. The valves have a closure time of approximately 3 minutes. The check valves will close automatically to prevent flow in the reverse direction. The location of valves, spill containment measures, and Keystone's ERP will minimize adverse effects to public safety and to the environment.

Federal regulations specify conventions for assessing, evaluating, repairing, and validating the integrity of hazardous liquid pipeline segments that could affect HCAs. As defined by 49 CFR Section 195.450, HCAs are high population areas (urbanized area that contains 50,000 or more people and that has a density of at least 1,000 people per square mile), other populated areas (a place that contains a concentrated population), unusually sensitive areas as defined by 49 CFR Section 195.6 (ecologically sensitive and public drinking water resources), and commercially navigable waterways. The total length of pipe that has the potential to affect HCAs in South Dakota is 34.3 miles. Segments of the pipeline that have the potential to affect HCAs are subject to a higher level of operational regulations.

The Emergency Response Plan (ERP) for the Keystone XL Project will be based on the Keysone Pipeline ERP, which was approved by PHMSA. The ERP will be consistent and compliant with the requirements of 49 CFR Parts 194 and 195. The ERP is comprehensive and includes response and technical strategies for all areas of significance including High Consequence Areas and significant water courses. In addition, Keystone has identified 17 water courses along its route that were deemed more significant based on a systematic risk based approach. Six categories were used in the assessment of the water courses and each was broken down into a measurable unit and assigned a value. Tactical Control Plans were developed to enable field operations to respond to points along a water course in a logical, enhanced manner. Each Tactical Control Plan may contain up to 12 points along a water course as a response strategy.

Response strategies will be identified in the ERP (Oil Spill Response Plan) and will be selected based on site-specific conditions and circumstances. For example, pre-planning for a crude oil spill reaching a specific water body will include the following information:

- Boat access locations will be pre-selected at strategically accessible points along the stream or water surface from the potential point of entry of the oil spill plume to the maximum estimated downstream travel distance. Similarly, equipment access locations are pre-selected to ensure resources are available to meet these requirements.
- Downstream at-risk resources are identified based upon the potential point of entry of the oil spill plume and the estimated downstream travel distance. Once this analysis has been completed, site-specific plans and objectives with respect to booming and other counter measures are determined.
- Boom deployment locations, priorities and objectives are established based on access, the extent of the resource, the identification of at-risk resources, and other site-specific considerations, including the efficacy of various boom deployment techniques (e.g., diversion, collection, and cascading).
- The above information will be incorporated into the ERP (Oil Spill Response Plan).

Emergency Response Planning

Keystone is required to prepare a Project-specific ERP. This plan will be similar in content to the Keystone Pipeline ERP, but will contain Project-specific information. The Project-specific ERP cannot be finalized until the Project route has been finalized through the NEPA and state-permitting processes. The Project's ERP will be completed and filed with PHMSA prior to commencing line fill operations. Keystone will liaise with state and local officials to ensure coordination with local and state offices of disaster services as the Plan is further developed.

The specific locations of Keystone's emergency responders will be determined upon conclusion of the pipeline detailed design and the completion of Keystone's ERP. Keystone will base emergency responders consistent with industry practice and in compliance with the applicable regulations, including 49 CFR Parts 194 and 195. Keystone's response time to transfer such additional resources to a potential leak site will follow an escalating or tier system, with Keystone's initial emergency responders capable of reaching all locations within South Dakota within 6 hours in the event of a spill.

Consistent with industry practice and in compliance with the applicable regulations, including 49 CFR Parts 194 and 195, the types and amount of emergency response equipment based on worst-case discharge volumes that will be pre-position for access by Keystone will be determined upon conclusion of the pipeline detailed design and the completion of Keystone's EPR (Oil Spill Response Plan), but prior to commencing line fill. This plan will be completed in the first quarter of 2009 and submitted to the USDOT PHMSA prior to commencing operations.

Leak Detection

Leak detection is discussed in Section 2.3.2.1.

Emergency Response

Emergency Response is discussed in Section 2.3.2.2.

As described within Section 3.1 of Keystone's ERP (Oil Spill Response Plan), Keystone's emergency procedures will require OCC operators to shutdown the pipeline within a predetermined time if abnormal conditions or a leak alarm cannot be positively ruled out as a leak.

In the event of a pressure loss, OCC operators will not attempt to re-establish line pressure without having first verified the cause of the loss in conjunction with the field person(s) responsible (i.e., the "Qualified Individual" under 49 CFR Section 194.5). Accordingly, line pressure will only be re-established after appropriate inspection, field verification and receipt of approval to proceed with pipeline pressurization from the Qualified Individual.

Additional procedures then require the notification of field, technical and management personnel. These personnel will assume responsibility and control of the incident, in conjunction with the Qualified Individual, as well as provide further direction with respect to additional investigations and the resumption of pipeline operations. Keystone's response organization will follow the industry accepted Incident Command System and will typically consist of personnel both on site and within an established remote or Regional Emergency Operations Center (EOC).

Response efforts are first directed to preventing or limiting any further contamination, once any concerns with respect to health and safety of the responders have been addressed. This is typically accomplished primarily with containment booms and berms. The Emergency Site Manager assumes responsibility for requesting additional resources in terms of personnel, equipment and materials and selecting the appropriate locations for construction of berms and deployment of booms as well as communicating any additional resource requirements to the EOC Manager.

For land-based spills, Keystone's containment strategies will include confining the affected site to as small an area as possible; preventing any spilled product from migrating; preventing any spilled product from reaching waterways or water bodies; and blocking any culverts, manholes, or other possible means for further product migration. With the approval of authorities having jurisdiction, activities such as digging ditches and building berms (e.g., earth, snow, ice, or sorbent materials) will be undertaken on the down slope of the spill site for containment purposes. In some cases it may be possible to use a combination of ditches and berms to divert the overland flow of spilled product to a collection point.

To contain the spilled product within a waterway, efforts are typically directed toward the deployment of containment booms or weirs as close as practical and safe downstream of the of the spill location. With the approval of the authorities having jurisdiction, the Emergency Site Manager assumes responsibility for selecting a suitable location for the deployment of containment booms, based upon the waterway site-specific conditions to ensure the effectiveness of the containment booms.

Containment strategies in water bodies include confining the spill as close as possible to the spill source; containing the spill prior to it becoming wider and more difficult to effectively contain; preventing the spilled material from reaching rivers, streams and other water bodies; and protecting sensitive areas in the direction of spill movement.

Crude oil is typically recovered from the surface of water and transferred to containment facilities by a combination of mechanical skimming, vacuum recovery and sorbent materials. While typical methods for the

recovery and transfer to containment facilities for crude oil spilled on land include vacuum recovery and sorbent materials.

The cleaning of shorelines and other affected natural or manmade structures is typically performed by traditional methods including, wiping, hot water, and low or high pressure wash down and the use of surfactants and emulsifiers or other agents. Water and other liquids used for wash down purposes for onshore applications are typically contained and collected using a combination of ditches and berms as described above. All site-specific cleaning methods and materials to be utilized are subject to the approval of the authorities having jurisdiction.

Remediation

Remediation of crude oil spills is discussed in Section 2.3.2.3.

Oil laden soils are typically either removed or treated with bioremediation in the event intrusive cleanup techniques are not appropriate. These and other methods of clean up including natural recovery, burning, dispersants, and other chemical usage can be considered in accordance with and at the discretion of the authorities having jurisdiction.

Site restoration activities including the sampling and analysis of the remaining soils and water depend upon site-specific conditions and are coordinated with the various federal, state, and local authorities having jurisdiction.

Integrity Management Program

Pipeline operators are required to develop a written IMP that must include methods to measure the program's effectiveness in assessing and evaluating integrity and protecting HCAs. Keystone will develop and implement an IMP for the entire pipeline including the HCAs.

TransCanada has developed, constructed and owned liquid pipelines in the US since the mid-1990s. TransCanada also has operated liquid pipelines for over 20 years (late 1970s to the late 1990s), requiring the implementation of a liquid IMP under the umbrella of its overall pipeline IMP. For Keystone and its other US pipeline assets, TransCanada is required to implement an IMP in accordance with 49 CFR Parts 192 and 195.

TransCanada has over 50 years of research, development and operational experience in developing and implementing integrity programs to address pipeline integrity issues. The overall objective of the IMP is to establish and maintain acceptable levels of integrity and having regard to the environment, public and employee safety, regulatory requirements, delivery reliability, and life cycle cost.

The IMP uses advanced in-line inspection and mitigation technologies applied with a comprehensive risk-based methodology. This, in turn initiates appropriate inspection and mitigation activities, while the results from the inspections for known or suspect pipeline integrity issues are used to develop specific integrity maintenance activities. On its 36,500-mile pipeline system, TransCanada has an exemplary record of pipeline safety and reliability. This is a direct result of the IMP. The IMP forms the starting point in TransCanada's maintenance management process as illustrated in the following diagram.

The maintenance management process provides the integrated framework for developing annual maintenance, scheduling, execution, and plant integrity plans. A critical feedback loop ensures that results and findings from the execution of maintenance tasks, inspections, and repairs are captured and serve as a trigger for reviewing, refining, and enhancing the IMP and annual maintenance plans.

49 CFR Part 195 also requires pipeline operators to develop and implement public awareness programs consistent with the API's Recommended Practice 1162, Public Awareness Programs for Pipeline Operators.

The purpose of Recommended Practice 1162 is to enhance pipeline safety and security by increasing the public understanding of the role of pipelines in transporting energy, informing the public how to recognize and respond to a pipeline emergency, and notifying the public of whom to contact in an emergency. Recommended Practice 1162 contains provisions for enhancing liaison with emergency responders and public officials.

6.5.3 Noise Impacts

The existing noise environment is characterized by determining ambient noise levels, identifying existing noise sources, identifying noise-sensitive receptors in the vicinity of Project noise sources, and evaluating local terrain features that may affect noise transmission.

The Project will occur primarily in rural agricultural areas. The route in South Dakota consists of the primarily rural land uses, where existing ambient noise levels along the pipeline route are quite low. It is estimated that day-night average levels range between 40 to 45 decibels on the A-weighted scale (dBA) (rural residential) and 45 dBA (agricultural cropland). Ambient (background) noise levels occur from roadway traffic, farm machinery on a seasonal basis, pets, and various other household noises. Pipeline areas along major highways and interstate highways may experience higher ambient noise levels of approximately 68 to 80 dBA (USEPA 1978).

Construction Impacts

Construction of pump stations may take longer than 30 days; however, due to the distance of possible residences from pump station locations, noise impacts will be minimal. See **Table 19** for distances. Residences within 500 feet of the ROW will experience short-term inconvenience from construction equipment noise for a period of 1 week to 30 days. Keystone will limit construction activities primarily to daylight hours. Noise impacts from construction activities will be mitigated according to the CMR Plan.

Operation Impacts

During operation of the pipeline, the noise impact associated with the electrically driven pump stations will be limited to the vicinity of those facilities. There are 63 structures within 1 mile of pump stations, although Keystone has not yet verified whether these are occupied residences. In the event that a landowner raises a noise-related concern during operations, Keystone will investigate and assess the appropriate noise mitigation response, if it is needed. **Table 19** describes the number of structures within 1 mile of the proposed pump stations.

Table 19 Structures within 1 Mile of Pump Stations

County	Pump Station	Milepost of Pump Station	Distance to Noise Sensitive Area (feet)	Direction from Pump Station	Number of Structures Within 1 Mile of Pump Stations
Harding	15	285.6	>1 mile	-	0
Harding	16	333.2	>1 mile	-	0
Meade County	17	386.9	4,118.40	NE	7
Haakon County	18	439.9	4065.6	N	2
Jones County	19	495.8	2376	E	19
Tripp County	20	546.4	1372.8	NNE	18
Tripp County	21	591.7	4276.8	NNE	23

Note: This table is based strictly on aerial photography interpretation.

6.5.4 Visual Impacts

An analysis of the Project corridor did not identify any designated scenic outlooks or viewing areas on or along the route. Visual resource impacts associated with construction of the Project include removal of existing vegetation, exposure of bare soils, earthwork and grading scars, and landform changes that introduce contrasts.

Construction Impacts

Keystone has aligned the pipeline route to avoid aesthetic features to the extent possible. Visual resource impacts from construction activities will be of short duration with no significant long-term impacts due to implementation of Keystone's mitigation measures outlined in the CMR Plan.

Operation Impacts

The long-term impacts of aboveground facilities on visual resources will depend on the location of each individual facility and its visibility from the surrounding area. Keystone has located the pump stations based on hydraulic and engineering design considerations but also has considered impacts on aesthetics and sensitive environmental resources in determining the facility locations. Pump stations are located on private land and each will require a small footprint of about 5 acres (217,800 square feet). There will be a series of up to five electrically driven pump units installed at each pump station. The pump units are not planned to be enclosed in buildings and will be connected via aboveground piping and valves. Other facilities will include an electrical transformer and a small control building to house electrical, measurement and control system components. The pump station site will be enclosed by a chain link fence approximately 6 feet high. **Exhibit 4** in Chapter 2.0 presents a drawing of a typical pump station.

6.6 Amelioration of Potential Adverse Community Impacts

Amelioration of potential adverse community impacts has been discussed in this section and throughout the remainder of the application. In general, community impacts are expected to be positive and potential negative impacts will be ameliorated through thoughtful design, construction and operation.

7.0 Other Information

7.1 Monitoring of Impacts

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

Keystone is proposing to implement training and two types of monitoring on this Project to help ensure compliance with environmental, safety, landowner, and company requirements as follows.

7.1.1 Environmental Training

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

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

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

Training will be acknowledged on a training form and the records of proof-of-training will be maintained for the duration of the Project. Each successfully trained individual will receive a copy of the training material and a hardhat certification sticker. Only personnel displaying the hardhat training sticker will be allowed on a job site. A copy of environmental training certification will be maintained in each individual's personnel file.

To provide on-site documentation of compliance, Keystone will utilize a team of inspectors overseeing environmental safety and quality. Keystone will require training of all inspectors to the

company's construction specifications. A review of the landowner and permit requirements with the applicable inspectors also will be required.

7.1.2 Environmental Inspection

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

On-site environmental compliance by Keystone's contractors will be documented. Keystone will use at least one full-time environmental inspector per construction spread during active construction activities. The site supervisor will be responsible for the inspector's duties if the environmental inspector is not available on site.

7.1.3 Post-construction Monitoring and Maintenance Programs

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

- Post-construction monitoring inspections will be conducted of disturbed non-cropland areas after the first growing season to determine the success of revegetation. Areas that have not been successfully re-established will be re-vegetated by Keystone or through compensation to the landowner to reseed the area. If, after the first growing season, revegetation is successful, no additional monitoring will be conducted.
- In non-agricultural areas, revegetation will be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation will be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.
- Keystone will maintain communication with the landowners and or tenants throughout the operating life of the pipeline to allow expedient communication of issues and problems as they occur. Keystone will provide the landowners with corporate contact information for these purposes. Keystone will work with landowners to prevent excessive erosion on lands disturbed by construction. Reasonable methods will be implemented to control erosion.

  This may not be implemented if the property across which the pipeline is constructed is bare cropland, which the landowner intends to leave bare until the next crop is planted.
- In wetland areas, all timber riprap, timber mats, and prefabricated equipment mats will be removed upon completion of construction. The contractor will replace topsoil, as applicable, and spread as closely to its original contours in the wetland as possible with no crown over the trench. Any excess spoil will be removed from the wetland. The contractor will stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and re-vegetation, as applicable, during final clean up. For each standard wetland crossed, the contractor will install a permanent slope breaker and trench breaker at the base

of slopes near the boundary between the wetland and adjacent upland areas. The contractor will locate the trench breaker immediately upslope of the slope breaker.

- Herbicides and pesticides will not be used in or within 100 feet of a wetland except as allowed by the appropriate land management agency or state agency.

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

7.2 List of Witnesses

Keystone is submitting the prepared direct testimony of the witnesses listed below in support of its application. Additional testimony will be submitted in accordance with the procedural schedule to be established by the PUC. Keystone reserves the right to designate additional witnesses as necessary. **Table 20** provides the portions of the document that each witness is responsible for.

- Robert Jones
- Steve Hicks
- Richard Gale
- Jon Schmidt
- Meera Kothari
- John Hayes
- Donald Scott
- Heidi Tillquist

Table 20 Witness Responsibilities for Application

Chapter	Section	Witness
1.0 Introduction	1.1 Project Purpose	Jones
	1.2 Project Overview and General Site Description	Jones
	1.3 Estimated Capital Costs	Jones
	1.4 Project Schedule	Jones /Hicks
	1.5 Project Participants	Jones
	1.6 Individual Authorized to Receive Communications	Jones
	1.7 Ownership and Management	Jones
	1.8 Other Required Permits and Approvals	Jones / Schmidt
2.0 Project Description	2.1.1 Facility Description Overview	Jones / Schmidt
	2.1.2 Future Expansion and	Jones

Table 20 Witness Responsibilities for Application

Chapter	Section	Witness
	Other Industrial Facilities	
	2.2 Engineering Design	Jones / Kothari
	2.2.1 Pipeline	Jones / Kothari
	2.2.2 Pump Stations	Jones / Kothari
	2.2.3 Mainline Valves	Jones / Kothari
	2.2.4 Land Requirements	Hicks / Schmidt
	2.2.5 General Construction Procedures	Hicks
	2.2.6 Special Construction Procedures	Hicks / Schmidt
	2.3 Operation and Maintenance	Kothari
	2.3.1 Normal Operations and Routine Maintenance	Kothari / Hayes
	2.3.2 Abnormal Operations	Scott / Hayes
	2.3.2.1 SCADA and Leak Detection	Scott / Tillquist
	2.3.2.2 Emergency Response Procedures	Hayes / Tillquist
	2.3.2.3 Remediation	Tillquist
3.0 Demand for Facility	3.0 Demand for Facility	Jones
	3.1.1 Increasing WCSB Crude Oil Supply	Jones
	3.1.2 Increasing Crude Oil Demand in the US	Jones
	3.1.3 Decreasing Domestic Crude Oil Supply	Jones
	3.1.4 Further Supply Diversification to Canadian Crude Oil	Jones
	3.1.5 Binding Shipper Interest	Jones
4.0 Proposed Route and Alternative Routes	4.1 Route Selection	Gale
	4.1.1 Objectives	Gale
	4.1.2 Data Gathering	Gale
	4.1.3 Definition of Control Points	Gale
	4.1.4 Constraints and Opportunities	Gale
	4.1.5 Route Alternatives Identification and Evaluation	Gale
	4.2 Route Refinement	Gale
	4.2.1 Mellette County Reroute	Gale
	4.2.2 Colome Reroute	Gale
	4.2.3 Future Route Refinements	Gale

Table 20 Witness Responsibilities for Application

Chapter	Section	Witness
	4.3 Extent to Which Reliance on Eminent Domain Powers Could be Reduced	Gale
5.0 Environmental Information and Effect on Physical Environment	5.1 Environmental Information Filed with US DOS	Schmidt
	5.2 Summary of Environmental Impacts	Schmidt
	Table 6 Impact Summary	Schmidt / / Jones / Tillquist / Hayes / Kothari/ Scott
	5.3 Physical Environment	No Text
	5.3.1 Land Forms and Topography	Schmidt
	5.3.2 Geology and Paleontology	Schmidt
	5.3.3 Economic Mineral Deposits	Schmidt
	5.3.4 Soils	Schmidt / Hicks/ Tillquist
	5.3.5 Erosion and Sedimentation	Schmidt / Hicks
	5.3.6 Seismic, Subsidence, and Slope Stability Risks	Schmidt / Hicks / Tillquist
	5.4 Hydrology	No Text
	5.4.1 Surface Water Drainage	Schmidt / Hicks
	5.4.2 Groundwater	Tillquist
	5.4.3 Water Use and Sources	Schmidt / Hicks
	5.4.3.1 Hydrostatic Testing	Schmidt / Hicks
	5.4.3.2 Spill Prevention	Hicks / Tillquist
	5.5 Terrestrial Ecosystems	No Text
	5.5.1 Vegetation Communities	No Text
	5.5.1.1 General Vegetation	Schmidt / Tillquist
	5.5.1.2 Noxious Weeds	Schmidt / Hicks
	5.5.2 Wildlife	No Text
	5.5.2.1 Biological Consultations	Schmidt
	5.5.2.2 Wildlife Habitat	Schmidt
	5.5.2.3 Big and Small Game Species	Schmidt
	5.5.2.4 Potential Impacts to Wildlife	Schmidt / Tillquist
	5.5.3 Threatened and Endangered Species	Schmidt
	5.5.3.1 Plant Sensitive Species	Schmidt

Table 20 Witness Responsibilities for Application

Chapter	Section	Witness
	5.5.3.2 Terrestrial Wildlife Sensitive Species	Schmidt
	5.5.3.3 Aquatic Sensitive Species	Schmidt
	5.5.3.4 Potential Impacts to Sensitive Species	Schmidt / Tillquist
	5.6 Aquatic Ecosystems	No Text
	5.6.1 Wetlands	Schmidt / Hicks / Tillquist
	5.6.2 Aquatic Biota	Schmidt
	5.6.2.1 Potential Construction Impacts	Hicks / Schmidt
	5.6.2.2 Operational Impacts	Tillquist
	5.6.3 Aquatic Sensitive Species	Schmidt / Tillquist
	5.7 Land Use and Local Land Controls	No Text
	5.7.1 Existing Land Use	Schmidt
	5.7.2 Displacement	Schmidt
	5.7.3 Compatibility with Existing Land Use and Measures to Ameliorate Adverse Impacts	Schmidt / Gale
	5.7.4 Local Land Use Controls	Hicks
	5.8 Water Quality and Uses	Schmidt / Hicks / Tillquist
	5.9 Air Quality	Schmidt / Hicks
	5.10 Solid Wastes	Hicks
6.0 Community Impact	6.0 Community Impact	Schmidt
	6.1 Economic Impacts	No Text
	6.1.1 Employment and Labor Market	No Text
	6.1.1.1 Construction Labor	Hicks
	6.1.1.2 Operations Labor	Hicks
	6.1.2 Agriculture	No Text
	6.1.2.1 Pastureland and Rangeland	Hicks / Tillquist
	6.1.2.2 Cropland	Hicks / Tillquist
	6.1.2.3 Irrigated Land	Hicks
	6.1.3 Commercial and Industrial Sectors	Jones
	6.1.4 Land Values	Jones
	6.1.5 Taxes	Jones
	6.2 Infrastructure Impacts	Jones
	6.2.1 Housing	Phillips
	6.2.2 Energy	Jones
	6.2.3 Sewer and Water	Hicks

Table 20 Witness Responsibilities for Application

Chapter	Section	Witness
	6.2.4 Solid Waste Management	Hicks
	6.2.5 Transportation	Hicks
	6.3 Community Services	No Text
	6.3.1 Health Services and Facilities	Hicks
	6.3.2 Schools	Hicks
	6.3.3 Recreation	Hicks
	6.3.4 Public Safety	Hicks / Hayes / Kothari
	6.4 Cultural and Historical Resources	Schmidt
	6.5 Other Impacts	No Text
	6.5.1 Population and Demographics	Hicks
	6.5.2 Protection of Human Health and Safety	Construction – Hicks Operations – Kothari / Hayes / Tillquist / Scott
	6.5.3 Noise Impacts	Schmidt
	6.5.4 Visual Impacts	Schmidt
	6.6 Amelioration of Potential Adverse Community Impacts	No witness required
7.0 Other Information	7.1 Monitoring of Impacts	Construction – Schmidt Operations – Kothari
	7.1.1 Environmental Training	Schmidt
	7.1.2 Environmental Inspection	Schmidt / Hicks
	7.1.3 Post-construction Monitoring and Maintenance Programs	Jones / Schmidt
	7.2 List of Witnesses	No witness required
Exhibit A	Maps	Gale / Schmidt
Exhibit B	CMRP	Hicks
Exhibit C	Water Crossings Table and Preliminary Site-specific Crossing Plans	Schmidt / Gale /Hicks

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9.0 Applicant's Verification

VERIFIED APPLICANT'S SIGNATURE

PROVINCE OF: Alberta, Canada

CITY OF: Calgary

Ms. Kristine L. Delkus, being duly sworn, deposes and says that she is Deputy General Counsel, Pipelines and Regulatory Affairs and is authorized to sign this application on behalf of the Project Owner, TransCanada Keystone Pipeline, LP.

She states that she does not have personal knowledge of all of the facts recited in the foregoing application, but the information in the application has been gathered by and from employees and contractors of the owner of the Project and that the information in the application is verified by her as being true and correct on behalf of TransCanada Keystone Pipeline, LP.

Dated this ____ day of _____ 2009.

"Original signed by Ms. Kristine L. Delkus"

_____
(Signature)

Exhibit A

Land Use/Land Cover, Soil Map Units, and Off-ROW Pipe Storage Yard Maps

(Provided on DVD)

Exhibit B

Construction, Mitigation, and Reclamation (CMR) Plan

(Provided on DVD)

Exhibit C

Water Crossings Table and Preliminary Site-specific Crossing Plans

(Provided on DVD)

Exhibit D

Prefiled Direct Testimony

(Provided on DVD)


Hardisty
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NC
VA
PA
NY
KEYSTONE XL
STEELE CITY
SEGMENT
Steele City
KEYSTONE PIPELINE
CUSHING EXTENSION
Cushing
KEYSTONE XL
GULF COAST
SEGMENT
KEYSTONE XL
HOUSTON LATERAL
Nederland
Houston
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ROUTE MAP
EXHIBIT 1