Prepared for:

TransCanada Keystone Pipeline, LP

PLAN OF DEVELOPMENT FINAL

VOLUME I & II

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POD Content Checklist

Checklist Entry	Location of Discussion
1. Purpose and Need	2.0
1a. What will be constructed	1.0, 3.0
1b. Commodity to be transported and for what purpose	1.0, 3.0
1c. Is the pipeline for a gathering system, trunkline, or distribution line	1.0, 3.0
1d. Will it be surface or subsurface	1.0, 3.0, 6.2, 6.4, 6.5
1e. Length and width of right-of-way and area for related facilities	3.0, 3.1, 3.3.5, 3.3.7, 4.1
1f. Is this ancillary to an existing right-of-way	3.2, 3.2.1, 3.4
1g. List alternative routes or locations	3.4, 3.4.1, 3.4.2
2. Right-of-way Location	3.0, Appendix A
2a. Legal Description	3.1, Appendix A
2b. Site-specific engineering surveys for critical areas (note: in addition to normal centerline surveys)	To be developed based on BLM consultation
2c. Maps and drawings showing river crossings	Appendix D
2d. Acre calculation of right-of-way by land status	Introduction, 1.0, 3.14, 4.1, 4.2, 4.3
3. Facility Design Factors	6.7
3a. Pipeline pressure standards	6.7
3a1. Pipe wall thickness and pounds per square inch (psi) rating	6.7
3b. Toxicity of pipeline product	6.7, 9.0
3c. Anticipated operating temperatures	To be provided
3d. Depth of pipeline	6.7
3e. Permanent width or size	1.0, 3.0, 4.1, 4.2
3f. Temporary areas needed	1.0, 3.0, 3.3.8, 4.1, 4.3
4. Additional Components of the Right-of-way	3.3
4a. Connection to an existing right-of-way	1.0, 3.0, 3.4
4a1. Existing components on or off public land	1.0, 3.0
4a2. Possible future components	3.8
4b. Location of pumping and/or compressor stations	3.3.3
4c. Need for sand and gravel and location of sources	3.3.10
4d. Location of equipment storage areas	3.0, 3.3.9, Appendix B
5. Government Agencies Involved	5.2, 5.3

Checklist Entry	Location of Discussion
5a. FERC, USFWS	5.2, 5.3, 7.7.3, 7.8.3, Appendix K
5b. Copy of FERC Section 7c application, if applicable	N/A
5c. State and local agencies that may be involved	5.2, 5.4
6. Construction of the Facilities	6.0 -6.10
6a. Construction (brief description)	6.0 - 6.10
6a1. Major facilities (including vehicles and number of tons and loads)	6.2, 6.4
6a2. Ancillary facilities (including vehicles and number of tons and loads)	NA
6b. Work force (number of people and vehicles)	6.2, 6.6
6c. Flagging and staking the right-of-way	6.2.1
6d. Clearing and grading	6.2.2
6e. Facility construction data	6.0 – 6.10
6e1. Description of the construction process	6.2, 6.3
6f. Access to and along the right-of-way during construction	3.0, 3.3.7, 4.1, 6.4, 8.4, Appendix A
6g Engineering drawings and specifications for site-specific problems relating to surface use or special mitigation	To be developed based on BLM consultation
6h Diagrams, drawings, and cross sections to help visualize the scope of the project	figures in 1.0, 3.0, 6.0, Appendix A
6i. Special equipment that will be utilized	6.2, 6.3
6j. Contingency planning	6.8. 9.0
6j1. Holder contacts	Cover
6j2. BLM contacts	Cover Letter
6k. Safety requirements	5.3, 7.12, 9.0, 9.11
6l. Industrial waste and toxic substances	6.2.9, 6.2.2.1, 6.8, 7.6.1.1, 7.12.1, Appendix B
7. Resource Values and Environmental Concerns	7.0, 9.0
7a. Address the level commensurate with anticipated impacts	7.0 - 7.12, 9.0 - 9.11
7a1. Location with regard to existing corridors	3.2.1, 3.4.3
7b. Anticipated Conflicts with Resources or Public Health and Safety	7.12, 9.11
7b1. Air, noise, geologic hazards, minerals and energy resources paleontological resources, soils, water, vegetation,	7.0 - 7.12, 9.0 - 9.11

Checklist Entry	Location of Discussion
wildlife, threatened and endangered species, cultural resources, visual resources, BLM projects, recreation activities, wilderness, etc.	
8. Stabilization and Rehabilitation	8.0
8a. Soil replacement and stabilization	6.3, 8.1, Appendix B
8b. Disposal of vegetation	6.2.2.1, Appendix B
8c. Seeding Specifications	6.2.9, 6.3.2, 7.7.1, 8.2
8d. Fertilizer	8.2
8e. Limiting access to the right-of-way	8.3
8f. Will road built during construction be reclaimed	8.4
9. Operation and maintenance	9.0 – 9.11
9a Will new or expanded access be need for operation and maintenance	3.3.7, 9.0
9b. Will there be hydrostatic testing and subsequent release of water and what is the anticipated volume	6.2.6
9c. Will removal and/or addition of pipe and/or pumps be required as part of pipeline maintenance	9.0, 9.11
9d. Will all maintenance activities be confined within the right-of-way	9.0, 9.11
9e. Safety	7.12, 9.0, 9.11
9f. Will industrial waste and toxic substances be generated or stored on the right-of-way	6.8, 7.12.1, Appendix B
9g. Inspection and maintenance schedules	9.0
9g1. Will inspections be conducted on-the-ground and/or by aircraft	9.0
9g2. If by aircraft, will the aircraft require landing strips and/or heliports	9.0
9h. Work schedules	6.6
9j. Fire control	6.10
9j. Contingency planning	6.8, 9.0
10. Termination and reclamation	8.0, 10.0
10a. Removal of structures	10.0
10b. Will pipe be removed or cleaned and left in the ground	10.0
10c. Obliteration of roads	8.4, 10.0
10d. Stabilization and revegetation of disturbed areas	8.0 – 8.4

List of Acronyms

amsl	above mean sea level
APE	area of potential effect
APHIS	Animal and Plant Health Inspection Service
API	American Petroleum Institute
bgs	below ground surface
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
BOR	US Bureau of Reclamation
bpd	barrels per day
CAA	Clean Air Act
CAPP	Canadian Association of Petroleum Producers
CFR	Code of Federal Regulations
CMR Plan	Construction, Mitigation, and Reclamation Plan
CO_2	carbon dioxide
CWA	Clean Water Act
dBA	decibels on an A-weighted scale
DOD	Department of Defense
DOS	Department of State
EIA	Energy Information Administration
EIS	Environmental Impact Statement

ERCB	Energy Resources Conservation Board
ERP	Emergency Response Plan
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act
GHG	greenhouse gas
gpm	gallons per minute
HCA	High Consequence Area
HDD	horizontal directional drill
Keystone	TransCanada Keystone Pipeline, LP
L_{dn}	day-night average sound levels
MDEQ	Montana Department of Environmental Quality
MEPA	Montana Environmental Policy Act
MFSA	Montana Major Facilities Siting Act
MFWP	Montana Fish, Wildlife, and Parks
mg/L	milligrams per liter
MLV	mainline valve
MOP	maximum operating pressure
MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways
NDT	non-destructive testing
NEPA	National Environmental Policy Act
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System

NRC	National Response Center
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	no surface occupancy
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
OCC	Operations Control Center
PFYC	Potential Fossil Yield Classification
PHMSA	Pipeline and Hazardous Materials Safety Administration
POD	Plan of Development
ppmw	parts per million by weight
Project	Keystone XL Project
psig	pounds per square inch gauge
RMP	Resource Management Plan
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SDGFP	South Dakota Game and Fish Department
SHPO	State Historic Preservation Officer
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SSURGO	Soil Survey Geographic database
SWCA	SWCA Environmental Consultants
TDS	total dissolved solid
THPO	Tribal Historic Preservation Officer
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
VRM	Visual Resource Management
WCSB	Western Canadian Sedimentary Basin
WSA	wilderness study areas

Table of Contents

List of Appendices

VOLUME II

List of Tables

List of Figures

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1.0 Introduction

TransCanada Keystone Pipeline, LP (Keystone) has prepared this Plan of Development (POD), which outlines the construction procedures, environmental requirements, site-specific project plans, and mitigation measures that will be implemented by Keystone during construction of the Keystone XL Project (Project) on federal lands. In most cases, construction procedures along the entire Project Right-of-Way (ROW) will follow Bureau of Land Management (BLM) guidelines. The POD is supplied in support of Keystone's SF299 (application #MTM98191), filed with BLM on March 17, 2008, and updated in 2009, 2010, September 2012, and this final POD. The POD is intended to be used as a project resource manual, which:

- Is a compendium of project environmental conditions and requirements; and
- Describes the processes and procedures that will be used to comply with the environmental requirements of the BLM and other federal, state, and local agencies for construction on federal lands.

During the course of preparing for and constructing the Project on federal lands, changes to the POD will occur. This document will be the Project reference for new or amended permits, approvals, clearances, and plans that may be issued during construction.

The Project will affect BLM lands within the jurisdiction of the Malta and Miles City field offices. These field offices manage federal lands under their jurisdiction according to the following resource management plans (RMPs): the Big Dry RMP (April, 1996) for eastern Montana and, the Judith Valley Phillips RMP (1992) for counties in northern Montana. New RMPs are currently being developed by the BLM for lands within the Project area; however, they will be condensed into two RMPs (Malta and Miles City) and will not be available for a few years. The BLM lands in the Project area are predominantly composed of grasslands used by farmers for grazing livestock (BLM 2008a), with lease agreements in place according to the RMPs. Construction and operation of the Project is consistent with the stipulations listed by the BLM RMPs and with current land uses. While some federally managed lands in southern Fallon County are currently operating under more stringent pipeline restrictions, these restrictions do not apply to the Project area. Under the RMPs, types of utilities that could be located within a corridor include power lines, pipelines, significant canals, ditches and conduits, railroads, electric communication and microwave sites, communication lines, and highways (BLM 1995, 1985). The Project will conform with the RMPs subject to: 1) site-specific RMP stipulations such as seasonal closures, 2) site-specific stipulations for crossing special management areas, and 3) other general stipulations needed to reduce or eliminate impacts to resources.

The Project will also cross lands owned by the Department of Defense (DoD) and managed by the US Army Corps of Engineers (USACE). These lands are located on the south and

southeastern side of the Missouri River near the confluence with the Milk River. The land is primarily rangelands with interspersed trees and shrubs. Based on discussions with the USACE, there are no restrictions to granting a pipeline easement on these lands.

BLM is working with Bureau of Reclamation (BOR) to include canals crossed on federally managed lands in Montana (**Table 1-1**). Project BOR water pipeline crossings in South Dakota occur on private lands; there are no federal lands associated with these water lines. Keystone has designed BOR canal crossings to meet their requirements and is awaiting BOR concurrence (see Appendix M). At the time of this POD submittal, the following disturbance on federal lands is anticipated.

Table 1-1 Disturbance of Federal Lands

Affected State	Miles Crossed[1]	Land Required for Temporary Use Permit (acres)	Land Required Under ROW Grant (acres)	Land Disturbed During Construction (acres)
Montana	61.36	492.19	287.60	779.79
Canal Crossings				
Affected State	**Milepost (MP)**	**Feature**	**County**	**Section-Township-Range**
Montana	84.96	Lateral V-235	Valley	12-27N-41E
	85.07	Main Drain No. VW22 Canal	Valley	12-27N-41E
	85.49	Vandalia Canal	Valley	12-27N-41E
	196.02	Glendive Main Canal	Dawson	10-13N-53E
	197.23	Glendive Open Drain	Dawson	14-13N-53E
	197.4	Lateral 4.7 Pipeline [2]	Dawson	14-13N-53E

[1]Mileage figure includes miles of pipeline ROW and miles of access roads on federal lands based on 08/15/12 centerline.
[2]Assumes an open cut construction crossing technique is used. If the canal is bored, there would be no construction impact to federal lands.

1.1 Project Summary

Keystone is proposing to construct, operate, and maintain a crude oil pipeline and related facilities for the importation of crude oil, extending from the international border between the United States and Canada, at Phillips County, Montana and extending to Steele City, Jefferson County, Nebraska. The Project, known as the Keystone XL Project (Project), will transport crude oil production from the Western Canadian Sedimentary Basin ("WCSB") and the Bakken

supply basin in Montana and North Dakota, to a point located on the existing Keystone Pipeline system at Steele City, Nebraska, which will allow for the delivery of that production to existing refinery markets in the Texas Gulf Coast area (please refer to **Figure** 1-1)[1].

Background

On September 19, 2008, Keystone submitted a Presidential Permit application to the DOS. The DOS considered all environmental data submitted by Keystone and issued a FEIS on August 26, 2011. However, in November 2011 the DOS announced that it was delaying its decision on the Presidential Permit to allow additional time to gather information regarding potential alternative routing in Nebraska. In December 2011, Congress imposed a 60-day time limit on the DOS' decision on whether to grant a Presidential Permit. In January 2012, the DOS determined that the project, as presented and analyzed at that time, did not serve the national interest. This determination was based on the rationale that the time provided by Congress for the decision was not adequate to complete the national interest review of the project, including, specifically, the assessment of potential alternative routes that would avoid the Sandhills region in Nebraska.

On February 27, 2012, Keystone advised the DOS that it had concluded that the portion of the previously proposed Project that will directly serve the Gulf Coast has its own independent utility as the stand-alone Gulf Coast Project and that construction of the Gulf Coast Project would begin as soon as the necessary permits for the specific construction activities were in place. Construction of the Gulf Coast Project commenced on August 6, 2012. Keystone also noted that it intended to file a Presidential Permit application for the more limited Keystone XL Project, which would include the former "Steele City Segment," and to supplement that application with an alternative route in Nebraska as soon as that route was approved by the State of Nebraska.

On May 4, 2012, Keystone filed a Presidential Permit application with DOS, along with all required non-environmental information for the more limited Keystone XL Project and included a commitment to incorporate the new route in Nebraska, when selected. Keystone incorporated by reference the FEIS prepared by the DOS for the original proposed Keystone XL Project.

After the FEIS was issued for the original Keystone XL project, the Montana Department of Environmental Quality (MDEQ) issued its Montana Major Facility Siting Act (MFSA) Certificate (March 30, 2012) requiring Keystone to utilize the Montana route variations identified in the FEIS. Since the FEIS was issued, Keystone has incorporated the MDEQ route variations recommended in the FEIS.

[1] Project also involves the construction of two pump stations in Kansas along the existing Keystone Cushing Extension.

Figure 1-1 Proposed Keystone XL Project Route and Overall Keystone Pipeline System

8*11

Federally owned and administered land in Montana will be crossed by the Project. **Table 1-2** provides permanent and temporary acreage impacts to BLM-administered lands, as well as miles crossed by the pipeline centerline and access roads. No pipe yards, contractor yards, or borrow pits will be located on federal lands. There are 24 temporary construction access roads located on BLM-administered land in Montana, and two temporary access roads located on USACE land in Montana. Four permanent access roads will cross federal lands in Montana (near MP 49.28 and 91.75). One mainline valve (MLV) will be constructed on BLM-administered land in Montana; no further aboveground facilities will be constructed on federal lands.

Table 1-2 Mileage and Acreage Impacts of BLM Lands in Montana

Affected County	Miles Crossed[1]	Land Required Under ROW Grant[3] (acres)	Land Required Under Temporary Use Permit[2] (acres)	Land Disturbed During Construction[4] (acres)
Phillips	6.51	24.49	47.34	71.82
Valley	29.04	121.74	212.38	334.12
McCone	12.74	64.19	109.99	174.19
Prairie	8.31	50.36	82.18	132.55
Fallon	3.05	17.97	28.09	46.06
Total	**59.65**	**278.75**	**479.98**	**758.74**

[1]Includes miles crossed by the pipeline centerline and miles of access roads on BLM-administered lands. This does not include BOR or DOD lands.
[2]Based on a 60-foot-wide temporary ROW, additional temporary workspaces, and construction of or improvements to 30-foot-wide access roads.
[3] Based on a 50-foot-wide permanent ROW and four permanent access roads.
[4]Construction disturbance is the area temporarily disturbed for the Project, and is the sum of the areas requested under the temporary use permit as well as those under the ROW Grant, with the exception of the MLV, which will be constructed and operated within the 50-foot permanent ROW.

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2.0 Purpose and Need

The purpose of the Project is to transport crude oil produced from the Western Canadian Sedimentary Basin (WCSB) and production from the Bakken supply basin in Montana and North Dakota to a point located on the existing Keystone Pipeline system at Steele City, Nebraska. This will allow for the delivery of that production to existing refinery markets in the Texas Gulf Coast area. A comprehensive discussion of the Project's purpose and need can be found in Keystone's May 4, 2012 application to DOS for a Presidential Permit. The Application may be downloaded from the DOS website:

http://keystonepipeline-xl.state.gov/proj_docs/permitapplication/index.htm.

As recognized in the FEIS, the primary purpose and need of the Keystone XL Project, as originally proposed, was to provide the infrastructure necessary to transport WCSB heavy crude oil from the border with Canada to delivery points in the Gulf Coast region (Petroleum Administration for Defense District (PADD) III, in response to the market demand of refineries in PADD III for heavy crude oil. The FEIS found that this market demand is driven by the need of refiners in PADD III to replace declining feed stocks of heavy crude oil obtained from other foreign sources with crude oil from a more stable and reliable source.

As currently proposed, the Keystone XL Project would meet that demand. The Project will terminate at the point of origin of the existing Keystone Pipeline Cushing Extension, at Steele City, Nebraska. At that point, the crude oil transported on the Keystone XL Pipeline would be transported to Cushing, Oklahoma on the Keystone Cushing Extension. At Cushing, the oil would have access to the TransCanada Keystone Gulf Coast Project, which will provide transportation service to Gulf Coast refineries.

In addition, the Bakken Market Link Project will include construction of "on-ramp" facilities in Fallon County, Montana to allow Bakken crude oil to access the pipeline system for delivery to Steele City and the Gulf Coast. The Bakken Market Link Project terminal is not sited on federal lands.

The FEIS found that the 58 refineries in the Gulf Coast region provide a total refining capacity of approximately 8.4 million bpd, or nearly half of U.S. refining capacity. These refineries provide substantial volumes of refined petroleum products, such as gasoline and jet fuel, via pipeline to the Gulf Coast region as well as the East Coast and the Midwest. According to the FEIS, in 2009, PADD III refineries imported approximately 5.1 million bpd of crude oil from more than 40 countries, and the top four suppliers were Mexico (21 percent), Venezuela (17 percent), Saudi Arabia (12 percent), and Nigeria (11 percent). Of this amount, approximately 2.9 million bpd was heavy crude oil. In addition, PADD III refinery runs are projected to grow by at least 500,000 bpd by 2020. However, as noted by the EnSys report, presented at Appendix A of the Supplemental Draft EIS, crude oil imports from Mexico and Venezuela, which flow

predominantly into Gulf Coast refineries, have been in steady decline and are projected to continue to drop over the next several years, from 2.9 million bpd in 2004 to about 0.8 million bpd by 2020. Although the supply of crude oil from Saudi Arabia to the U.S. appears to be fairly stable, the remaining major PADD III suppliers face declining or uncertain production.[2]

The pipeline will be constructed and operated in compliance with the regulations of the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) as set forth at 49 CFR Parts 194 and 195. In addition, Keystone has agreed to adopt and comply with 57 Special Conditions developed by PHMSA and included at Appendix U to the FEIS issued by DOS in August 2011 for the original Keystone XL Project. Construction of the proposed Project would begin when Keystone obtains all necessary permits, approvals and authorizations. Based on the current permitting schedule, the Project is planned to be placed in service sometime in 2015.

[2] FEIS at pp. 1-9 to 1-10.

3.0 Project Description

This project description describes the Project in its entirety. A discussion of the project components on federal lands is provided in Section 3.1 of this document. Ownership of lands crossed is summarized in **Table 3-1**.

Table 3-1 Surface Ownership Crossed by the Project ROW

Ownership Type	Miles Crossed	Percent of Total Length
Montana		
Federal	46.29	16.20
State	30.64	10.73
Private	207.59	72.67
Local government	0.52	0.18
Water	0.61	0.21
Keystone XL Project Total	**285.65**	**99.99**

NOTE: Mileage shown is for the pipeline construction right-of-way only. Access roads are not included.

Keystone is proposing to construct and operate a crude oil pipeline and related facilities extending from Hardisty, Alberta, Canada, to a point located on the existing Keystone Pipeline system at Steele City, Nebraska. This will allow for delivery of up to 830,000 bpd of crude oil production from the WCSB and the Bakken supply basin in Montana and North Dakota to refinery markets in the Texas Gulf Coast. In total, the US portion of the Project will consist of approximately 875.39 miles of new, 36-inch-diameter pipeline, comprised of approximately 285.65 miles in Montana, 315.3 miles in South Dakota, and 274.44 miles in Nebraska. It will interconnect with the northern terminus of the existing 298-mile-long, 36-inch-diameter Keystone Cushing Extension segment of the Keystone Pipeline System.

A total of 20 new pump stations, each located on an approximate 5-15-acre site, will be constructed in the US. A permanent access road near MP 49.28 will be needed for access into Pump Station 10.

Valves will be installed and located as indicated by the hydraulic profile of the pipeline, as required by federal regulations and the 57 Special Conditions developed by PHMSA, and with the intent to enhance public safety and protect the environment as part of Keystone's integrity management program. The spatial footprint of each valve site will be contained within the permanent ROW and pump stations sites along the Project route. Permanent access to the

intermediate mainline valve (IMLV)[3] site will require the construction of two permanent access roads near MP 91.75. A densitometer for detection of crude oil batch interfaces will be located within the footprint of Pump Station 26 at Steele City, Nebraska.

Approximately 191 temporary use access roads to the construction ROW, 6 temporary use contractor yards, and 7 railroad sidings will be required during construction of the Project. In addition, over 20 pipe stockpile sites are being considered. Construction of the Project in remote areas of the Project will require construction and operation of 8 temporary construction camps for construction worker housing (4 in Montana, 3 in South Dakota, and 1 in Nebraska).

Power line and associated facility upgrades will be required in multiple locations along the route to provide electrical power for the new pump stations and to power remotely operated valves and densitometers located along the pipeline route. Keystone will not construct nor be responsible for the permitting of new power lines and related facility construction. Local power providers will be responsible for construction and for obtaining any necessary approvals or authorizations from federal, state, and local governments for such facilities (except as outlined below).

A separate ROW Grant will be required from the BLM for power lines that cross BLM lands. This is required by the BLM in order to ensure those ROW Grant Applications are processed in parallel with the DOS NEPA process. Power providers have started their permitting processes with the BLM. In addition, those power providers that require a MFSA certificate from the MDEQ have started that process.

Figure 3-1 shows an overview of the Project, entry into the US, and interconnection with the Keystone Cushing Extension pipeline[4].

The Project will require a 50-foot-wide permanent ROW for the operation phase. An additional 60-foot-wide temporary ROW will be required during construction. Additional area will be required for extra temporary workspaces, and for construction and operation of aboveground facilities.

The proposed construction work area (the footprint of all disturbances during construction) for the Keystone XL facilities is estimated at approximately 15,492.64 acres. This area is required for the construction of 875.39 miles of 36-inch-diameter crude oil pipeline. In addition to the 50-foot-wide permanent ROW and 60-foot temporary ROW, the proposed construction work area also includes site-specific workspaces (e.g., slash storage (no ground disturbance), staging areas,

[3] IMLVs are those valves that are not located within pump station sites.

[4] There will be 5 pump stations in Nebraska. However, four of the pump station locations have yet to be determined and are not shown on Figure 3-1.

pipe yards, contractor yards, river crossings, and access roads). On private lands, the ROW will be acquired from landowners of the property where the Project facilities will be located.

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Figure 3-1 Project Overview, Keystone XL and US Entry

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The Project will require the issuance of a Presidential Permit by the US Department of State (DOS) to cross the US/Canada border. In Montana, the Project requires a certificate under the Montana Major Facilities Siting Act (MFSA), which includes environmental review under the Montana Environmental Policy Act (MEPA). The MDEQ issued a MFSA Certificate to Keystone in March 2012. In South Dakota, the Public Utilities Commission (PUC) issued a permit under the Energy Conversion and Transmission Facilities Act in March 2010, as amended in June 2010. In April, 2012, Keystone submitted a proposed reroute of the Project to the Nebraska Department of Environmental Quality (NDEQ) for review and ultimate decision by the Governor. Keystone submitted certain refinements to that route on September 5, 2012. The Governor's decision is expected by year end 2012.

3.1 Affected Federal Lands

The Project will require the issuance of ROW Grant(s) and Temporary Use Permit(s) from the BLM to cross 59.65 miles of BLM-Administered lands (including access roads) and 1.71 miles (including access roads) on USACE lands. The federally-managed lands in Montana are shown on maps in **Appendix A**. No federally-managed lands are crossed in South Dakota or Nebraska. Issuance of a ROW Grant is considered a federal action and is subject to environmental review pursuant to NEPA (42 USC § 4321 et seq.). The remainder of this POD focuses on construction methods and impacts associated with affected federal lands only, and are intended to provide the BLM adequate information to evaluate construction procedures for the Project for the purpose of issuing the necessary ROW Grant(s) and Temporary Use Permit(s). The POD references the Environmental Report submitted to DOS on September 7, 2012, and the Construction, Mitigation, and Reclamation Plan (CMRP), attached as Appendix E of the Environmental Report. DOS is the lead federal agency, for the purposes of the NEPA analysis. A BLM-Specific CMRP also is included as **Appendix B** of this POD. The Environmental Report encompasses all lands, regardless of ownership or management, and includes an objective disclosure of environmental impacts, beneficial and adverse, resulting from the Project, as well as a set of reasonable alternatives. Additionally, along with the Environmental Report, Keystone submitted reports for biological, paleontological, and cultural resource surveys to the DOS on November 20, 2008, July 6, 2009, May 20, 2010, and September 2012. These reports are included as appendices F, G, J and L of this POD.

Preliminary mapping information for power lines affecting federal lands is included in **Appendix C**, based on information provided by the power providers.

Discussions and quantification of impacts in this POD will apply to construction and operation of the Project on federal lands in Montana only (**Table 3-2**). These lands consist of BLM lands, and US Department of Defense (DOD) lands in Montana, and BOR canals/water pipelines in Montana. A description of the affected environment and impacts on all lands potentially impacted by the Project is included in the Environmental Report submitted to the DOS.

Table 3-2 Summary of Federal Lands Affected by the Project

Facility	Land Required Under Temporary Use Permit[1] (acres)	Land Required Under ROW Grant[2] (acres)	Land Disturbed During Construction (acres)
Montana			
Pipeline ROW	335.73	280.73	616.46
Additional Temporary Workspace Areas (TWAs)	109.40	0.00	109.40
Pipe Stockpile Sites, Rail Sidings, and Contractor Yards	0.00	0.00	0.00
Construction Camps	0.00	0.00	0.00
Access Roads	47.06	6.86	53.92
Montana Subtotal[3]	**492.19**	**287.60**	**779.79**

[1]Operational acreage was estimated based on a 50-foot permanent ROW in all areas. All pigging facilities will be located within either pump stations or delivery facility sites. Intermediate MLVs and densitometers will be constructed within the construction easement and operated within the permanently maintained 50-foot ROW. Other MLVs, check valves and block valves, and meters will be located within the area associated with a pump station, delivery site, or permanent ROW. Consequently, the acres of disturbance for these aboveground facilities are captured within the Pipeline ROW and Pump Station/Delivery Facilities categories within the table.
[2]Discrepancies in total acreages are due to rounding.
[3]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.

3.2 Connection to an Existing Right-of-Way

3.2.1 Location in Regard to Existing Corridors

For approximately 20 miles between approximately Milepost 0 and 25, the Project will be adjacent to the Northern Border Pipeline, an existing natural gas pipeline. A portion of the lands crossed by the Project adjacent to Northern Border are owned by BLM (see Table 4-1). Construction disturbance in this area will include a portion of the landscape previously disturbed and reclaimed by Northern Border. Northern Border was constructed in the early 1980s. No other Project components on federal lands are collocated with existing ROW corridors.

3.3 Additional Components of the Right-of-Way

The Project generally will require a 50-foot-wide permanent and a 60-foot-wide temporary ROW. The temporary ROW width may exceed 60 feet in some locations depending on site-specific conditions, including rough terrain, and the depth and method of topsoil stripping. Additional work spaces also could be required for areas requiring special construction techniques (e.g., river, wetland, and road crossings; horizontal directional drill (HDD) entry and exit points; steep slopes; rocky soils), pipe yards, and construction staging areas.

The location of additional temporary workspaces will be modified as the Project continues to be refined. This will involve the adjustment of workspaces as necessary with respect to actual wetland and waterbody crossing locations. Keystone will adjust additional temporary workspace at prescribed set back distances from waterbody and wetland features (to maintain a vegetated buffer between additional temporary workspaces and the feature), unless impractical, as determined on a site-specific basis.

Keystone does not currently anticipate the need for expansion of the Project through addition of components beyond those disclosed in the Environmental Report.

3.3.1 Aboveground Facilities

Keystone will construct one IMLV along the new pipeline ROW on federal lands to be located downstream of the Missouri River crossing, at approximate Milepost 91.6. This IMLV will be fenced and located in a 50-foot by 50-foot site within the permanent pipeline ROW. For a description of Project aboveground facilities, regardless of land ownership, refer to the Environmental Report.

3.3.2 Delivery Facilities

No Project delivery facilities will be located on federal lands.

3.3.3 Pump Stations and Power Lines

No pump stations will be constructed on federal lands.

Pump stations will operate on locally purchased electric power and will be fully automated for unmanned operation. Permitting and construction of power lines will be the responsibility of each electrical power provider. Overview mapping of potential impact areas for power lines on federal lands is included in **Appendix C** of this POD; however, each electrical power provider will be responsible for the final analysis of impacts, as well as construction and mitigation methods, to be filed as a portion of their ROW Grant application(s).

3.3.4 Valve Stations/Densitometer Sites

No densitometer sites will be located on federal lands.

3.3.5 Pigging Facilities

No pig launchers and/or receivers will be constructed on federal lands.

3.3.6 Access Roads

The Project will use existing public and private roads to provide access to most of the construction ROW; construction of new temporary or permanent access roads will be limited.

Paved roads are not expected to require improvement or maintenance prior to or during construction. Gravel roads and dirt roads may require maintenance during the construction phase due to high use. Road improvements such as blading and filling will be restricted to the existing road footprint. Private roads and any new temporary access roads will be used and maintained only with permission of the landowner or land management agency. All new temporary access roads will be reclaimed to original contour and land use after construction.

Keystone will construct short, permanent access roads from public roads to the proposed pump stations, and IMLVs. One road on federal land, leading to Pump Station 10, designated CAR-068, will be a permanent road, maintained throughout the life of the Project. Two permanent access roads designated CAR-227 and VAR-07 will be used to access an IMLV site along the ROW easement to the south side of the Missouri River crossing. Future maintenance of these permanent access roads will be the responsibility of Keystone. One permanent access road intersects BLM land for a short distance near MP 118.36.

Another 21 temporary access roads from public roads to the construction ROW on federal lands will also be used. These will be extended or improved to reach the ROW. These extensions would be reclaimed after the Project is constructed. See the discussion in Section 4.1 that details the number and locations of the proposed access roads that will affect federally owned or managed lands. At a minimum, construction of all Project access roads on federal lands will require completion of cultural resources and biological surveys, as well as the appropriate BLM, State Historic Preservation Officer (SHPO), and US Fish and Wildlife Service (USFWS) consultations and approvals.

The design and construction of new access roads and upgrades to existing access roads required for the Project will include implementing proper drainage measures, minimizing soil erosion, and preserving topsoil. On federal lands, approximately 55 acres of disturbance will be associated with the construction of new access roads or the temporary widening of certain existing access roads. Further, Keystone anticipates that all dirt or gravel access roads may initially, or at some time during the Project, require upgrading from their present condition to allow for adequate passage of construction traffic. Private roads and new temporary access roads will be used and maintained only with permission of the landowner or land management agency. These roads are shown on the maps in **Appendix A**. Refer to the BLM-Specific CMR Plan (**Appendix B)**, for details on controlling traffic and crossing procedures for access roads.

3.3.7 Temporary Extra Workspace and Staging Areas

Keystone is proposing additional temporary work spaces that include deviations from the nominal 110-foot-wide construction ROW, to allow for grading due to rugged terrain, for storage of topsoil and slash, and to provide adequate space for spoil excavated from the trench, allowing a buffer outside the spoil storage for either clods that might roll off or extra space required for very sandy material. As proposed, the Project also will require additional work spaces and staging areas

necessary for waterbody, roadway, and difficult terrain crossings, and certain pipeline point of intersection (PI) locations. The specific additional work spaces are shown on the route maps.

In addition to the 50-foot-wide permanent ROW, construction of the Project will require a 60-foot-wide temporary ROW and smaller additional temporary work spaces along the pipeline. Typical dimensions of TUAs are summarized in **Table 3-3**.

Table 3-3 Dimensions and Acreage of Typical Temporary Use Areas

Feature	Dimensions (length by width in feet at each side of crossing)	Acreage
Waterbodies traversed via HDD (Horizontal Directional Drill)	250 x 150, as well as the length of the drill plus 150 x 150 on exit side	1.4
Waterbodies >50 feet wide	300 x 100	0.7
Waterbodies <50 feet wide	150 x 25 on working and spoil sides or 150 x 50 on working side only	0.2
Bored highways and railroads	175 x 25 on working and spoil sides or 175 x 50 on working side only	0.2
Open-cut or bored county or private roads	125 x 25 on working and spoil sides or 125 x 50 on working side only	0.1
Foreign pipeline/utility/other buried feature crossings	125 x 50	0.1
Push-pull wetland crossings	50 feet x length of wetland	Varies
Construction spread mobilization and demobilization	470 x 470	5.1
Stringing truck turnaround areas	200 x 80	0.4

Locations of all additional work spaces on federal lands based on the August 2012 centerline, including township, range, and section, are shown on maps included in Appendix A. Final locations and sizes of work spaces and temporary ROW will be provided to BLM prior to finalization of the POD.

3.3.8 Pipe Storage and Contractor Yards

No pipe storage or contractor yards will be located on federal lands.

3.3.9 Borrow Pits

Where pipeline padding is required and adequate padding is not available from the trench spoil, borrow material will be used for the pipeline padding. Sources and locations of borrow material have not been finalized, but will be primarily private, existing sources. No borrow material will be taken from federal lands.

3.4 Alternatives

The proposed route for the Project was developed through an iterative, multidisciplinary route selection process. This process involved the systematic identification of objectives, control points, collection of data, review of alternatives and continual reassessment of these factors as refinement occurred.

3.4.1 Definition of Control Points

The objectives of the Project (Chapter 2.0) required the Keystone XL route to enter the US at an existing border facility near Morgan, Montana, and end at the Cushing Extension Pipeline interconnect near Steele City, NE. Other geographical or land use issues served to further define route alternatives, including:

- The narrow gap between the Fort Peck Reservoir and Fort Peck Indian Reservation, Montana; and,
- Crossing the Niobrara River at locations not designated as wild and scenic, in Nebraska.

3.4.2 Constraints and Opportunities

A number of constraints were identified to guide the route selection process. The route was designed to avoid these constraints whenever possible and minimize contact when unavoidable. A primary constraint included public lands, including BLM, USACE, US Fish and Wildlife Service (USFWS), and state lands. Where possible, the pipeline was routed to avoid these lands; however, the entry point (Morgan, Montana) and control points listed in Section 3.4.1 required the pipeline to traverse a region with a high concentration of BLM lands in northeastern Montana. In addition, the MFSA requires MDEQ to evaluate the use of public lands in routing, and MDEQ required Keystone to adopt variations to the proposed route, some of which cross additional federal and state lands. Therefore, no route was able to entirely avoid public lands. Additional constraints include:

Primary

- Large waterbodies and water control structures;
- Lands with permitting processes that could affect schedule;
- Extreme terrain;
- Large wetland complexes;

- Urban areas;
- Properties listed on the National Register of Historic Places (NRHP); and
- National Wildlife refuges and state management areas.

Secondary

- Water crossings;
- Wetland crossings;
- Waterfowl production areas;
- Irrigated croplands;
- Bedrock;
- Rural communities;
- 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 (i.e., co-location with) such as pipelines (preferred), power lines and roadways;
- Flat or gently rolling terrain;
- Soils, which can be readily excavated; and
- Areas lacking forested vegetation.

Route Alternatives Identification

Based on the above information and objectives, a number of route alternatives and alternative route segments were developed and evaluated. These routes and route segments met the basic Project objectives and respected the constraints and opportunities to varying degrees. Discussion of route alternatives that will affect federal lands follows; discussions of all route alternatives for the Project are included in the Environmental Report filed with the DOS on November 20, 2008, as well as the August 2011 DOS FEIS.

Outside of this alternatives analysis effort and over one year after the MFSA application was filed with the MDEQ, MDEQ requested that Keystone develop and use a GIS analysis weighting criteria that it identified to develop another alternative for analysis. One of the major criteria that MDEQ weighted heavily for pipeline routing was public lands including both State of Montana and BLM lands. The GIS analysis was completed and a new alternative was generated that MDEQ subsequently modified or adjusted and required to be included in the DOS FEIS. The modifications are considered variations to the preferred route and are discussed below.

The following paragraphs provide an overview of the characteristics of each of the major route alternatives and alternative route segments. These alternatives are illustrated on **Figure 3-2**.

3.4.3 Major Route Alternatives

Keystone XL Western Alternative

The Keystone XL western alternative enters the US at Morgan, Montana, and runs southwest through Montana, South Dakota, and Nebraska to reach the southern terminus of the Cushing Extension Pipeline. The total length of this route would be approximately 1,110 miles in the US. Of this, approximately 56 miles would be on federally managed lands as well as 9 miles of tribal lands. This route would cross northeast of Fort Peck Reservoir and avoid crossing reaches of the Niobrara River designated wild and scenic.

Most of the northern portion of the western alternative, from the US/Canada border to the delivery point at Cushing, would be constructed within new ROW; only the northernmost portion of the alternative would parallel the existing Northern Border Pipeline. South of Cushing to Nederland and Moore Junction, this alternative route would follow multiple ROWs. New pipeline would be constructed for the entire route. This alternative was not analyzed further because it failed to make use of the Cushing Extension, thereby resulting in approximately 300 additional miles of greenfield pipeline construction.

Keystone XL Route A

The Keystone XL, Route A, co-locates with an existing pipeline for the entire pipeline route. This alternative would be approximately 920 miles long; of this, 17 miles would cross federally managed lands. Route A co-locates with the Northern Border Pipeline from the US/Canada border through Montana, North Dakota, and into South Dakota, until intersecting with the existing Keystone Mainline Pipeline in eastern South Dakota. The route then co-locates with the Keystone Mainline Pipeline, southward through South Dakota and Nebraska, ending in southeastern Nebraska at the Platte Pipeline at Steele City, Nebraska. At this location, the alternative would connect with the Keystone Cushing Extension. This alternative would cross the following federal lands:

<u>Wilderness Study Area - Bitter Creek (Milepost 44 to Milepost 48)</u>

Under the Federal Land Policy and Management Act (FLPMA), the BLM conducted studies on several tracts of land with the intention of designating certain parcels as “wilderness study areas” (WSAs). One of these properties is the Bitter Creek WSA in the state of Montana, which consists of approximately 59,660 acres. The area is known to contain a variety of vegetation types and wildlife habitats. Currently, the BLM manages the protection of WSAs. The BLM would be the primary agency that would determine the possibility and mitigation involved with crossing this WSA.

Figure 3-2 Alternative Routes Evaluated– Keystone XL Route

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Tribal lands – Fort Peck Indian Reservation (Milepost 58 to Milepost 146)

Fort Peck Indian Reservation is under the jurisdiction of the Bureau of Indian Affairs (BIA). Obtaining ROW easements across BIA lands can require significantly more time and processing than private or other federally managed lands.

Keystone XL Route A1A

Route A1A is an additional alternative to Route Option A along the Steele City Segment. This alternative would cross approximately 17 miles of federal lands, with a total pipeline length of 951 miles. As in the Steele City Segment, Route Option A, this alternative co-locates with the Northern Border Pipeline along the east-west portion of the route and with the existing Keystone Mainline Pipeline along the north-south segment, except in northeastern Montana where the route passes to the north of the Fort Peck Indian Reservation.

The route deviates from the Keystone XL, Route Option A, in central Valley County, Montana, by continuing to run east just to the north of the Fort Peck Indian Reservation. The route then turns south at the eastern edge of the reservation in Sheridan County, Montana, and runs to the west of the Medicine Lake area through an area identified post-reconnaissance as a wildlife refuge. This area is discussed in more detail below. The route crosses into Roosevelt County, Montana, turning to the southeast and crosses into Williams County, North Dakota. The route joins back with the Steele City Segment, Route Option A, just north of the Missouri River crossing at the Williams-McKenzie County line in North Dakota and continues to co-locate with the Northern Border Pipeline, until reaching the Keystone Mainline Pipeline in Clark County, South Dakota, then co-locating with the Keystone Mainline Pipeline south to Steele City, Nebraska. This route would cross the following federal lands:

Medicine Lake National Wildlife Refuge (Approximate Milepost 169)

The Medicine Lake National Wildlife Refuge (NWR) was established in 1935 to provide breeding habitats for migratory birds and other wildlife. The Medicine Lake NWR is managed by the USFWS. It lies within the highly productive prairie pothole region and has relief typical of the glacial drift prairie. Medicine Lake NWR was recognized by the American Bird Conservancy as one of the "Top 100 Globally Important Bird Areas in the US" and was designated as a National Natural Landmark in 1980.

The Medicine Lake NWR is home to a diverse array of native prairie and wetland-associated wildlife species. More than 273 species of birds were spotted in the NWR and 125 bird species breed there. The 31,660-acre refuge contains 22 natural and artificial lakes and managed impoundments, along with numerous small wetlands or "potholes" encompassing more than 13,000 wetland acres. NWR uplands consist of gently rolling mixed-grass prairie with a few trees found in riparian areas. The rolling hills and sand dunes around Medicine Lake make up the most extensive sandhill formation in Montana.

NWR grasslands and wetlands are prime breeding areas for waterfowl, with 17 species producing 40,000 offspring annually. It also is an important resting area for migrating birds, including sandhill cranes, Canada geese, white-fronted geese, tundra swans, and many duck species. The American white pelican nesting colony in the refuge is one of the largest in North America, with about 10,000 birds breeding there each summer. Large populations of rare grassland birds such as Baird's sparrows, Sprague's pipits, and chestnut-collared longspurs nest on refuge prairies, attracting birdwatchers from all over the US.

Additionally, some year-round residents include white-tailed and mule deer, coyote, badger, beaver, muskrat, sharp-tailed grouse, and pheasant. Less frequent visitors include moose, elk, and pronghorn. A wolverine was seen in 1998.

Route Option A1A traverses Diversion Ditch No. 1, a canal that connects the refuge to Big Muddy Creek in Sheridan County, Montana. The field reconnaissance indicates that the ditch is an extension of the refuge, but the surrounding lands are not. The potential impact of this crossing may be minimized or avoided by adjusting the currently proposed alignment, or by using the horizontal directional drill (HDD) installation technique to cross Diversion Ditch No. 1 and/or Lake Creek. Whether or not a pipeline crossing would be allowed at this point is subject to agency discussion and the potential presence of other utility crossings.

Keystone XL Route B

Keystone XL, Route B, is designed to minimize the miles of newly constructed pipe relative to the Western Alternative by taking advantage of interconnection with existing pipe, as well as providing a shorter route than and avoiding many of the environmental and regulatory restraints associated with Alternatives A and A1A. This route option would be approximately 851 miles long, and cross approximately 43 miles of federally managed lands. Route B enters the US parallel to the Northern Border Pipeline in Phillips County, Montana, and is co-located with that existing ROW for approximately 21.5 miles within the first 25 miles of the Project.

After Route B diverges from the Northern Border Pipeline, it continues in a more southerly direction to the west of the Fort Peck Indian Reservation, crossing the Missouri River through the narrow gap between the Fort Peck Reservoir and the Fort Peck Indian Reservation. The route then proceeds southeast, crossing into Harding County, South Dakota, and continues in a southeasterly direction to enter Nebraska in Keya Paha County. There it crosses the Niobrara River east of the segment that is designated as wild and scenic. The route continues southeast, to parallel a short portion of the Keystone Mainline Pipeline ROW in the southern portion of Jefferson County. The Project would then interconnect with the proposed Cushing Extension segment of the Keystone Pipeline Project near Steele City. This route would cross the following federal lands:

Department of Defense Property (Approximate Milepost 87.3)

The DOD is the underlying owner of a parcel of land on the south and southeastern side of the Missouri River near the confluence with the Milk River. It is a parcel of land that cannot be avoided because the Charles M. Russell NWR lies to the west-southwest and the Fort Peck Indian Reservation lies to the northeast of the proposed crossing. Land in this area generally is open rangeland with trees and shrubs interspersed on the property.

Because this pipeline would be greater than 24 inches in diameter, Congressional notification would be required. Currently, discussions with the USACE indicate granting an easement for the pipeline would be possible.

Table 3-4 summarizes the lengths of the alternatives considered for the northern portion of the Project.

Based on these considerations, and on the comprehensive route analysis provided in the Environmental Report, Keystone determined Route B would be the preferred route for the Steele City Segment of the Project.

Table 3-4 Lengths of the Project Route Options (Canadian Border to Cushing, Oklahoma)

Route Option	Route and the Corresponding Alternative	Mileage (new pipe construction)	Mileage (connection to Keystone Cushing Extension)
Western Route	Western Alternative – direct line to Cushing, Oklahoma.	1,110	0
Route A	Eastern route through Montana, North Dakota, South Dakota, and Nebraska, to connect to the Keystone Cushing Extension at Steele City.	920	298
Route A1A	Eastern route through Montana, North Dakota, South Dakota, and Nebraska, to connect to the Keystone Cushing Extension at Steele City, avoiding BIA lands.	951	298
Route B	Eastern route through Montana, South Dakota, and Nebraska, to connect to the Keystone Cushing Extension at Steele City.	875.38	0

Route Changes Since FEIS Publication

After the FEIS was issued, the MDEQ issued its MFSA Certificate (March 30, 2012) requiring Keystone to utilize the Montana route variations identified in the FEIS. Since adopting those route variations, Keystone has worked with landowners to follow the MFSA-designated corridor (500 feet) as well as minimize landowner and environmental impact. A total of 64 route changes

were implemented. None of the Montana route changes are outside of the 500 foot corridor; all are compliant with the requirements of MDEQs environmental specifications (Attachment 1 of Appendix I of the FEIS). Table 3-5 presents the two route changes in Montana that are greater than 200 feet from the FEIS centerline[5] (**Table 3-5**).

Table 3-5 Montana Route Changes Between FEIS Route and August 15, 2012 Centerline

Figure Number	County	Begin MP	End MP	Base Route Length (Miles)	Reroute Length (Miles)	Maximum Perpendicular Distance from Center Line (Feet)	Reason for Route Change
1001	Phillips	25.17	25.67	0.54	0.51	229	To accommodate an HDD* through Frenchman Creek as opposed to the originally proposed open cut method.
1003	McCone	108.10	110.31	2.19	2.21	209	To avoid paralleling a creek and eliminate two creek crossings

*HDD - Horizontal Directional Drill

In April, 2012, Keystone submitted a proposed reroute of the Nebraska section of the Project to the NDEQ for review and ultimate decision by the Governor. Keystone submitted certain refinements to that route to NDEQ on September 5, 2012. The Governor's decision is expected by year end 2012.Minor, non-material route variations were implemented in South Dakota as permitted by Keystone's SDPUC Permit.

[5] Changes to the MSFA certificated route less than 250 feet from the centerline do not require an amendment.

4.0 ROW Grant Application and Temporary Use Permit

4.1 Affected Federal Lands

As indicated in **Table 3-1**, most of the Project will be constructed on private lands. The primary disturbance on public lands includes approximately 46.29 miles of buried pipeline ROW on federal lands in Montana. Approximately 45.13 miles are lands under BLM jurisdiction, including lands overseen by the Malta and Miles City Field Offices (**Table 4-1**). In addition, approximately 15 miles of access roads in Montana will be located on lands under BLM jurisdiction, in the Malta and Miles City field offices (**Table 4-2**). These field offices manage public lands under their jurisdiction according to the following resource management plans (RMPs): the Big Dry (1995) RMP for eastern Montana; and the Judith Valley Phillips RMP (1992) for counties in northern Montana (**Figure 4-1**). New RMPs are currently being developed by the BLM for lands within the project area; however, they will not likely be available prior to commencement of the Project.

The BLM lands in the Project area are predominantly composed of grasslands utilized by ranchers for grazing their livestock (BLM 2008a), with lease agreements in place according to the RMPs. Construction and operation of the Project is consistent with the stipulations listed by the BLM RMPs and with current land uses. While some federally managed lands in southern Fallon County are currently operating under more stringent land use restrictions, these restrictions do not apply to the Project area as those parcels are not crossed. Types of utilities that could be located under the RMPs within a corridor include power lines, pipelines, significant canals, ditches and conduits, railroads, electric communication and microwave sites, communication lines, and highways (BLM 1995, 1985). The Project will conform with the RMPs subject to: 1) site-specific RMP stipulations such as seasonal closures, 2) site-specific stipulations for crossing special management areas, and 3) other general stipulations needed to reduce or eliminate impacts to resources.

The remaining 1.16 mile of federally owned lands crossed by the pipeline are owned by the DOD and are managed by the USACE and the crossing of water conveyances managed by BOR. The DOD lands are on the south and southeastern side of the Missouri River near the confluence with the Milk River. The land is primarily rangelands with interspersed trees and shrubs. Based on discussions with the USACE, there are no restrictions to granting a pipeline easement on these lands.

The crossings of canals, managed by the BOR in Montana, are approximately 50 feet wide. These canal crossings are not shown in the mileage or acreage calculation because the BOR has an easement for these canals and does not own the land. Based upon discussions with the local BOR representatives, there are no restrictions to granting a pipeline easement across these conveyances.

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Figure 4-1 BLM Resource Management Plan Boundaries

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The Project will require the issuance of ROW Grants and Temporary Use Permits from the BLM to cross the federally managed lands shown on maps in **Appendix A**. Issuance of the ROW Grants is considered a federal action and is subject to environmental review pursuant to NEPA (42 USC § 4321 et seq.). The remainder of this POD focuses on construction methods and impacts associated with federal lands, only, with the intent of providing the BLM adequate information to evaluate construction procedures for the Project for the purpose of issuing the necessary ROW Grant(s) and Temporary Use Permits. The POD references the Environmental Report and CMR Plan, provided to the DOS, the lead federal agency, for the purposes of the NEPA analysis. The BLM-Specific CMR Plan also is included as **Appendix B** of this document. The Environmental Report encompasses all lands, regardless of ownership or management, and includes an objective disclosure of environmental impacts, beneficial and adverse, resulting from the Project, as well as a set of reasonable alternatives. Additionally, along with the Environmental Report, Keystone submitted reports for biological, paleontological, and cultural resource surveys conducted during the spring, summer, and fall of 2008, 2009, 2010, and 2011 to the DOS on November 20, 2008, July 6, 2009, June 2010, and September 2012. Locations of federal lands crossed by the pipeline based on centerline mileposts are included in **Table 4-1**; locations of federal lands crossed by proposed access roads are included in **Table 4-2**. These locations are mapped, with township, range, and section identified, in **Appendix A**. A summary of estimated disturbance on federal lands associated with the Project and associated facilities are included in **Table 4-3**.

Power lines to pump stations that will be constructed across federal lands will require separate ROW Grant application submittals. Keystone has prepared a preliminary analysis of these lands for consideration under NEPA; maps applicable to power lines on federal lands are included in **Appendix C**.

Additional information on lands affected by the Project is included within resource discussions in Chapter 7.0 of this document, and within the Environmental Report filed with the DOS.

4.2 Right-of-Way Grant

Keystone requests a grant of a ROW that will include a permanent 50-foot easement for the pipeline, portions of four permanent access roads, and one IMLV on federal lands. With the exception of one 50-foot by 50-foot fenced area within the permanent ROW that will be maintained for one IMLV on federal lands, the entire permanent pipeline ROW will be reclaimed and after reclamation, grazing will be the primary land use.

In addition to the pipeline ROW, Keystone will require approximately 6.7 acres of federal lands for four permanent access roads (**Table 4-3**). These roads are provided in **Table 4-2** and on maps in **Appendix A**.

Table 4-1 Pipeline to be Located on Federal Lands

Start Milepost	End Milepost	Miles Crossed	Federal Owner	RMP
Montana				
Phillips County				
0.00	0.93[1]	0.93	Bureau Of Land Management	Judith Valley Phillips
2.47	2.64[1]	0.17		
6.03	6.25[1]	0.23		
9.20	9.74[1]	0.54		
11.40	12.33[1]	0.93		
13.06	13.78[1]	0.72		
15.38	15.42[1]	0.04		
21.30	21.66[1]	0.36		
24.99	25.11[1]	0.13		
Valley County				
28.84	28.87	0.03	Bureau Of Land Management	Judith Valley Phillips
32.62	33.60	0.98		
33.60	34.10	0.50		
34.10	34.84	0.74		
35.21	35.58	0.37		
35.58	36.32	0.75		
36.32	36.67	0.34		
37.07	37.34	0.27		
37.68	38.58	0.90		
38.58	38.86	0.28		
42.56	43.14	0.59		
45.82	46.19	0.37		
46.19	46.27	0.08		
46.27	46.59	0.32		
46.59	46.93	0.33		
46.93	46.96	0.03		
47.71	47.95	0.24		
47.95	48.47	0.52		
49.97	50.64	0.67		
50.64	50.69	0.05		
50.69	51.42	0.73		
51.42	52.01	0.59		
52.01	52.17	0.16		
52.17	52.36	0.18		
52.36	52.69	0.34		
52.69	52.94	0.24		
53.36	54.45	1.09		
54.68	55.20	0.51		
55.53	56.00	0.47		
56.00	56.16	0.17		
56.79	56.83	0.04		
57.17	57.50	0.34		

Table 4-1 Pipeline to be Located on Federal Lands

Start Milepost	End Milepost	Miles Crossed	Federal Owner	RMP
58.28	58.79	0.51		
58.79	59.31	0.52		
59.31	60.14	0.83		
60.14	60.59	0.44		
60.59	61.61	1.02		
62.45	62.84	0.39		
63.63	64.34	0.71		
65.22	65.71	0.49		
66.91	67.30	0.38		
67.30	68.33	1.04		
McCone County				
89.76	90.15	0.39	Bureau Of Land Management	
90.15	90.19	0.04		
90.19	90.48	0.28		
90.48	91.64	1.16	US Army Corps Of Engineers	
91.64	92.43	0.79		
92.43	93.09	0.66		
93.84	94.09	0.25		
94.09	95.16	1.07		
95.16	95.50	0.34		
95.80	96.44	0.64		
96.44	97.07	0.63		
99.73	100.04	0.32		
104.19	104.46	0.27		
107.31	107.55	0.24		Big Dry RMP
107.86	108.08	0.22		
109.78	110.43	0.65	Bureau Of Land Management	
111.13	111.22	0.09		
112.40	113.01	0.61		
113.01	113.03	0.02		
115.89	116.31	0.42		
116.31	116.56	0.25		
117.11	117.43	0.32		
117.43	117.81	0.38		
118.68	118.77	0.10		
120.08	120.60	0.53		
120.76	120.97	0.21		
127.52	127.55	0.03		
129.84	130.33	0.49		
Prairie County				
211.19	211.84	0.65	Bureau Of Land Management	Big Dry RMP
212.44	212.50	0.05		
212.50	213.14	0.65		
213.23	214.00	0.78		

Table 4-1 Pipeline to be Located on Federal Lands

Start Milepost	End Milepost	Miles Crossed	Federal Owner	RMP
214.00	214.45	0.45		
214.45	215.68	1.22		
215.68	215.68	0.01		
215.68	216.88	1.19		
216.88	217.66	0.79		
217.66	218.53	0.87		
218.53	218.88	0.35		
218.88	220.18	1.30		
Fallon County				
231.66	232.28	0.63	Bureau Of Land Management	Big Dry RMP
233.16	233.20	0.04		
233.20	233.76	0.56		
239.60	239.78	0.18		
249.20	249.91	0.71		
256.35	256.46	0.11		
256.66	256.89	0.23		
275.06	275.56	0.50		
Total Miles		**46.29**		

[1]Co-located with Northern Border Pipeline.
[2]One IMLV will be located at approximately Milepost 91.6.
NOTE: Permanent ROW requested would be 50 feet wide. Discrepancies in total miles are due to rounding

Table 4-2 Access Roads to be Located on Federal Lands

Access Road Designation	Corresponding Pipeline Milepost	Miles of Federal Lands Crossed	County	Existing or New Access road	Federal Owner
CAR-228	0.13	0.08	Phillips	Both	
CAR-001A	7.14	1.28	Phillips	Existing	
CAR-002A	14.39	0.10	Phillips	Existing	
CAR-003	16.92	0.52	Phillips	Existing	
CAR-005	23.16	0.26	Phillips	Existing	
CAR-006B	25.10	0.24	Phillips	Existing	
CAR-008	33.05	0.94	Valley	Both	
CAR-010A	38.20	1.42	Valley	Both	
CAR-012B	43.98	0.06	Valley	Existing	
CAR-013	46.49	1.33	Valley	Both	
CAR-068A[1]	49.28	0.85	Valley	Existing	
CAR-015A	51.44	0.83	Valley	Both	Bureau Of Land Management
CAR-016	54.34	1.81	Valley	Existing	

Table 4-1 Pipeline to be Located on Federal Lands

Start Milepost	End Milepost	Miles Crossed	Federal Owner		RMP
CAR-072	56.22	0.24	Valley	Existing	
CAR-084	56.87	0.42	Valley	Existing	
CAR-225	61.82	1.19	Valley	Existing	
CAR-154	64.52	0.41	Valley	Existing	
CAR-125	90.02	0.64	McCone	Existing	US Army Corps Of Engineers
CAR-227[1,2]	90.65	0.77	McCone	Both	US Army Corps Of Engineers
VAR-07[1,2]	91.75	0.04	McCone	Both	Bureau Of Land Management
CAR-089	117.11	0.52	McCone	Existing	
CAR-088	117.60	0.15	McCone	Existing	
CAR-086[1,2]	118.36	0.29	McCone	Existing	
CAR-024A	129.36	0.62	McCone	Existing	
CAR-040C	283.41	0.08	Fallon	Existing	

[1]Permanent Access Roads
[2]Valve Access Road Completely Within Permanent Easement

4.3 Temporary Use Permit

Keystone requests a temporary use permit on federal lands for areas required for construction of the Project, including a minimum of a 60-foot-wide temporary ROW, temporary work –spaces, and temporary roads to access the construction areas. The duration of the Temporary Use Permit, starting on the first day of construction through revegetation on federal land, is estimated to be a minimum of 24 months and a maximum of four years, dependent on revegetation success.

Approximately 335.73 acres will be disturbed and reclaimed due to the 60-foot temporary ROW, located in areas listed in **Table 4-3** and on maps in **Appendix A**, will be disturbed by the 60-foot temporary ROW and reclaimed. In addition, based on current analysis, Keystone will require an additional 109.40 acres for temporary work spaces associated with activities such as crossing waterbodies, roadways, or rough terrain, or for truck turnarounds. Preliminary location of these areas is shown on maps in **Appendix A**.

Temporary roads to construction areas, as listed in **Table 4-2**, also will cross federal lands. Roads will be maintained, improved, or newly constructed to be 30 feet wide to accommodate construction traffic. For the purposes of this POD, all existing roads are conservatively considered to require at least moderate improvement. Conservatively, construction of or improvements to approximately 15.07 miles of 30-foot-wide temporary access roads to cross federal lands is estimated to require approximately 53.92 acres.

Areas of temporary disturbance will be reclaimed to pre-existing conditions after construction.

Table 4-3 Summary of Land Requirements Associated with Federal Lands[1] on the Project in Montana

Facility	Land Required Under Temporary Use Permit[1] (acres)	Land Required Under ROW Grant[2] (acres)	Land Disturbed During Construction[3] (acres)
Pipeline ROW	335.73	280.73	616.46
Mainline Valve	0	0	0
Additional Work Spaces[4]	109.4	0	109.4
Access Roads[3]	47.06	6.86	53.92
Keystone XL Project Total[4,5]	**492.19**	**287.6**	**779.79**

[1]Pipeline disturbance is based on a total of 110-foot-wide construction ROW, except in areas requiring extra workspace necessitated by site conditions. Construction of one IMLV on federal lands will occur within the construction ROW.
[2]Operation acreage for the pipeline was estimated based on a 50-foot-wide permanently maintained ROW in all areas. One IMLV will be located on federal lands in a 50-foot by 50-foot area (approximately 0.06 acre) within the Permanently maintained ROW. No other aboveground facilities will be located on federal lands.
[3]Construction disturbance is the area temporarily disturbed for the Project, and is the sum of the areas requested under the temporary use permit as well as those under the ROW Grant, with the exception of the IMLV, which will be constructed and operated within the 50-foot permanent ROW.
[4]Does not include the potential for extended additional work spaces necessary for construction in rough terrain or in unstable soils. These locations are currently undergoing identification and analysis. Potential disturbance associated with these areas will be included in supplemental filings to BLM.
[5]Access road disturbance is based on a nominal 30-foot-wide disturbance for the length of all identified routes. Permanent impacts would be limited to access road CAR-068 associated with Pump Station 10.
[1]Includes USACE land.

5.0 Plan of Development

5.1 Relationship to Other Environmental Documents

This POD will be finalized based on the ongoing environmental analysis conducted through the NEPA process and preconstruction planning. Once finalized, this analysis will contribute measures for avoidance, minimization, and mitigation of environmental impacts resulting from construction of the pipeline facilities on federal lands. The POD appendices incorporate regulatory approvals, plans, permits, maps, and other authorizations that involve environmental requirements, and serve as the mechanism to implement BLM and DOD requirements identified during agency review of lands under federal jurisdiction. If amendments and/or additions to the appendices are recommended by regulatory agencies prior to or during construction of the project, the POD will be consistently and accurately maintained and updated as a reference document.

5.2 Federal and State Agencies Involved

A preliminary list of federal, state, and local permits and approvals is provided in **Table 5-1**. Individual road crossing and road use permits have been aggregated in this table under general county permits, since such permits will be a standard requirement in all counties crossed.

5.3 Permits and Relationship to Federal Policies, Plans, and Programs

A number of federal agencies have permitting, environmental review, and regulatory roles with respect to the Project. The roles of the applicable federal agencies with respect to the Project are summarized below.

The DOS is responsible for the issuance of a Presidential Permit authorizing the international border crossing. As the lead federal agency under NEPA, the DOS is responsible for conducting an environmental review pursuant to NEPA for the entire Project, as well as identifying potential cooperating agencies for the NEPA analysis. After consideration of the views of affected agencies and interested parties, the DOS makes a determination whether the pipeline will serve the national interest. If it is determined that issuance of a Presidential Permit will serve the national interest, the DOS prepares a permit including such terms and conditions identified during the NEPA review.

The BLM is a cooperating agency with jurisdictional authority over the project. As a cooperating agency, the BLM assisted in development of the August 2011 FEIS and is assisting in development of the Supplemental EIS (SEIS) with DOS to satisfy its responsibility under NEPA in considering Keystone's request for a ROW Grant. The ROW Grant application for the Project is subject to standard approval procedures as outlined in 43 Code of Federal Regulations (CFR) § 2800 and 2880. The BLM is responsible for mitigation measure compliance on federally

managed land, including BLM and DOD lands. BLM approval of Keystone's application for a ROW Grant requires that the project POD include site-specific stipulations, plans, permit conditions, and agreements developed during the course of the NEPA review.

The USACE, USFWS, Department of Transportation--Pipeline and Hazardous Materials Safety Administration (PHMSA), appropriate SHPO, and other state and local agencies also have regulatory authority. USACE has regulatory jurisdiction under Section 404 of the Clean Water Act (CWA) for the protection and management of waters and wetlands crossed by the projects. Section 404 of the CWA regulates the discharge of dredged material, placement of fill material, or excavation within waters of the US and authorizes the USACE to issue individual or nationwide permits for proposed actions. Keystone will comply with Sections 401 and 402 of the CWA through the delegated authority of the state regulatory approval process. DOS, in consultation with the USFWS, is the lead federal agency responsible for compliance with the Endangered Species Act (ESA) (Section 7). Keystone will comply with federal regulations governing the construction and safe operation of pipelines, enforced by PHMSA. DOS, in consultation with the Montana and other states SHPOs and Native American tribes, also is responsible for compliance with Section 106 of the National Historic Preservation Act (NHPA).

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
Federal		
U.S. Department of State (DOS)	Presidential Permit, Executive Order 13337 of April 30, 2004 (69 Federal Register [FR]. 25299, et seq.)	Considers approval of cross-border facilities.
	National Environmental Policy Act (NEPA)	Lead federal agency for the environmental review in connection with consideration of Presidential Permit application
	Section 106 of the National Historic Preservation Act (NHPA)	Supervises and coordinates compliance with Section 106 of NHPA and consultation with interested Tribal agencies
	Section 7 of the Endangered Species Act (ESA)	Coordinates ESA consultation with the United States Fish and Wildlife Service (USFWS)
Bureau of Land Management (BLM)	The right-of-way (ROW) and temporary use permit (TUP) for the pipeline would be under Section 28 of the Mineral Leasing Act (MLA). The ROW and short-term ROWs for ancillary facilities such as powerlines would be under the Federal Land Policy and Management Act (FLPMA).	Considers approval of ROW grant and temporary use permits for the portions of the Project that would encroach on public lands

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
	Archeological Resources Protection Act (ARPA) Permit	Considers issuance of cultural resource use permit to survey, excavate or remove cultural resources on federal lands
	Notice to Proceed	Following issuance of a ROW grant and approval of the Project's Plan of Development (POD), considers the issuance of a Notice to Proceed with Project development and mitigation activities for federal lands
	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Corps of Engineers (USACE) – Omaha District	Section 404, Clean Water Act (CWA)	Considers issuance of Section 404 permits for the placement of dredge or fill material in Waters of the U.S., including wetlands
	Section 10 Permit (Rivers and Harbors Act of 1899)	Considers issuance of Section 10 permits for pipeline crossings of navigable waters
	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act (ESA) Section 7 Consultation, Biological Opinion	Considers 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
U.S. Bureau of Reclamation (Reclamation)	ROW Grant and Temporary Use Permit under Section 28 of the MLA	Determines if ROW grant issued under MLA by BLM is in compliance with Reclamation standards
	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
Federal Highway Administration (FHA)	Crossing Permit	Considers issuance of permits for the crossing of federally funded highways

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety	49 CFR Part 195 – Transportation of Hazardous Liquids by Pipeline	Reviews design, construction, operations, maintenance, and emergency operations plan (termed Emergency Response Plan [ERP]), inspection of pipeline projects, including Integrity Management Programs and identifying high consequence areas prior to installation
	49 CFR Part 194 – Response Plans for Onshore Pipelines	Reviews Response Plans (termed Pipeline Spill Response Plan [PSRP]) prior to initiation of operation and within 2 years of startup approves the PSRP.
U.S. Environmental Protection Agency, Regions 6, 7, and 8	Section 401, CWA, Water Quality Certification	Considers approval of water use and crossing permits for non-jurisdictional waters (implemented through each state's Water Quality Certification Program)
	Section 402, CWA, National Pollutant Discharge Elimination System (NPDES)	Reviews and issues NPDES permit for the discharge of hydrostatic test water (implemented through each state's Water Quality Certification Program, where required)
U.S. Department of Agriculture – Natural Resources Conservation Service	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Department of Agriculture – Farm Service Agency	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Department of Agriculture – Rural Utilities Services (RUS)	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
Western Area Power Administration (Western)	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
Advisory Council on Historic Preservation	Consultation	Advises federal agencies during the Section 106 consultation process; signator to the

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
		Programmatic Agreement
U.S. Department of Treasury – Bureau of Alcohol, Tobacco, and Firearms	Treasury Department Order No. 120-1 (former No. 221), effective 1 July 1972	Considers issuance of permit to purchase, store, and use explosives should blasting be required
Montana		
Montana State Historic Preservation Office (SHPO)– Montana Historical Society[3]	Section 106 consultation regarding National Register of Historic Places (NRHP) eligibility of cultural resources and potential Project effects on historic properties, Compliance with Montana State Antiquities Act	Reviews and comments on activities potentially affecting cultural resources
Montana Department of Environmental Quality (MDEQ)	Certificate of Compliance under the state Major Facility Siting Act (MFSA)	A MFSA Certificate was issued in March 2012
MDEQ – Permitting and Compliance Division – Water Protection Bureau	Montana Ground Water Pollution Control System and Non-degradation Review (three levels of water protection based on water classification, i.e., outstanding resource waters etc.), Standard 318 (Permitting conditions for Pipeline Crossings at Watercourses – short term turbidity)	Considers issuance of permit for stream and wetland crossings; provides Section 401 certification consults for Section 404 process
	Montana Pollutant Discharge Elimination System (MPDES)	Considers issuance of permit for hydrostatic test water discharge into surface water, trench dewatering, and stormwater discharge
MDEQ – Permitting and Compliance Division – Waste and Underground Tank Management Bureau	Septic Tank, Cesspool, and Privy Cleaner New License Application Form (for work camps)	Reviews and licenses Cesspool, Septic Tank and Privy Cleaners, inspects disposal sites for septic tank, grease trap and sump wastes
MDEQ – Permitting and Compliance Division – Air Resources Bureau	Air Quality Permit Application for Portable Sources; Air Quality Permit Application for Stationary Sources	Considers issuance of air quality permit(s) for work camps dependent on source of power such as portable diesel generator or use of non-electrical equipment is used during construction or operation of the pipeline (i.e., diesel powered pumps during hydrostatic testing)
MDEQ – Permitting and Compliance Division – Public Water Supply Bureau	Water and Wastewater Operator Certification (for work camps)	Reviews and licenses operators of certain public drinking water and wastewater treatment

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
		facilities; issues approval to construct, alter or extend public water or sewer systems (including hauling, storage and distribution of water)
Montana Department of Natural Resources and Conservation (DNRC) – Water Resources Division (General)	Water Appropriation Permit (Beneficial Water use Permit) and/or Water Wells Drilling/ Alteration	Considers issuance of permit for water use for hydrostatic testing or waters for dust control
Montana DNRC State Board of Land	Management of timber, surface, and mineral resources for the benefit of the common schools and the other endowed institutions in Montana	Considers approval of permanent easements across state land
Montana DNRC State Board of Land and, Real Estate Management Division	Administers all activities on lands classified as "Other" and all secondary activities on lands classified as grazing, agriculture, or timber	Considers issuance of license to use state land
Montana DNRC Trust Land Management Division	Navigable Rivers/Land use License/Easement	Consults on and considers issuance of permits for projects in, on, over, and under navigable waters
Montana DNRC, Conservation Districts	Natural Streambed and Land Preservation Act (also known as the 310 Law)	Consider issuance of permits for construction in perennial streams, rivers, or designated reservoirs on private land
Montana Fish, Wildlife and Parks	Natural Streambed and Land Preservation Act (also known as the 310 Law)	Provide technical oversight to DNRC Conservation Districts in review of applications for 310 permits
Department of Transportation – Glendive District	State and Highway Crossing Permit for pipeline and access roads that encroach state highway ROW, with traffic control based on the Manual on Uniform Traffic Control Devices	Considers issuance of permits for crossings of state highways
Department of Transportation – Helena Motor Carrier Services (MCS) Division Office	Oversize/Overweight Load Permits, where required	Considers issuance of permit for oversize/overweight loads on state maintained roadways
Montana Public Service Commission	Grant Common Carrier Status	Considers whether or not an applicant qualifies as a common carrier under Montana Annotated Code (MAC) 69-13-

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
		101; as Keystone has been determined to be a common carrier, the commission would supervise and regulate operations under MCA Title 69 allowing Keystone to cross state highways and state streams.
County Road Departments	Crossing Permits	Considers issuance of permits for crossing of state highways
County Floodplain Departments	County Floodplain permitting	Considers issuance of permits and review of work in floodplains
County and Local Authorities	Pump Station Zoning Approvals, where required	Reviews under county approval process
	Special or Conditional Use Permits, where required	Reviews under county approval process (Note: These permits are not required after a Certificate of Compliance under MFSA is issued)
County Weed Control Boards	Approval of reclamation plan	Considers approval of a reclamation/weed control plan (Note: These approvals still required after Certificate of Compliance under MFSA is issued)
South Dakota[2]		
South Dakota Historical Society[3]	Consultation under Section 106, NHPA	Reviews and comments on activities potentially affecting cultural resources
South Dakota Public Utilities Commission	Energy Conversion and Transmission Facilities Act	A PUC Certificate was issued in March 2010, as amended in June 2010
Department of Environment and Natural Resources, Surface Water Quality Program	Section 401, CWA, Water Quality Certification	Considers issuance of permit for stream and wetland crossings; consult for Section 404 process
	Hydrostatic Testing/Dewatering & Temporary Water Use Permit (SDG070000)	Considers issuance of General Permit regulating hydrostatic test water discharge, construction dewatering to waters of the state, and Temporary Water use Permit
	SDCL 34A-18 (oil spill response plans).	Review and consider approving crude oil pipeline spill response plans.

Table 5-1 Permits, Licenses, Approvals, and Consultation Requirements for the Project

Agency[1]	Permit or Consultation/Authority	Agency Action
Department of Game, Fish, and Parks	Consultation	Consults regarding natural resources
Department of Transportation	Crossing Permits	Considers issuance of permits for crossing of state highways
County Road Departments	Crossing Permits	Considers issuance of permits for crossing of county roads
County and Local Authorities	Pump Station Zoning Approvals, where required	Reviews under county approval process
	Special or Conditional Use Permits, where required	Reviews under county approval process
Nebraska		
Nebraska State Historic Preservation Office (SHPO)[3]	Consultation under Section 106, NHPA	Reviews and comments on activities potentially affecting cultural resources
Department of Environmental Quality (DEQ)	Nebraska Legislative Bills 4 and 1161	Complete a Supplemental Environmental Impact Statement for review by the Nebraska Governor
DEQ, Division of Water Resources	Section 401, CWA, Water Quality Certification	Considers issuance of permit for stream and wetland crossings; consult for Section 404 process
	Excavation Dewatering and Hydrostatic Testing Permit Form NEG6720000 Dewatering Form NEG6721000 Relocation	Considers issuance of permit regulating hydrostatic test water discharge and construction dewatering to waters of the state
Department of Natural Resources	Water Appropriations – Groundwater and Surface Water	Considers issuance of permit to use Public Waters (for hydrostatic test water or dust control)
Game and Parks Commission	Consultation	Consults regarding natural resources
Department of Transportation	Crossing Permits	Considers issuance of permits for crossing of state highways
County Road Departments	Crossing Permits	Considers issuance of permits for crossing of county roads
County and Local Authorities	Pump Station Zoning Approvals, where required	Reviews under county approval process
	Special or Conditional Use Permits, where required	Reviews under county approval process

[1] All permits are considered attainable and consistent with existing land use plans based on consultation with the relevant agencies listed in the table.
[2] Permits associated with construction camps are described in the FEIS Section 2.2.7.4.
[3] The SHPO has the opportunity to review federal agency decisions under Section 106 of the National Historic Preservation Act, but this is not a legal obligation.

5.4 Permits and Relationship to Non-federal Policies, Plans, and Programs

In Montana, the Project requires a certificate under the Montana MFSA, under 75-20-101 et seq., Montana Code Annotated, which includes environmental review under the Montana Environmental Policy Act (MEPA). The MDEQ issued its Montana Major Facility Siting Act (MFSA) Certificate (March 30, 2012) requiring Keystone to utilize the Montana route variations identified in the FEIS. Since adopting those route variations, Keystone has worked with landowners to follow the MFSA-designated corridor (500 feet) as well as minimize landowner and environmental impact. A total of 64 route changes were implemented. None of the Montana route changes are outside of the 500-foot corridor; all are compliant with the requirements of MDEQs environmental specifications.

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6.0 Construction

Keystone will implement an environmental compliance program for the Project. Construction of the Project on federal lands will begin after all applicable state and federal ROW grants and permits have been acquired for the Project. Conditions and requirements will be reviewed with the installation contractor and procedures established to ensure personnel are familiar with the conditions and that they will be adhered to during construction. Keystone personnel, Keystone's chief inspector, construction contractor, and environmental inspectors will receive copies of the following prior to commencement of construction activities:

- All conditions placed on construction that have been agreed to by Keystone and the landowners;
- Conditions contained in the required permits, as well as Keystone's POD and BLM-Specific CMR Plan;
- Any approved alterations to the POD and BLM-specific CMRP; and,
- Procedures detailed in the Construction/Reclamation Unit Specifications in Appendix P.

6.1 Construction Impact Mitigation Procedures

The facilities will be designed, constructed, tested, and operated in accordance with all applicable requirements, including in the US Department of Transportation (USDOT) regulations at 49 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.

To manage construction impacts, Keystone will implement the procedures detailed in its BLM-Specific CMRP (**Appendix B**) and the Construction/Reclamation Unit Specifications in Appendix P. Where procedures are not detailed in the Construction/Reclamation Unit Specifications, Keystone will implement the procedures detailed in its BLM-Specific CMRP (Appendix B)." This plan contains construction and mitigation procedures that will be used throughout the Project. Subsections address specific environmental conditions.

A Project Spill Prevention, Control, and Countermeasures (SPCC) Plan (**Appendix E**) will be implemented to avoid or minimize the potential for harmful spills and leaks during construction. The plan describes spill prevention practices, emergency response procedures, emergency and personal protection equipment, release notification procedures, and cleanup procedures.

Mitigation and other measures contained in this POD will apply to the basic design and construction specifications applicable to federal lands disturbed by the Project.

6.2 Pipeline Construction Process

Before starting construction at a specific site, Keystone will finalize engineering surveys of the ROW centerline and additional temporary work spaces and complete the acquisition of ROW easements.

Pipeline construction generally proceeds as a moving assembly line as shown in **Figure 6-1** and summarized below. Keystone currently plans to construct the pipeline through Montana in four spreads; three of which cross Federal lands. Standard pipeline construction is composed of specific activities including survey and staking of the ROW, clearing and grading, pipe stringing, bending, trenching, welding, lowering in, backfilling, hydrostatic testing, and cleanup. 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 rugged terrain, waterbodies, wetlands, paved roads, highways, and railroads.

6.2.1 Survey and Staking

The first step of construction involves marking the limits of the approved work area (i.e., the construction ROW boundaries and any temporary work spaces) and flagging the location of approved access roads and existing utility lines. Before clearing and grading activities commence, landowner fences will be braced and cut and temporary gates and fences will be installed by the fence crew to contain livestock, if present. Wetland boundaries and other environmentally sensitive areas will be marked or fenced for protection at this time. Before the pipeline trench is excavated, a survey crew will stake the centerline of the proposed trench.

6.2.2 Clearing, Topsoil Salvage, and Grading

A clearing crew will follow the fence crew and will clear the work area of vegetation (including crops) and obstacles (e.g., trees, logs, brush, rocks). Temporary erosion control measures, such as silt fence, will be installed prior to or immediately following vegetation removal down slopes into wetlands and riparian areas. Straw bales may be used where they are the only option.

Following the clearing crew, the grading crew will perform earthmoving to create a safe and level workspace. Topsoil will typically be salvaged over the entire ROW. Salvage depths will typically be a minimum of 4 inches to a maximum of 12 inches depending on the depth of topsoil present in the area. Topsoil will be salvaged over the trench-line only; the trench and working side, in limited areas where topography allows and where it is important to maintain root structures in place to minimize impacts to specific soil or vegetation resources; or from the full construction ROW (see 6.2.4). . On USDI-BLM lands, topsoil shall be salvaged over the entire ROW. Topsoil salvaging shall be done as detailed in the Construction/Reclamation Unit Specifications and the Keystone XL Pipeline Special Soil Handling Report – Montana.

Figure 6-1 Pipeline Construction Process – Typical Pipeline Construction Spread Layout

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Grading will be kept to a minimum but will be conducted where necessary to provide a reasonably level work surface. Where the ground is relatively flat and does not require grading, rootstock will be left in the ground. More extensive grading will be required on steep side slopes or vertical areas and, where necessary, to avoid excessive bending of the pipe.

The minimum clearing and grading equipment per spread is as follows: six D8 dozers, one 330 backhoe (thumb and hoe pack), two 345 backhoes, two D8 ripper dozers, and one 140 motor grader. Two environmental crews will be required per spread for installing silt fence and hay bale structures, as required.

6.2.3 Disposal of Vegetation Removed During Construction

The primary need for disposal of vegetation will arise from construction in forested areas. Section 4.13 of the BLM-Specific CMRP addresses timber removal and treatment. Generally, where practicable, or where required by BLM, usable timber will be salvaged. Tree stumps shall be grubbed to a maximum of 5 feet on either side of the trench line and where necessary for grading a level surface for pipeline construction equipment to operate safely. Stump removal and brush clearing shall be done with bulldozers equipped with brush rakes to preserve organic matter. The Contractor shall not be allowed to dispose of woody debris in wooded areas along the pipeline ROW. All tree wastes, stumps, tree crowns, brushes, branches, and other forest debris shall be either burned (with appropriate burn permits), chipped (using a mobile chipper), or removed from the ROW according to stipulations contained in the ROW Grant. Burial of this waste vegetative material on the site shall require the authorization of BLM. Chips must not be spread over cultivated land; however, they may be spread and incorporated with mineral soil over the forest floor at a density that shall not prevent revegetation of grass, in consultation with Natural Resources Conservation Service (NRCS) and BLM. If salvage is not ~~–~~required, Contractor will be allowed to salvage all marketable timber from designated areas. In this case, the contractor will remove stacked timber from the construction ROW and transport it to a designated offsite access point or lumber mill.

6.2.4 Trenching

The trench will be excavated to a depth that provides sufficient cover over the pipeline after backfilling. Typically, the trench will be 7 to 8 feet deep and 4 to 5 feet wide in stable soils. In most locations, the depth of cover over the pipeline will be a minimum of 48 inches, as discussed in more detail in Section 6.6. Trenching may precede bending and welding or may follow, depending upon several factors, including soil characteristics, water table, presence of drain tiles, and weather conditions at the time of construction.

When rock or rocky formations are encountered, tractor-mounted mechanical rippers, or rock trenchers, will be used to fracture the rock prior to excavation. In areas where mechanical

equipment cannot break up or loosen the bedrock, blasting (use of explosives) will be required. Excavated rock will be used to backfill the trench to the top of the existing bedrock profile.

Topsoil segregation will be separated from subsoil over the full width of the ROW on USDI-BLM lands.. This will allow for proper reclamation of the soil during the backfilling process. Topsoil will not be stored in riparian or floodplain areas expected to flood during construction.

The minimum trenching equipment per spread is as follows: six 345 backhoes, one 345 backhoe with pecker hammer, and two ditching machines.

6.2.5 Pipe Stringing, Bending, and Welding

Prior to or following trenching, sections of externally-coated pipe nominally 80 feet long (also referred to as “joints”) will be transported by truck to the ROW and placed or “strung” along the trench in a continuous line. After the pipe sections are strung along the trench and before joints are welded together, individual sections of the pipe will be bent to conform to the contours of the trench by a track-mounted, hydraulic pipe-bending machine. Where multiple or complex bends are required in a section of pipe, that section of the pipeline will be bent at the factory. After the pipe sections are bent, the joints will be welded together into long strings and placed on temporary skid supports.

The pipeline joints will be lined up and held in position until securely joined by welding. Keystone will non-destructively inspect 100 percent of the welds using non-destructive testing (NDT) methods, such as radiographic, ultrasonic, or other USDOT-approved inspection method. Welds that do not meet established specifications will be repaired or removed. Once the welds have passed inspection, a protective epoxy coating will be applied to the welded joints. The pipeline will then be electronically inspected or “jeeped” for faults or voids in the epoxy coating and visually inspected for any faults, scratches, or other coating defects. Any damage to the coating will be repaired before the pipeline is lowered into the trench.

To minimize the impact on agricultural areas, livestock, and wildlife movements during construction, Keystone will leave hard plugs (short lengths of unexcavated trench) or install soft plugs (areas where the trench is excavated and replaced with minimal compaction) to allow machinery, livestock, and wildlife to cross the trench safely. Soft plugs will be constructed with a ramp on each side to provide an avenue of escape for animals that may fall into the trench.

Prior to lowering the pipe into the trench, multiple sections of pipe may be welded together above the trench. These welded pipe strings may be greater than 1 mile in length. Keystone will lower these sections of pipeline into the trench using side boom tractors.

The minimum stringing, bending, and welding equipment per spread is as follows: two 345 backhoes – one at the pipe yard and one at the ROW; one D7 dozer; eight string trucks; two bending machines; thirteen 572 side booms; one mechanized welding machine with end-facing

machine; one welding shack; eight ultrasonic testing units; one hand scanner; one sled; two heat rings; two coating rings; and one sled with generators.

6.2.6 Lowering in and Backfilling

Before the pipeline is lowered in, the trench will be inspected to be sure it is free of rock and other debris that could damage the pipe or protective coating. In areas where water has accumulated, dewatering may be necessary to permit inspection of the bottom of the trench. The pipeline then will be lowered into the trench.

On sloped terrain, trench breakers (stacked sand bags or foam) will be installed in the trench at specified intervals to prevent subsurface water movement along the pipeline. The trench will then be backfilled using the excavated material.

In rocky areas, the pipeline will be protected with an abrasion-resistant coating or rock shield (fabric or screen that is wrapped around the pipe to protect the pipe and its coating from damage by rocks, stones, and roots). Alternatively, the trench bottom will be filled with padding material (e.g., finer grain sand, soil, or gravel) to protect the pipeline. Topsoil will never be used as padding material.

The minimum equipment per spread for lowering in and backfilling is as follows: three 345 backhoes (one equipped with long neck), five 583 side booms, two padding machines, and three D8 dozers.

Three tie-in crews per spread will be utilized to complete the tie-ins to the mainline. The minimum equipment per spread per tie-in crew is as follows: two welding machines; welding shacks, seven 572 side booms, eight ultrasonic testing units, hand scanner, sled, two heat rings, two coating rings, sled with generators, two 345 backhoes (one equipped with shaker bucket), one 583 side boom, and one D8 dozer.

6.2.7. Hydrostatic Testing

The pipeline will be hydrostatically pressure tested in sections determined by the pipe elevation to ensure the system is capable of withstanding the operating pressure for which it is designed. This process involves isolating the pipe segment with test manifolds, filling the line with water, pressurizing the section to a pressure at least 1.25 times the MOP, and maintaining that pressure for a period of 8 hours. The hydrostatic test will be conducted in accordance with 49 CFR Part 195.

Keystone proposes to obtain water for hydrostatic testing from rivers and streams crossed by the pipeline and in accordance with federal, state, and local regulations. Hydrostatic testing will occur in sections approximately 30 miles in length (with a maximum of 50 miles). The volume of water required for testing 50 miles of pipe is approximately 14 million gallons, or 43 acre-feet. One

bank of a proposed source, the Missouri River, is on federal lands, and tributaries to another source, Cabin Creek, are on federal lands. The pipeline will be hydrostatically tested after backfilling and all construction work that will directly affect the pipe is complete. If leaks are found, they will be repaired and the section of pipe retested until specifications are met. Water used for the testing may then be transferred to another pipe section for subsequent hydrostatic testing. The water will be returned to the original source as required. The water will be tested to ensure compliance with the general discharge permit in compliance with National Pollutant Discharge Elimination System (NPDES) requirements, treated if necessary, and discharged.

Hydrostatic test water will be discharged to the land surface at an approved location near the source or directly to the waterbody source. All discharges will be directed into –Keystone-approved energy dissipation devices, depending on NPDES discharge permit requirements. Discharged water on the ground may evaporate or infiltrate into the soil or drainage where the water is released. The discharge of hydrostatic test water will follow state permit requirements, which would reduce potential effects on water quality or aquatic organisms. Energy dissipaters will be used to prevent erosion at discharge locations.

6.2.8 Final Tie-ins

Following successful hydrostatic testing, test manifolds will be removed and the final pipeline tie-in welds will be made and inspected.

6.2.9 Commissioning

After the final tie-ins are complete and inspected, the pipeline will be cleaned and dewatered. Commissioning involves verifying that equipment has been installed properly and is working, that controls and communications systems are functional, and that the pipeline is ready for service. In the final step, the pipeline is prepared for service by filling the line with crude oil.

6.2.10 Cleanup and Reclamation

After backfilling, final cleanup will begin as soon as weather and site conditions permit. Every reasonable effort will be made to begin final cleanup (including final grading and installation of permanent erosion control devices) as soon as possible and complete final cleanup within approximately 20 days after backfilling the trench. During cleanup, construction debris on the ROW will be removed and disposed of and work areas will be final graded and preconstruction contours will be restored as closely as possible. Segregated topsoil will be returned and spread over the surface of the ROW and permanent erosion controls will be installed.

After permanent erosion control devices are installed and final grading is complete, all disturbed work areas, except annually cultivated fields, will be seeded as soon as possible. Seeding is intended to stabilize the soil, revegetate areas disturbed by construction, and restore native

vegetation. Timing and methodology of the reseeding efforts shall be completed as detailed in the Construction/Reclamation Unit Specifications.

The minimum cleanup and reclamation equipment per spread is as follows: six D8 dozers, three 345 backhoes, and two tractors with mulcher spreaders (seed and reclamation).

6.2.11 Additional Construction Spread Requirements

In addition to the equipment described above, the following resources typically will be deployed on each spread, though the number of personnel and equipment would be limited at any given time, as depicted in **Figure 6-1**:

- 500 to 600 construction personnel;
- 50 inspection personnel;
- 85 pickups, water trucks, tractor trailers;
- 7 equipment low-boys;
- 7 flat beds; and
- Five 2-ton bob tails.

6.3 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 crossing paved roads, highways, railroads, steep terrain, waterbodies, wetlands, and when blasting through rock. These special techniques anticipated on federal lands are described in the following sections.

Crossing of BOR canals will be completed according to procedures contained in Appendix M - BOR Required Crossing Criteria for Reclamation Facilities (August 2010).

6.3.1 Road, Highway, and Railroad Crossings

Construction across roads will be in accordance with the requirements in crossing permits and approvals obtained by Keystone. On federal lands, roadways crossed generally will be smaller, unpaved roads and driveways. These roads will be crossed using the open-cut method where permitted 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 restored within 1 or 2 days. Keystone will take measures, such as posting signs at open-cut road

crossings to ensure safety and minimize traffic disruptions and prepare traffic control plans in accordance with the applicable regulations as necessary.

Roads that cannot be crossed using the open-cut method may be crossed by boring beneath the road. **Figure 6-2** illustrates a typical bored road crossing. Boring requires the excavation of a pit on each side of the feature to be crossed, 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. For long crossings, sections can be welded onto the pipe string just before being pulled through the borehole. Boring will result in minimal or no disruption to traffic at road crossings, and will typically take 1 to 2 days.

6.3.2 Steep Terrain

Additional grading may be required in areas where the 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 operations. In such areas, the slopes will be excavated prior to pipeline installation and restored following backfill to a stable condition.

In areas where the pipeline route crosses laterally along the side of a slope, cut and fill grading may be required to obtain a safe, flat work terrace and to accommodate pipeline bending limitations. Topsoil will be stripped from the entire ROW and stockpiled prior to cut and fill grading on the side slope. During construction, topsoil piles will be protected from erosion through matting, mulching, or watering, as necessary, based on site-specific conditions. After the pipeline is installed, the slope's contour will be restored as near as practicable to pre-construction condition. Topsoil from the stockpile will be spread over the surface, erosion control measures installed, and seeding implemented as specified detailed in its BLM-Specific CMRP (Appendix B)."

In areas with greater than 5 percent slopes or with highly erodible soils, temporary sediment barriers such as silt fence will be installed during clearing to prevent the movement of disturbed soil into wetland, waterbody, or other environmentally sensitive areas. Straw bales may be used where they are the only option. Temporary slope breakers consisting of mounded and compacted soil berms will be installed across the ROW during grading and permanent slope breakers will be installed during cleanup. Mulch or tackifier may be applied in areas of high erosion potential or with greater than 8 percent slopes. Following construction, land imprinting or other techniques will be used to scarify the slope, if needed; approved seed mixes will be applied to steep slopes and the ROW will be mulched with hay, non-brittle straw, wood straw, or covered with biodegradable erosion control fabric. Sediment barriers will be maintained across the ROW until permanent vegetation is established. Fencing or other livestock management measures may be implemented during re-establishment of vegetation. Additional temporary work spaces may be required for storage of graded material and/or topsoil during construction.

Figure 6-2 Typical Bored Road or Railroad Crossing

8.5 x 11 B&W

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Keystone has identified an area on BLM land with steep slopes that will require an alternative route to pass through the area (MP 115, McCone County, Montana). Landowners surrounding the BLM parcel have denied access through their property into this location for constructability reviews. Once access can be granted, Keystone will work with BLM to develop a suitable crossing location and construction/reclamation measures for this area.

6.3.3 Waterbody Crossings - Perennial

See **Table 7-6** for a list of all waterbody crossings on federal lands. The Missouri River will be crossed using the HDD method. The only perennial waterbody crossing is the unnamed tributary to Struple Coulee near MP 91.5, which will be crossed using dry flume or dry dam-and-pump methods (CMRP Details 13 and 14). A bridge would be installed across the creek to allow mainline construction equipment to pass over the creek, and the stream crossing would be constructed in a short period of time (24 to 48 hours) using a separate specialty construction crew. The flume crossing method involves diverting the flow of water across the trenching area through one or more flume pipes placed in the waterbody. The dam-and-pump method is similar to the flume method except that pumps and hoses will be used instead of flumes to move water around the construction work area. In both methods, trenching, pipe installation, and backfilling are done while water flow is isolated from construction. Once backfilling is completed and the stream channel is restored to original grade, the stream banks are restored and stabilized and the flume or pump hoses are removed.

The HDD method involves drilling a pilot hole under the waterbody and banks, then enlarging the hole through successive reaming passes 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 in a closed loop system to power and lubricate the drill bit, 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 waterbody and then pulled through the drilled hole. Ideally, use of the HDD method results in no impact on the banks, bed, or water quality of the waterbody being crossed (BLM-Specific CMRP Detail 15).

If a waterbody is flowing at the time of construction, the Project will utilize dry flume or dry dam-and-pump methods (BLM-Specific CMRP Details 13 and 14). The flume crossing method involves diverting the flow of water across the trenching area through one or more flume pipes placed in the waterbody. The dam-and-pump method is similar to the flume method except that pumps and hoses will be used instead of flumes to move water around the construction work area. In both methods, trenching, pipe installation, and backfilling are done while water flow is isolated from construction. Once backfilling is completed, the stream banks are restored and stabilized and the flume or pump hoses are removed.

Approximately 9 intermittent waterbody crossings are required by the Project on federal lands. In the event these intermittent waterbodies are dry at the time of crossing, Keystone proposes to use modified conventional upland cross-country construction techniques that would prevent ponding on the ROW if water were to flow through the waterbody during construction and reduce sediment from reaching the waterbody (-CMRP Detail 11). If an intermittent waterbody is flowing when crossed, Keystone will install the pipeline using one of the dry-ditch crossing methods discussed previously. When crossing waterbodies, Keystone will adhere to the guidelines outlined in its Site-specific Waterbody Crossing Plan for the Missouri River (**Appendix D**), and/or Keystone's BLM-Specific -CMRP located in **Appendix B** and the requirements of its waterbody crossing permits. There are no perennial streams on federal lands in Montana that are crossed by the open cut wet method. Canal crossings on BOR lands are detailed in Appendix M.

6.3.4 Wetland Crossings

Data from wetland delineation field surveys, aerial photography, and National Wetland Inventory (NWI) mapping were used to identify wetlands crossed by the pipeline. Pipeline construction across wetlands will be similar to typical conventional upland cross-country construction procedures, with several modifications where necessary to reduce the potential for pipeline construction to affect wetland hydrology and soil structure.

The wetland crossing method used will depend largely on the stability of the soils at the time of construction. If wetland soils are not excessively saturated at the time of construction and can support construction equipment without equipment mats, construction will occur in a manner similar to conventional upland cross-country construction techniques (BLM-Specific CMR Plan Detail 8). Where possible, topsoil will be segregated over the trench line; however, in most saturated soils, topsoil segregation will not be possible. Temporary work spaces will be required on both sides of particularly wide saturated wetlands to stage construction, fabricate the pipeline, and store materials. These work spaces will be located in upland areas a minimum of 10 feet from the wetland edge.

Construction equipment working in saturated wetlands will be limited to that area essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where there is no reasonable access to the ROW except through wetlands, non-essential equipment will be allowed to travel through wetlands only if the ground is firm enough or has been stabilized to avoid rutting.

Clearing of vegetation in wetlands will be limited to trees and shrubs, which will be cut flush with the surface of the ground along the working side of the ROW and removed from the wetland. To avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland soils, stump removal, grading, topsoil segregation, and excavation will be limited to the area immediately over the trench line. During clearing, sediment barriers, such as silt fence, will be installed and maintained on down slopes adjacent to saturated wetlands and within work spaces

as necessary to minimize the potential for sediment runoff. Straw bales may be used where they are the only option.

Where wetlands are located at the base of slopes, permanent slope breakers will be constructed across the ROW in upland areas adjacent to the wetland boundary. Temporary sediment barriers will be installed where necessary until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers will be removed from the ROW and disposed of properly.

Wetlands typically reestablish volunteer hydrophytic vegetation that is appropriate to the site quickly following pipeline disturbance. Wetlands should only be reseeded if directed by the BLM and USACE.

6.3.5 Blasting

Blasting may be required in areas where consolidated shallow bedrock or boulders cannot be removed by conventional excavation methods. If blasting is required to clear the ROW and to fracture rock within the ditch, strict safety precautions will be followed. Keystone will exercise extreme care to avoid damage to underground structures, cables, conduits, pipelines, and underground watercourses or springs. To protect property and livestock, Keystone will provide adequate notice to adjacent landowners or tenants in advance of blasting. Blasting activity will be performed during daylight hours and in compliance with federal, state, and local codes and ordinances and manufacturers' prescribed safety procedures and industry practices.

6.3.6 Residential and Commercial Construction

No residential or commercial construction on federal lands was identified in the vicinity of the Project.

6.3.7 Fences and Grazing

Fences will be crossed or paralleled by the construction ROW. Before cutting any fence for pipeline construction, each fence will be braced and secured to prevent the slacking of the fence and a temporary gate will be installed. To prevent the passage of livestock the gates will be closed when construction crews leave the area. If gaps in natural barriers used for livestock control are created by pipeline construction, the gaps will be fenced according to land management agency or lessee's requirements. All existing improvements, such as fences, gates, irrigation ditches, cattle guards, and reservoirs will be maintained during construction and repaired to pre-construction conditions or better upon completion of construction activities.

6.3.8 Fueling

On lands administered by the BLM, distances from specific sensitive features for equipment parking, refueling, and materials storage will be specified in the BLM-Specific CMRP (**Appendix**

B). Contaminants from construction equipment, welding, and refueling could enter flows, pools, and sediments at waterbody crossings. To minimize the occurrence of such impacts, Keystone has developed a SPCC Plan in accordance with state permit requirements as **Appendix E** of this POD.

6.3.9 Access Roads

Prior to the pipeline's installation, Keystone and the BLM will reach a mutually acceptable agreement of routes crossing federal lands that will be utilized by the Contractor for entering and exiting the pipeline construction ROW. Twenty-five access roads crossing federal lands, as discussed in Section 3.3.7 and listed in **Table 4-2**, are required for construction and operation of the Project. These roads are shown on the maps in **Appendix A**. For a complete list of access roads, regardless of ownership, see the Environmental Report. Four roads leading to IMLVs and a pump station will be maintained for the life of the Project. Existing two-track roads will require modification to accommodate Project traffic. Direct access to the pipeline ROW also will require construction of new roads that connect existing roads to the ROW. Gravel roads and dirt roads may require maintenance during the construction period due to high use. Refer to the BLM-Specific CMRP (Appendix B) for details on controlling traffic and crossing procedures for access roads. Modification and construction of access roads on federal lands will be in accordance with BLM Surface Operating Standards (Gold Book, BLM 2007a). Keystone will take all necessary precautions for protection and safety of the public during construction, and will develop a site-specific crossing plan for the federal lands to address the primary concerns of limited access and potential conflicts with hunters during construction.

Once the final access route has been approved and permitted by the BLM, surveyed for biological and cultural resource, and DOS has issued its ROD, construction will begin. Typical equipment utilized for access road construction will include one dozer, one motor grader, and one hoe. The dozer will clear the path by making the necessary cuts and fills. If necessary, the motor grader also will be used to clear the path on level terrain. The hoe will be used to clear rock and debris and to install the necessary flume pipe in all washes and cuts. After clearing is complete, the motor grader will crown, ditch, and shape the road. If gravel is needed for road pack in wetlands, geotech fabric or other suitable material will be installed first. This will enhance the ability to remove the gravel during reclamation and keep the project in compliance with USACE Nationwide permitting requirements.

Roads generally will be modified or constructed to 30 feet width. Ideally, roads will be a double-lane, graded, drained, and surfaced travel-way with a design speed of 15 mph. However, where practicable and appropriate to minimize the impact on the environment, primitive, two-track roads with turn outs may be utilized with minor or moderate grading. Turnouts generally will take advantage of naturally occurring landscape, such as additional widths on ridges or other available areas on flat terrain.

6.4 Aboveground Facilities Construction

MLV construction will be carried out concurrently with the construction of the pipeline. One MLV will be constructed on BLM land, south of the Missouri River crossing. Construction activities will include clearing, grading, trenching, installing piping, fencing the area, cleaning up, and restoring the area. If necessary, an approach will be constructed to the fenced MLV site on.

6.5 Construction Work Force and Schedule

6.5.1 Work Force

Construction of the proposed Project would begin when Keystone obtains all necessary permits, approvals and authorizations.. Keystone anticipates a total peak work force on the 3 spreads that cross Federal lands of approximately 1,500 to 1,800 construction personnel. Construction personnel will consist of Keystone employees, contractor employees, construction inspection staff, and environmental and safety inspection staff.

Keystone is planning to build the Project in 10 construction spreads, three of which will have components on federal lands (**Table 6-1**). Construction activity will occur simultaneously on spreads within each phased segment of the Project.

Keystone anticipates 500 to 600 construction and inspection personnel associated with each spread. Each spread will require 6 to 8 months to complete.

Keystone, through its construction contractors and subcontractors, will attempt to hire temporary construction staff from the local population.

Table 6-1 Construction Spreads Associated with Federal Lands on the Keystone XL Project

Spread Number	Approximate Number of Workers	Location (Mileposts)	Approximate Distance within Construction Spread (miles)
Spread 1	500-600	0 - 90	90
Spread 2	500-600	90 – 151.48	61.48
Spread 3	500-600	151.48 – 197.68	46.2
Spread 4	500 - 600	197.68 – 288.63	90.95

6.5.2 Work Schedules

An industry rule-of-thumb for construction progress is a rate of approximately 20 completed miles per calendar month, which could be used for scheduling purposes. Based on experience, the construction schedule is estimated as follows:

- 2-3 weeks (14-21 calendar days) of work on the ROW prior to the start of production welding. These activities will include clearing, grading, stringing, and ditching.
- Production welding, based on an average of 1.25 miles per working day and a 6-day work week (7 calendar days), will be completed at 7.5 miles per week, on average.
- 7 weeks (49 calendar days) of work after completion of production welding. These activities will include NDT, field joint coating, lowering-in, tie-ins, backfill, ROW clean-up, hydrostatic testing, reseeding, and other ROW reclamation work.

Using this as a basis for determining the duration of construction activities on the ROW will yield the time requirements shown below for various spread lengths (**Table 6-2**).

Table 6-2 Resulting Construction Times Based on Estimates of Schedule

Spread Length	Pre-welding	Welding Time	Post-welding and Clean-up	Duration
80 miles	21 days	75 days	49 days	145 days (21 weeks)
90 miles	21 days	84 days	49 days	154 days (22 weeks)
100 miles	21 days	94 days	49 days	164 days (24 weeks)
120 miles	21 days	112 days	49 days	182 days (26 weeks)

In addition, about 1 month for contractor mobilization before the work is started and 1 month after the work is finished for contractor demobilization should be added to the overall construction schedule.

Staging areas are designated at the start of each construction spread (located on private lands at public road crossings) where access may be gained without necessitating use of private roads, wherever possible.

6.6 Facility Design Factors

All proposed facilities will be designed, constructed, tested and operated, in accordance with all applicable requirements included in the USDOT regulations at 49 CFR Part 195, Transportation of Hazardous Liquids by Pipeline, and other applicable federal and state regulations, and the 57 Special Conditions developed by PHMSA and included at Appendix U of the 2001 DOS FEIS. These requirements are intended to ensure adequate protection for the public and to prevent liquid pipeline accidents and failures. Among other design standards, Part 195 specifies pipeline material and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

The pipeline will be constructed of high-strength steel pipe (American Petroleum Institute [API] 5L) with maximum operating pressure (MOP) ratings of 1,440 to 1,600 pounds per square inch gauge (psig). New steel pipe will be mill inspected by an authorized owner's inspector and mill tested to API/American Society for Testing and Materials specification requirements, as a minimum. Pipe wall thickness will be a minimum of 0.4635 inch. An external coating (fusion-bonded epoxy) will be applied to the pipeline to protect against corrosion. Cathodic protection will be provided by impressed current. All pipe will be manufactured, constructed, and operated in accordance with applicable local, state, and federal regulations. Toxicity and potential spill information relating to the crude oil to be transported by the pipeline was included in the Risk Assessment, filed with the DOS in July 2009.

The design of the Project's pipeline is based on a maximum 1,440 psig discharge pressure at each pump station. The result is that the MOP of the pipeline between pump stations generally is 1,440 psig. For location-specific, low elevation segments, the MOP will be 1,600 psig. This allows a consistent maximum discharge pressure for all pump stations, optimized for efficiency at nominal flow capacity. **Table 6-3** identifies pipeline segments on federal lands with a MOP of 1,600 psig.

Table 6-3 Pipe Segments on Federal Lands with MOP of 1,600 psig

Pipe Segment	Milepost (0 at US/Canada Border) Start	Milepost (0 at US/Canada Border) End	Length (Miles) of Heavy Wall Pipe Required on Federal Lands
US border	0.0	0.9	0.9
From PS 9 to PS 10	2.47	2.64	0.17
From PS 10 to PS 11	49.97	50.64	0.67
	50.64	50.69	0.05
	50.69	51.42	0.73
	51.42	52.01	0.59
	52.01	52.17	0.16
	52.17	52.36	0.18
	52.36	52.69	0.34
	52.69	52.94	0.24
	36	0.45	0.09
	68	0.20	0.51
	53	0.00	0.47

Table 6-3 Pipe Segments on Federal Lands with MOP of 1,600 psig

Pipe Segment	Milepost (0 at US/Canada Border) Start	Milepost (0 at US/Canada Border) End	Length (Miles) of Heavy Wall Pipe Required on Federal Lands
	56.00	56.14	0.15
	2.47	2.64	0.17
	49.97	50.64	0.67
	50.64	50.69	0.05
	50.69	51.42	0.73
From PS 11 to PS 12	99.73	100.04	0.32
From PS-14 to PS-15	237.2	237.3	0.1

The location of the pipeline on federal lands is depicted on maps in **Appendix A**. Township, range, and section, as well as preliminary centerline location, work spaces, and aboveground facilities are included.

Typically, the trench will be about seven to eight feet deep and about four to five feet wide in stable soils. In most areas, the USDOT requires a minimum of 36 inches of cover. In rocky areas the USDOT requires a minimum depth of cover of 18 inches. However, for the Project, the depth of cover for the pipeline will be a minimum of 48 inches in most locations (**Table 6-4**). Trenching may precede bending and welding or may follow based on several factors including soil characteristics, water table, existence of drain tiles, and weather conditions at the time of construction.

Table 6-4 Minimum Pipeline Cover

Location	Cover, Normal Excavation (inches)	For Rock Excavation (inches)
All waterbodies[1]	60	36
Dry creeks, ditches, drains, washes, gullies, etc.	60	36
Drainage ditches at public roads and railroads	60	48
All other land	48	36

[1] For waterbody crossings that are crossed by the HDD method, the depth of cover will be a minimum of 25 feet.

The components of a cathodic protection system include:

- Rectifiers;

- Anode ground beds;
- Conductive material; and
- Test leads.

Cathodic protection uses a rectifier to convert alternating current power to direct current power. The rectifier output is electrically connected to the pipe on one side and, on the other side, to anodes (metal rods). The rectifier is usually sited adjacent to existing power lines in the area. Anodes are buried in groups (referred to as ground beds) along the pipeline and are backfilled with a carbon-based conductive material to improve their effectiveness. As the electric current flows from the pipeline through the rectifier to the anode bed the pipe is protected from corrosion.

The distance between rectifier units depends on the current requirements of the system. Current requirements are based on different soil types. Typically, a rectifier and anode ground bed can protect 40 or more miles of pipeline from a single location. Efforts are made to locate the equipment at other facility sites, such as pump stations or valve sites.

The effectiveness of the cathodic protection system is measured using test leads. Test leads attached to the pipe allow the cathodic protection system to be checked on a regular basis. These test leads are located at approximately 2-mile intervals, brought to the surface via wires, and attached to a supporting post.

6.7 Spill Prevention and Contingency Plan

Spill prevention and containment applies to the use and management of hazardous materials on the construction ROW and ancillary areas during construction. This includes the refueling or servicing of equipment with diesel fuel, gasoline, lubricating oils, grease, hydraulic and other fluids during normal upland applications and special applications within 100 feet of perennial streams or wetlands. Keystone has committed to measures outlined in Chapter 3.0 of the BLM-Specific -CMRP, which will be implemented in the various states in compliance with 40 CFR Part 112 (for oil spills) and corresponding state regulations (including NPDES requirements for spills of other substances that may occur during construction activities).

Refueling and lubricating of most construction equipment will be restricted to upland areas at least 100 feet away from the edge of any perennial 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 perennial waterbodies for refueling. In a few unavoidable cases, such as for pumps or directional drill equipment located within or near a waterbody or wetland, refueling will be completed within or near a waterbody or wetland. In these situations, the specific measures identified in the SPCC Plan portion of the BLM-Specific –CMRP will be followed.

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 waterbodies and wetlands.

6.8 Snow Removal

Winter construction is not currently planned. Should winter construction, and consequently, snow removal, become necessary, Keystone will amend the BLM-Specific CMRP and POD with information pertaining to methods and ROW requirements for snow removal.

6.9 Fire Prevention Plan

Measures that will be implemented for fire prevention and suppression are described in detail in Section 2.16 of the BLM-Specific CMRP (**Appendix B**) and Keystone's Fire Prevention and Suppression Plan (Appendix P). At a minimum, Keystone will ensure all construction contractors comply with those measures identified in Appendix P, as well as all federal, state, county and local fire regulations pertaining to burning permits and the prevention of uncontrolled fires. In addition to mitigation measures listed in Appendix P, Keystone also will ensure:

- All combustible material will be cleared for a minimum of a 10-foot radius around locations where welding activities will occur; and
- Personnel will be on-site during welding activities, and for a minimum of 2 hours after welding activities have ceased to suppress any potential fires. Keystone will ensure these personnel have adequate ability to communicate with off-site emergency personnel.
- The project specific Fire Prevention Plan prepared by Keystone will be approved by BLM prior to commencing construction.

7.0 Resource Concerns During Construction

The discussion in this section is specific to construction impacts on federal lands; however, these issues will occur throughout the Project area. For a discussion of Project-wide impacts, see the Environmental Report, filed with the DOS on November 20, 2008 and the updates filed on July 6, 2009, the Keystone XL FEIS issued in August 2011, and the Environmental Report filed with DOS on September 7, 2012.

Assumptions

For the purposes of this analysis, the following assumptions were made:

1. The Project's construction, operation, reclamation methods, and environmental protection measures contained in the BLM-specific CMRP will be implemented on federal land along with BLM ROW Grant stipulations.
2. Keystone will acquire all necessary federal, state, and local permits and approvals to construct and operate the Project (not including power lines, which will be constructed and operated by power providers), regardless of whether these permits and approvals are listed.

Guidelines

Activities in the "Construction Phase" include surface-disturbing activities necessary to construct the pipeline, valves, and permanent access roads so that the pipeline system can be placed into service. It also includes reclamation activities for areas where the surface is disturbed.

For all resources, unless specific exceptions are stated, short-term impacts are those that will occur over a 5-year period or less, while long-term impacts are those that exceed 5 years.

Keystone's committed environmental protection measures included in the BLM-Specific CMRP (**Appendix B**) were used to evaluate environmental impacts.

7.1 Air Resources

7.1.1 Air Quality Regulation Applicability to Project Facilities on Federal Lands

Construction of the Project will result in intermittent and short-term emissions. These emissions will include fugitive dust from soil disruption and combustion emissions from construction equipment and construction worker commuter vehicles. Mobile sources of emissions are the construction equipment and contractor vehicles to be used during construction of the pipeline, pump stations, and other ancillary facilities. Fugitive sources of emissions during construction will include particulate emissions from paved and unpaved roadways, particulate emissions from

soil disturbance during construction activities, and fugitive tailpipe emissions from the operation of earthmoving and other heavy equipment and commuter vehicles.

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. Fugitive particulate emissions will be limited to the immediate vicinity of the Project and the surrounding region will not be significantly impacted. If dust control plans are required by the BLM, they will be filed prior to land disturbance activities.

Construction equipment exhaust will result in temporary increases in combustion emissions and local airborne particulate matter concentrations. The combustion emissions from construction equipment will be minimized because the engines are manufactured to meet federal standards for mobile sources established by the US Environmental Protection Agency (USEPA) mobile source emissions regulations (40 CFR 85). In addition, the USEPA is requiring the sulfur content of non-road diesel to be reduced from 500 parts per million by weight (ppmw) to 15 ppmw by mid-2010, reducing sulfur dioxide and particulate emissions from diesel combustion.

Dust suppression techniques may be used in construction zones near residential and commercial areas to mitigate the impacts of fugitive dust emissions in sensitive areas. Local ordinances on open burning will be followed. Both of these impacts will be temporary and so impacts to local or regional air quality is expected to be minor. Measures which will be implemented are described in detail in **Appendix B** of this POD.

Mitigating measures for dust control available for the construction activities include:

- Proper maintenance of construction equipment;
- Watering of the construction sites (or use of other tackifier such as magnesium chloride) for fugitive dust control, if necessary; and
- Minimizing soil disturbance to areas necessary for construction.

Local ordinances on open burning will be followed, with appropriate burn permits being acquired prior to conducting such activities.

7.1.2 Climate

This section discusses the regional climate and meteorological conditions that influence transport and dispersion of air pollutants and discusses the existing levels of criteria air pollutants in the Project region as they pertain to federal lands crossed by the Project.

The project area is located within the humid continental climate that is found over great expanses in the temperate regions of the mid-latitudes. The humid continental climate is noted for its variable weather patterns and its large temperature range due to its interior location in mid-latitude continents. This climate lies in the boundary zone between many different air masses, principally polar and tropical. Polar-type air masses collide with tropical type air masses causing uplift of the less dense and moister tropical air resulting in precipitation. These huge systems generally work their way across the surface from west to east, embedded in the dominant wind flow of the westerly wind belt.

During the winter, the polar high expands in area to influence the northern portion of the continental humid climate. Cold temperatures occur during winter when continental arctic air masses sweep into the region. Otherwise, continental polar air masses dominate for much of the winter. Precipitation in the humid continental climate occurs only with invasions of maritime tropical air. A noticeable decrease and seasonality to the precipitation occurs as distance from the Gulf of Mexico increases.

The cool summer subtype of the humid continental climate in North America is found throughout much of the Great Lakes region and upper Midwest extending into south central Canada. This is the region in which the Project crosses federal lands. Most of its precipitation falls in the summer. However, this region receives less precipitation than warmer summer subtypes due to colder temperatures and the associated lower humidity.

The climate data presented in **Table 7-1** are representative of the region where pipeline construction emissions could impact air quality on federally managed lands. Historical climate data from meteorological stations along the pipeline route for Circle, Montana, and Midland, South Dakota, are included.

Table 7-1 Climate Data in the Vicinity of Federal Lands Crossed by the Project

Location/Precipitation Type	Monthly Average												
Circle, Montana Location[1]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	26.0	33.1	43.2	57.7	68.8	78.2	86.9	85.8	73.4	59.7	42.0	30.2	57.1
Average Min. Temperature (°F)	3.8	10.6	19.4	31.1	41.5	50.3	55.8	53.9	42.8	31.9	19.0	8.2	30.7
Average Total Precipitation (in.)	0.4	0.3	0.6	1.3	2.0	2.6	1.9	1.3	1.3	0.8	0.4	0.4	13.4
Average Total Snow Fall (in.)	5.6	3.4	3.6	2.2	0.4	0.0	0.0	0.0	0.1	0.9	2.6	5.1	23.9
Average Snow Depth (in.)	4	4	1	0	0	0	0	0	0	0	0	2	1
Midland, South Dakota Location[2]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	32.8	38.3	47.2	62.4	73.2	82.5	90.8	89.9	79.2	65.7	48.1	36.6	62.2
Average Min. Temperature (°F)	6.0	11.1	20.2	32.6	44.1	54.0	59.6	57.4	45.9	33.5	20.1	10.2	32.9
Average Total Precipitation (in.)	0.3	0.4	1.1	1.6	2.8	3.1	2.2	1.7	1.4	1.1	0.5	0.3	16.4
Average Total Snow Fall (in.)	3.9	5.8	6.4	1.8	0.2	0.0	0.0	0.0	0.0	0.6	3.1	4.4	26.2
Average Snow Depth (in.)	1	1	1	0	0	0	0	0	0	0	0	1	0

[1]Source: Western Regional Climate Center (WRCC), Circle, Montana, Station 241758, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?mt1758

[2]Source: High Plains Regional Climate Center (HPRCC), Midland, South Dakota, Station 395506, http://hprcc1.unl.edu/cgi-bin/cli_perl_lib/cliMAIN.pl?sd5506

7.2 Noise

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.

During construction, Keystone will be required to comply with any applicable local construction noise requirements. Construction activities will normally be limited to daylight hours. Nighttime noise levels will normally be unaffected by construction activities.

The Project will be constructed primarily in rural agricultural areas. It is estimated that day-night average levels (L_{dn})[6] on the A-weighted scale (dBA)[7] range between 40 dBA (rural residential) and 45 dBA (agricultural cropland) (USEPA 1978). Ambient (background) noise levels occur from roadway traffic, farm machinery on a seasonal basis, pets, and various other household noises. Project areas along major highways and interstates may experience higher ambient noise levels of approximately 68 to 80 dBA (USEPA 1978).

7.3 Geology Resources

The Project is located in the Great Plains physiographic province (Fenneman 1928). Federal lands affected by the Project are within two major sections of the Great Plains: the Glaciated Missouri Plateau and the Unglaciated Missouri Plateau (**Figures 7-1** and **7-2**). The Missouri Plateau is essentially a dissected plateau characterized by badlands, buttes, mesas, and exhumed mountain ranges such as the Black Hills. The proposed route is in the Glaciated Missouri Plateau from the US-Canada border to near Circle, Montana, where it crosses the Unglaciated Missouri Plateau through South Dakota. The glaciated area generally is of low relief compared with the unglaciated area, which has a greater variety of landforms (Trimble 1980). The Glaciated Missouri Plateau is covered by glacial deposits, but the boundary between the glaciated and unglaciated sections is not distinct because the glacial deposits thin gradually. Elevations along the proposed route where it intersects federal lands vary from 3,000 feet above mean sea level (amsl) in the northern and southeastern parts of the Project area to approximately 2,000 feet amsl at the Missouri River.

The surficial deposits in Montana primarily are composed of Quaternary alluvium and colluvium and glacial till. In South Dakota, surficial deposits also include alluvial terraces, and eolian

[6] L_{dn} is the A-weighted equivalent sound level for a 24-hour period with 10 decibels added to nighttime sounds to adjust for increased sensitivity to noise at night.

[7] The A-weighted scale adjusts for the sensitivity of the human ear to different sound frequencies.

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Figure 7-1 Physiographic Regions of Eastern Montana

Figure 7-2 General Geology – Keystone XL Project Area

deposits (sand dunes). The alluvium primarily occurs in modern channels and floodplains, but also is present in older river terraces or in glacial deposits.

The bedrock geology consists of Upper Cretaceous and Tertiary rocks. **Table 7-2** provides a description of the bedrock rock units crossed by the proposed route. The Claggett Shale and the Bearpaw Shale were deposited under marine conditions and the Judith River Formation was deposited under marine to marginal marine conditions (Condon 2000). The Fox Hills Formation is a marginal marine sandstone that has 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 Tertiary section is primarily represented by various members of the Fort Union Formation, which 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 the emerging Rocky Mountains to the west and south of the Project area (McDonald 1971). The Flaxville Formation is thought to be Miocene in age and was deposited by braided streams sourced to the west and southwest (Leckie 2006).

Table 7-2 Summary of Paleontological Sensitivities of Geologic Units Underlying the Proposed Route on Federal Lands

Geologic Formation (Fm)/Deposit (Map Symbol)	Period	Description	BLM Potential Fossil Yield Classification System (PFYC) Class/Types of Fossils	Milepost
Alluvium/colluvium (Qal), landslides (Qls), sand and gravel (Tsg), and other unconsolidated deposits (e.g., sand dunes)	Tertiary – Quaternary	Sand, gravel and clay	Class 2/Holocene-age deposits contain the unfossilized remains of modern taxa and are too young to contain fossils. Pleistocene-age deposits may contain mineralized or partially mineralized bones, invertebrates, and plants. Fossil mammals are known from	Units occur intermittentl y throughout route, alluvium primarily occurs along drainages and river crossings.

Table 7-2 Summary of Paleontological Sensitivities of Geologic Units Underlying the Proposed Route on Federal Lands

Geologic Formation (Fm)/Deposit (Map Symbol)	Period	Description	BLM Potential Fossil Yield Classification System (PFYC) Class/Types of Fossils	Milepost
			sediments thought to be of equivalent age and source to the Tertiary deposits; however, no fossils have been found in these deposits.	
Ludlow Member of Fort Union Fm. (Tfl)	Tertiary - Paleocene	Primarily sandstone, siltstone, mudstone, carbonaceous shale and lignite/ uraniferous lignite, up to 460 feet thick.	Class 5/Plants, invertebrates, vertebrates (fish, amphibians, reptiles, birds, mammals).	249 through 249.7, 256.1 through 256.2, 256.4 through 256.6, 275.3 through 275.3
Tongue River Member of Fort Union Fm. (Tftr)	Tertiary - Paleocenc e	Poorly cemented sandstone interbedded with siltstone and mudstone and coal. Some coals have burned to form “clinker beds”. Commonly eroded to badland topography. Thickness 400 to 650 feet.	Class 5/Plants, invertebrates, vertebrates (fish, amphibians, reptiles, birds, mammals)	129.9 through 130.2, 211 through 211.6, 212.2 through 220, 231.4 through 232.1, 232.9 through 233.5, 239.4 through 129.9 through 130.2, 211 through 211.6, 212.2 through 220, 231.4

Table 7-2 Summary of Paleontological Sensitivities of Geologic Units Underlying the Proposed Route on Federal Lands

Geologic Formation (Fm)/Deposit (Map Symbol)	Period	Description	BLM Potential Fossil Yield Classification System (PFYC) Class/Types of Fossils	Milepost
				through 232.1, 232.9 through 233.5, 239.4 through 239.5239.5t hrough 236.8
Lebo Member of Fort Union Fm. (Tfle)	Tertiary - Paleocene	Sandstone, siltstone, and mudstone interbedded with carbonaceous shale. Forms rolling hills. Thickness 180 to 300 feet.	Class 5/Invertebrates (mollusks), vertebrates (mammals).	120.6 through 120.8, 129.7 through 129.9
Tullock Member of Fort Union Fm. (Tft)	Tertiary-Paleocene	Sandstone, claystone, and carbonaceous shale and thin isolated coal beds. Thickness 200 to 300 feet.	Class 5/Plants, Invertebrates, and vertebrates (fish, amphibians, reptiles, birds, mammals).	107.2 through 107.5, 107.8 through 107.9, 117.3 through 117.7, 118.5 through 118.6, 119.9 through 120.4, 127.4
Hell Creek Fm (Khc)	Upper Cretaceous	Shale, sandy shale, mudstone, lenticular sandstone and coal beds. Forms badland topography. Contact with underlying Fox Hills Fm. is gradational and	Class 5/ Large numbers of plants and terrestrial vertebrates (fish, reptiles, mammals, dinosaurs), invertebrates (mollusks), and	92.3 through 93, 93.8 through 94.5, 94.8 through 97, 99.6 through

Table 7-2 Summary of Paleontological Sensitivities of Geologic Units Underlying the Proposed Route on Federal Lands

Geologic Formation (Fm)/Deposit (Map Symbol)	Period	Description	BLM Potential Fossil Yield Classification System (PFYC) Class/Types of Fossils	Milepost
		sometimes not distinguishable. Thickness 300to 400 feet.	plants. Fossil fauna and flora are well preserved and diverse.	100, 104.1 through 104.4, 107.9 through 108, 109.7 through 110.3, 111 through 111.1, 112.3 through 112.9, 115.8 through 116.4, 117 through 117.4, 256.6 through 256.6, 274.8 through 275.3
Bearpaw Fm./Pierre Shale (Kb/Kp)	Upper Cretaceous	Bentonitic mudstone and shale with fossiliferous concretions containing. Thickness 1,100 feet or more. The Pierre shale is the eastern equivalent to the Claggett, Judith River, and Bearpaw Fms.	Class 3/Invertebrates (mollusks, ammonites) are very common, marine vertebrates (plesiosaurs, mosasaurs, turtles) are less common and terrestrial vertebrates (dinosaurs) are uncommon.	0 through 0.9, 6 through 6.3, 9.2 through 9.7, 11.4 through 12.3, 13.1 through 13.8, 15.4 through 15.4, 21.3 through 21.6, 32.6 through 34.1, 34.5 through

Table 7-2 Summary of Paleontological Sensitivities of Geologic Units Underlying the Proposed Route on Federal Lands

Geologic Formation (Fm)/Deposit (Map Symbol)	Period	Description	BLM Potential Fossil Yield Classification System (PFYC) Class/Types of Fossils	Milepost
				34.5, 34.8 through 34.8, 35.2 through 35.3, 35.6 through 35.8, 36.1 through 36.7, 45.8 through 46.9, 47.7 through 48.4, 49.9 through 52.2, 52.4 through 52.9, 53.4 through 54.4, 54.6 through 55.2, 55.7 through 56.1, 56.8 through 56.8, 57.1 through 57.5, 58.2 through 61.6, 62.4 through 62.8, 63.6 through 64.3, 65.2 through 65.7, 66.9 through

Table 7-2 Summary of Paleontological Sensitivities of Geologic Units Underlying the Proposed Route on Federal Lands

Geologic Formation (Fm)/Deposit (Map Symbol)	Period	Description	BLM Potential Fossil Yield Classification System (PFYC) Class/Types of Fossils	Milepost
				68.3, 90.6 through 90.8, 91.6 through 91.8
Judith River Fm. (Kjr)	Upper Cretaceous	Sandstone, siltstone, mudstone, shale, and coal or lignite. Thickness up to 600 feet.	Class 5/ Contains a variety of vertebrate fossils including fish, turtles, crocodiles, dinosaurs, and mammals. Also invertebrates and plants.	2.5 through 2.6, 25 through 25, 28.8 through 28.9, 35.8 through 36.1, 37.1 through 37.3, 37.7 through 38.7, 42.5 through 43.1

[1]Classification based on description in BLM (2006).

Sources: Bergantino (1999, 2001, 2003); BLM (1992; 2006); Condon (2000); Gill and Cobban (1966); SWCA (2008); Vuke and Colton (2003); Vuke et al. (2003, 2001); Wilde and Bergantino (2004); and Wilde and Smith (2003a,b).

Major structural features crossed by the proposed route include the Williston Basin, the Sioux Arch or Ridge, and the Salina Basin (**Figure 7-2**). The entire route crosses the western fringe of the Williston Basin, a major structural basin that covers northeast Montana, most of North Dakota, and northwest South Dakota (Peterson and McCary 1987). The majority of the federal lands affected by the Project are within the Williston Basin. The Williston Basin also extends north into Saskatchewan and Manitoba in southern Canada. The basin contains approximately 15,000 feet of Paleozoic through Tertiary sedimentary rock. The center of the basin is located in western North Dakota and, in the Project area, the rocks dip gently towards the east and northeast. Other major structural features crossed by the proposed route in areas intersected by federal lands include the Hinsdale, Weldon-Brockton, and Poplar Fault Zones or Lineaments and

the Cedar Creek Anticline. The fault zones or lineaments extend into the Precambrian basement (ancient rocks that lie beneath the sedimentary rock section). These fault zones are thought to have influenced sedimentation patterns in the basin, but are not thought to be active at present (Fischer 2005). The Cedar Creek Anticline is a northwest to southeast trending anticlinal structure in southeastern Montana that extends into the southwestern corner of North Dakota and the northwestern corner of South Dakota (Clement 1987). The structure is 145 miles long and 6 to 20 miles wide. The Project is located on the southwest flank of the structure and generally parallels the strike of the anticline.

7.3.1 Mineral Resources

The major energy mineral resources that potentially occur on federal lands in the Project area in Montana are oil, natural gas, and coal (Montana Bureau of Mines and Geology 1963). Uranium deposits are present, but do not represent a significant resource. The major non-fuel mineral resources are sand, gravel, and bentonite (Montana Bureau of Mines and Geology/US Geological Survey [USGS] 2004; Kennedy 1990,). The Williston Basin (**Figure 7-2)** 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). Recent technological advances in oil production and recovery reversed oil production declines experienced in the 1990s. The recently tapped Bakken Formation has an estimated mean technically recoverable resource of 3.7 billion barrels of oil and 1.9 trillion cubic feet of gas (USGS 2008a). The pipeline route crosses a relatively low number of oil and gas producing areas since the route lies on the western edge of the basin. However, the proposed route passes through the Buffalo Field in Harding County on private lands. One well, a plugged and abandoned well on private lands in Valley County, was identified within 1,320 feet of the proposed ROW on federal lands. This well was located within 1,000 feet of the ROW on federal lands, at approximately Milepost 36.9.

The pipeline route crosses the Fort Union Coal region from just south of the Missouri River to the northwest corner of South Dakota (Averitt 1963). The coal in the Fort Union Formation generally is lignite in the Project area. The proposed route crosses approximately 2 miles of the coal-bearing Ludlow Member of the Fort Union Formation, and limited coals in the Hell Creek Formation. Based on today's economics, potential for the development of mines in the state is low (Erickson 1956). To the southwest of the proposed route in the Powder River Basin, the coal becomes progressively higher rank to sub-bituminous and is mined extensively in that area of Montana as well as northeast Wyoming.

No lignite mines are present along the proposed route. In southeastern Montana, uranium-bearing lignites have been found in the Fort Union Formation (Weissenborn and Weiss 1963). While some fairly high-grade deposits have been identified in northeast Fallon County and northern Carter County, the proposed route does not intersect identified deposits in these counties. 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 proposed route does not cross mined out areas. The mining method used was to strip off the overburden 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. Bentonite, a clay derived from layers of volcanic ash, is present in mineable quantities in the Bearpaw Shale, and in other upper Cretaceous and Tertiary formations. Bentonite has a variety of uses and is commonly used as a major constituent of drilling fluids and as a moisture absorbent. In the Project area, bentonite was mined in an area known as the Chinook-Malta-Glasgow bentonite district (Kennedy 1990). There are a number of abandoned pits in the Glasgow-Malta area. Bentonite was mined and processed southeast of Glasgow beginning in 1976 (BLM 1992). The processing plant was shut down in 1979, but mining continued until 1985. According to the BLM, the bentonite claims have been abandoned. As of 2004, there was no bentonite mining in the area (Montana Bureau of Mines and Geology/USGS 2004).

Aggregate production occurs from local deposits in floodplains and glacial deposits. Sand and gravel deposits have been identified to the east of the proposed route in glacial sediments in the Fort Peck Indian Reservation and areas to the north (Weis 1963). Gravel deposits are present on private lands along the Yellowstone River where the route crosses the river. The proposed route does not cross aggregate mining operations. It is anticipated that the pipeline trench will be backfilled with materials derived from the trench excavation. It might be necessary to obtain construction sand and gravel from local commercial sources for use as pipe padding, road base, or surface facility pads. These uses for sand and gravel will not substantially affect the long-term availability of construction materials in the area.

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. One plugged and abandoned oil and gas well was identified on private lands close to the Project construction ROW on federal lands. Construction activities could impact abandoned wells since construction could remove existing abandoned well markers and damage near-surface cement plugs. Because both oil and gas are typically produced from depths of more than 1,000 feet, construction of the pipeline is not expected to affect the oil and natural gas producing formations. Because of required notification and surveys to locate underground facilities, construction-related impacts will be limited to surface or near-surface components of area wells and gathering systems, which will temporarily disrupt production until repairs are made. Prior to construction, Keystone will verify 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 abide by utility locate rules in each state and conduct due diligence to identify and contact all oil and gas well operators and pipeline gathering system owners prior to construction activities.

7.3.2 Seismic Hazards

The intensity and frequency of seismic events (seismicity) determines the relative chance of seismic hazard occurrences. The physical manifestations of seismic hazards are faults and ground motion. The following describes the potential for seismic hazard occurrences in the Project area.

Faults are dislocations where blocks of earth material on opposite sides of the faults have moved in relation to one another. Rapid slippage of blocks of earth past each other can cause energy to be released, resulting in an earthquake. The Weldon-Brockton fault zone or lineament has surface expression in the Brockton-Froid Fault that has been defined as Late Quaternary in age (**Figure 7-2)** (USGS and Montana Bureau of Mines and Geology 2006). Late Quaternary means that movement occurred in the last 300,000 years. The fault was mapped on-trend with the Weldon-Brockton lineament 50 miles east of the proposed route in Roosevelt County, just north of Culbertson, Montana. The fault was mapped on the basis of surface features, shallow auger holes, and evidence obtained from oil and gas exploration data (Wheeler 1999). There is an indication of offset in older strata, but no evidence that would lead to a conclusion of movement on the fault in the last 10,000 years. An active fault is one in which movement can be demonstrated to have taken place within the last 10,000 years (USGS 2008b). Some researchers think the feature is not a fault, but an erosion feature in the glacial deposits that cover the area.

Seismicity concerns the intensity, frequency, and location of earthquakes in a given area. Eastern Montana and northwestern South Dakota historically have little earthquake activity (USGS 2008b, c, d). From 1973 to 2007, east of longitude 110 degrees west to the Montana state line, there were 14 earthquakes; 7 were not assigned magnitudes. The other seven had magnitudes of 4.1 or less. During the same period, 30 earthquakes were recorded in South Dakota, the strongest being 4.2 in magnitude. There are no recorded epicenters from 1973 to present along the proposed route.

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 estimates peak ground acceleration expressed as a percentage of the acceleration of gravity with a two percent probability of exceedence in 50 years (Frankel et al. 1997; Peterson et al. 2008).

7.3.3 Landslides

Landslide is a term used for various processes involving the movement of earth material down slopes (USGS 2004). Landslides can occur in a number of different ways in different geological settings. Large masses of earth become unstable and gravity pulls them downhill. The instability can be caused by a combination of steep slopes, periods of high precipitation,

undermining of support by natural processes (stream erosion), or unintentional undercutting or undermining the strength of unstable materials in the construction of roads and structures.

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-aged Hell Creek, Claggett, Bearpaw Shales, and shales in the Tertiary Fort Union Formation (Radbruch-Hall et al. 1982). These shale units can contain appreciable amounts of bentonite, a rock made up of montmorillonite clay that has deleterious properties when exposed to moisture.

The Project is located in areas of varying landslide susceptibility and recorded incidence (**Table 7-3**). Landslide susceptibility "refers to the likelihood of a landslide occurring in an area on the basis of terrain conditions," but does not take into account the probability of occurrence (National Research Council 2004). Incidence is based on the percentage of area involved in movement (low: less than 1.5 percent; moderate: 1.5 to 15 percent, and high: more than 15 percent) (Radbruch-Hall et al. 1982).

Of particular concern for slope stability in Montana are Cretaceous shales present on slopes greater than 15 percent (MDEQ 2004). In the Project area, steeper slopes occur along the Missouri River Valley walls and larger tributaries (Radbruch-Hall et al. 1982). Landslides are documented at Milepost 39 and Milepost 90.4 to Milepost 91.5. At both of these locations, slumps occurred at major drainages, the former at the Willow Creek crossing, and the latter on the south side of the Missouri River Valley (Bergantino 1999, 2002). **Table 7-4** presents places on the proposed routes where slopes exceed 15 percent and are underlain by Cretaceous shale. These areas with steep slopes and underlain by Cretaceous shales may have more susceptibility to landslides than other areas. These areas with steep slopes that are underlain by Cretaceous shales may be more susceptible to landslides than other areas.

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 pipeline route, Keystone has attempted to minimize the amount of steep slopes crossed by the pipeline. Special pipeline construction practices described in the BLM-Specific CMR Plan will minimize slope stability concerns during construction and reclamation.

Table 7-3 Landslide Incidence and Susceptibility on Federal Lands

Pipeline Segment (Approximate Mileposts)		Landslide Incidence	Landslide Susceptibility
Start Milepost	End Milepost		
0.00	0.93	LOW	HIGH
2.47	2.64		
6.03	6.25		
9.20	9.74		
11.40	12.33		
13.06	13.78		
15.38	15.42		
21.30	21.66		
24.99	25.11		
28.84	28.87		
32.62	34.84		
35.21	36.67		
37.07	37.34		
37.68	38.86		
42.56	43.14		
45.82	46.96		
47.71	48.47		
49.97	52.94		
53.36	54.45		
54.68	55.20		
55.53	56.16		
56.79	56.83		
57.17	57.50		
58.28	61.61		
62.45	62.84		
63.63	64.34		
65.22	65.71		
66.91	68.33		
89.76	91.32	HIGH	N/A
91.32	93.09	MODERATE	HIGH
93.84	95.50		
95.80	97.07		
99.73	100.04		
104.19	104.46		
107.31	107.55	LOW	N/A
107.86	108.08		
109.78	110.43		
111.13	111.22		
112.40	113.03		

Table 7-3 Landslide Incidence and Susceptibility on Federal Lands

Pipeline Segment (Approximate Mileposts)		Landslide Incidence	Landslide Susceptibility
Start Milepost	End Milepost		
115.89	116.56		
117.11	117.81		
118.68	118.77		
120.08	120.60		
120.76	120.97		
127.52	127.55		
129.84	130.33		
211.19	211.84		
212.44	213.14		
213.23	220.18		
231.66	232.28		
233.16	233.76		
239.60	239.78		
249.20	249.91		
256.35	256.46		
256.66	256.89		
275.06	275.56		

Table 7-4 Locations on Federal Lands in Montana with >15% Slopes Underlain by Cretaceous Shale

County	Start Milepost	End Milepost	Miles
Phillips County	11.54	11.57	0.029
	11.57	11.59	0.018
	11.59	11.60	0.015
	12.21	12.22	0.015
	13.65	13.69	0.037
	13.74	13.78	0.038
	24.99	25.05	0.058
Valley County	32.68	32.69	0.013
	33.73	33.77	0.044
	34.51	34.53	0.015
	34.83	34.84	0.006
	35.74	35.78	0.041
	35.95	35.97	0.021
	36.01	36.03	0.022
	37.68	37.72	0.036
	37.74	37.77	0.026
	37.85	37.89	0.036
	37.94	37.99	0.048

Table 7-4 Locations on Federal Lands in Montana with >15% Slopes Underlain by Cretaceous Shale

County	Start Milepost	End Milepost	Miles
	38.00	38.00	0.000
	38.10	38.13	0.034
	38.54	38.55	0.006
	38.62	38.75	0.131
	43.05	43.06	0.010
	43.10	43.11	0.010
	43.13	43.14	0.012
	46.25	46.30	0.048
	46.30	46.33	0.033
	46.63	46.67	0.034
	46.67	46.72	0.046
	46.76	46.79	0.026
	46.80	46.83	0.030
	46.85	46.86	0.017
	48.26	48.32	0.068
	48.36	48.37	0.016
	48.42	48.47	0.053
	51.11	51.15	0.046
	51.36	51.37	0.016
	51.45	51.50	0.050
	51.60	51.64	0.033
	51.64	51.65	0.012
	52.46	52.49	0.033
	53.75	53.79	0.038
	53.82	53.85	0.038
	53.92	53.92	0.001
	53.95	54.00	0.048
	54.04	54.07	0.025
	55.06	55.09	0.028
	55.11	55.13	0.028
	55.16	55.19	0.028
	55.78	55.81	0.038
	55.98	55.98	0.001
	56.00	56.01	0.013
	56.07	56.11	0.037
	56.12	56.15	0.032
	57.39	57.41	0.024
McCone County	90.65	90.80	0.149
	90.84	90.84	0.003
	91.36	91.36	0.006
	91.40	91.46	0.065
	91.49	91.55	0.062
	91.58	91.68	0.095

Table 7-4 Locations on Federal Lands in Montana with >15% Slopes Underlain by Cretaceous Shale

County	Start Milepost	End Milepost	Miles
	91.73	92.09	0.368
	92.18	92.19	0.015
	92.19	92.28	0.083
	92.38	92.42	0.039
	92.55	92.55	0.003
	92.62	92.64	0.016
	92.65	92.68	0.030
	92.70	92.71	0.012
	92.80	92.81	0.011
	92.84	92.85	0.010
	92.87	92.90	0.027
	93.04	93.09	0.055
	93.98	94.01	0.025
	94.14	94.18	0.038
	94.26	94.26	0.002
	94.34	94.35	0.013
	94.37	94.45	0.088
	94.53	94.57	0.039
	94.58	94.67	0.089
	94.68	94.83	0.148
	94.85	94.90	0.049
	94.95	94.96	0.012
	95.04	95.09	0.046
	95.13	95.14	0.009
	95.23	95.25	0.018
	95.27	95.28	0.019
	95.29	95.32	0.032
	95.36	95.41	0.050
	95.42	95.50	0.077
	95.80	95.89	0.087
	95.91	95.97	0.053
	95.98	95.99	0.011
	96.00	96.01	0.009
	96.03	96.09	0.058
	96.11	96.16	0.055
	96.23	96.32	0.089
	96.32	96.34	0.017
	96.35	96.40	0.050
	96.40	96.56	0.160
	96.58	96.64	0.055
	96.71	96.72	0.010
	96.89	96.94	0.054
	96.96	97.07	0.111

Table 7-4 Locations on Federal Lands in Montana with >15% Slopes Underlain by Cretaceous Shale

County	Start Milepost	End Milepost	Miles
	99.73	99.77	0.048
	99.97	100.03	0.060
	104.41	104.46	0.050
	116.01	116.07	0.059
	116.23	116.27	0.046
Fallon County	275.06	275.07	0.012
	275.13	275.17	0.037
	275.17	275.18	0.010

7.3.4 Subsidence

No ground subsidence or karst hazards are present in the vicinity of the proposed route on federal lands (National Atlas 2008).

7.3.5 Flooding

In general, seasonal flooding hazards exist where the pipeline route will cross rivers and streams, and flash flooding hazards exist where the pipeline will cross localized drainages. On federal lands, the pipeline route will cross 1 perennial stream, 8 intermittent streams, 4 canals, and 53 ephemeral drainages, waterbodies, all of which are locations where seasonal or flash flooding could occur. No aboveground facilities are currently located in identified flood zones on federal lands. The stream and drainage crossings are listed in **Table 7-6**.

The effects of construction will include disturbances to the topography along the proposed 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.

7.3.6 Swelling Clays

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

7.3.7 Blasting

Blasting potentially could adversely impact the geologic and physiographic environment. Limited blasting may be required in areas where shallow bedrock or boulders were encountered that

cannot be removed by conventional excavation with a track hoe trencher, ripping with a bulldozer followed by track hoe excavation, or hammering with a track hoe-mounted hydraulic hammer followed by excavation. 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.

7.4 Paleontological Resources

The fossil potential of the various formations crossed by the Project on federal lands is provided in **Table 7-2**. In 2007 the BLM adopted the Potential Fossil Yield Classification (PFYC) system - a predictive modeling tool for evaluating paleontological potential based on geologic mapping (BLM 2007). Keystone has applied the PFYC system to units within the Project area based on an analysis of existing data (BLM 1998, 2008) pending concurrence from the BLM and state agencies. The Judith River, Hell Creek, and Fort Union formations are the most sensitive units within the project area (PFYC Class 5). The Judith River and Hell Creek formations have yielded scientifically significant remains of numerous dinosaurian taxa as well as many other fossil vertebrates, invertebrates, and plants. In addition, fossil invertebrates and plants have been documented in the Fox Hills Formation (PFYC Class 3) within the project area (Lange 1967). However, because vertebrate fossils are comparatively uncommon, the Fox Hills Formation has moderate paleontological potential (PFYC Class3). Concretions containing fossil invertebrates are locally common and well preserved, but rare. Vertebrate fossils are known from the Pierre and Bearpaw shales (PFYC Class 3) in the project area.

Paleontological surveys were conducted (see **Appendix G**) of areas underlain by units designated as PFYC classes 3, 4, and 5 (moderate to very high paleontological potential). During the 2008 through 2010 field surveys, 40 non-significant fossil occurrences were documented and 19 significant fossil localities were discovered on federal lands.

There is the potential for discovery of additional surface fossils and subsurface fossils during pipeline construction regardless of pre-construction surveys, especially in areas in Montana historically known to produce abundant fossils. Should any subsurface fossils be encountered during construction of the Project, Keystone will adhere to the Project's Paleontological Resources Mitigation Plan for Montana. This plan for protection of paleontological resources is appended (**Appendix F**). Adherence to the Paleontological Mitigation Plan will minimize adverse impacts to scientifically significant paleontological resources on federal lands, and the recovered fossils will be transferred to a BLM-approved paleontological curation facility for curation and permanent storage.

7.5 Soil Resources

Sensitive soils including prime farmland, hydric, highly erodible, low reclamation potential, droughty, and other important soil characteristics are described in further detail below.

Prime farmland soils are defined by the US Department of Agriculture (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 2007). 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.

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 2007).

Erosion is defined as the wearing away of the land surface by water, wind, ice, or other geologic events (USDA NRCS 2007).

Soil limitations for the potential of depth to bedrock within 60 inches of ground surface were obtained from the Soil Survey Geographic (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.

Successful reclamation and revegetation is important for maintaining productivity and to protect the underlying soil from potential damage, such as erosion.

Soil association drainage characteristics were obtained from the SSURGO database. These drainage characteristics refer to the frequency and duration of saturation or partial saturation under natural soil conditions. Seven natural soil drainage classes are recognized by the USDA: excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained (USDA NRCS 2007).

Grading and excavating for the pipeline and ancillary facilities will primarily disturb rangeland soils, as well as a small amount of agricultural, wetland, and forestland soils. Certain inherent soil characteristics influence the agricultural productivity and revegetation potential after disturbance. The major soil characteristics of concern on federal lands and the miles encountered of each type in each state are indicated in **Table 7-5**. The quantification of mileage for each of the characteristics is based on data in the SSURGO database. **Appendix H** includes a table of soil characteristics crossed by the Project centerline on federal lands. The description and types of soils crossed by the Project in Montana has not materially changed since issuance of the FEIS.

On land with soils that are compaction prone, soil compaction and rutting will likely result from the movement of heavy construction vehicles along the construction ROW and additional work spaces, and on temporary access roads. 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 high ground weight equipment. If soils are moist or wet where trenchline only topsoil trenching can occur, topsoil will likely adhere to tires and/or tracked vehicles and be carried away.

Typically, soils that are compaction prone also are prone to rutting or displacement when saturated. Rutting occurs when the soil strength is not sufficient to support the applied load from vehicle traffic. 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 upgradient from ruts, or by diverting and concentrating water flows creating accelerated erosion. In locations where grading and stockpiling of topsoil does not occur, rutting may mix thin topsoil with the subsoil, thereby reducing soil productivity. Rutting is most likely to occur on moist or wet fine textured soils, but also may occur on dry sandy soils due to low soil strength.

Revegetation recovery rates may be slow in areas with stony or rocky soils associated with glacial till. 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 reclamation efforts. Shallow lithic (hard) bedrock occurs on approximately 4 percent of the pipeline route. Where the pipeline route crosses soils with lithic bedrock blasting or rock saws may be required for trenching.

Table 7-5 Summary of Soil Characteristics of Concern for the Project on BLM Land

	Total Miles[1]	Highly Erodible		Low Revegetation Potential (LRP)	Prime Farmland[2]	Hydric	Compaction Prone[3]	Stony – Rocky[4]	Shallow Bedrock[5]	Droughty[6]
		Wind	Water							
Project Total[7]	46.29	1.19	27.11	34.37	3.91	0.18	41.13	4.21	0.00	1.96

[1]Table includes construction of pipeline only. Individual soils may occur in more than one characteristic class.
[2]Includes land listed by the NRCS (2007) as potential prime farmland if adequate protection from flooding and adequate drainage are provided.
[3]As designated by the NRCS (2007).
[4]Includes soils that have clay loam or finer textures.
[5]Includes soils that have either: 1) a cobbly, stony, bouldery, gravelly, or shaly modifier to the textural class; or 2) have > five percent (weight basis) of stones larger than 3 inches in the surface layer.
[6]Includes soils that have lithic rock within 60 inches of the soil surface.
[7]Includes coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.
NOTE: Discrepancies in acreage totals are due to rounding.

Some soils along the route in Montana weathered from glacial till or cretaceous shales that are high in smectitic clay minerals. These soils typically have high shrink swell potentials and also are prone to erosion by water when disturbed. Soils such as the Sunburst series occur in Valley, Phillips, and McCone counties. The Sunburst series has a very high shrink-swell potential due to a high percentage of smectite clay minerals. The route will cross numerous other smectitic soils such as Neldore, Scobey, Gerdrum, Creed and the Bascovy series. Badlands also may be associated with cretaceous shales and may be highly erodible and difficult to reclaim when disturbed. Please refer to Section 7.3 for further discussion on slope instability associated with cretaceous shales and swelling clays.

A small portion of the Project on federal lands will encounter droughty soils. Droughty soils will be prone to wind erosion during construction and will be more difficult to successfully stabilize and revegetate following construction. Similarly, scattered areas of saline and/or sodic soils 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 reclamation 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.

Keystone plans to minimize or mitigate potential impacts to soils during construction by implementing the soil protection measures identified in the BLM-Specific CMR Plan (**Appendix B**) and the Construction/Reclamation Unit Specifications (Appendix P). The measures include procedures for conserving, 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 the BLM 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 BLM-Specific CMR Plan.

To accommodate potential discoveries of contaminated soils, Keystone will develop contaminated soil discovery procedures in consultation with relevant agencies. These procedures will be added to the BLM-Specific CMR Plan. If hydrocarbon contaminated soils are encountered during trench excavation, the state agency responsible for emergency response and site remediation will be contacted immediately. A site-specific remediation plan of action will be developed in consultation with that agency. Depending on contaminant and the level of contamination found, affected soil may be replaced in the trench, land farmed, or removed to an approved landfill for disposal.

7.5.1 Soils on the Project Route

The soils in the northern portion of Montana generally formed in glacial till. Some glacial lacustrine deposits occur and shale may be exposed on some uplands. Small areas of alluvial

deposits occur along rivers and drainageways. The soils generally are very deep, well drained, and loamy or clayey. Soils such as Natrustalfs (Elloam and Thoeny series) and Haplustalfs (Phillips series) formed in till on till plains. Ustorthents (Hillon and Sunburst series) formed in till on till plains and hills. Argiustolls formed in till on till plains and hills (Bearpaw, Joplin, Scobey, Telstad, and Vida series) and in alluvium on alluvial fans, stream terraces, and hills (Ethridge and Evanston series).

From McCone County south to Fallon County the soils formed on old plateaus and terraces that eroded. Slopes generally are gently rolling to steep. Steeply sloping badlands border a few of the larger river valleys. In some areas flat-topped, steep-sided buttes rise sharply above the general level of the plains. The soils generally are shallow to very deep, well drained, and clayey or loamy. In areas of cretaceous shales, soils with high bentonite clay contents may occur, such as the Neldore series. These soils frequently have saline or sodic soil chemical properties.

Other soils that occur in the area such as Ustorthents formed in residuum on hills and ridges (Cabba, Cabbart, and Yawdim series). Ustifluvents (Havre series) formed in alluvium on fans, terraces, and flood plains. Haplustepts (Busby, Cherry, Delpoint, Lonna, and Yamacall series) formed in alluvium, eolian deposits, and residuum on terraces, fans, and hills. Calciustepts (Cambeth series) formed in alluvium, colluvium, and residuum on fans, hills, and plains. Natrustalfs (Gerdrum series) and Haplustolls (Shambo series) formed in alluvium and glaciofluvial deposits on fans and terraces and in drainageways. The typical freeze-free period ranges from 135 to 165 days (USDA Soil Conservation Service 1981).

Figure 7-3 depicts soils that may be susceptible to erosion due to water and Figure **7-4** depicts soils susceptible to wind erosion.

7.6 Water Resources

7.6.1 Surface Water

Surface water resources on federal lands along the Project route are located within the Missouri River Water Resource Region (which includes Montana, South Dakota, Nebraska, and Northern Kansas). Hydrologic units crossed by the Project are shown in **Figure 7-5.** Table 7-6 is a detailed tabulation of the stream crossings associated with the proposed route on federal lands. For a complete discussion of potential surface water impacts associated with the Project, refer to the Environmental Report.

Potential impacts to surface water on public lands resulting from the Project could arise during either construction or operation. Potential construction impacts include water quality degradation from temporary increases in suspended solids concentrations during in-stream construction activities, increased sedimentation in streams resulting from in-stream construction runoff, nearby channel and bank modifications that affect channel morphology and stability, and

reduced flows in streams where water is withdrawn for hydrostatic testing. Other potential construction impacts include water quality degradation from the spilling of hazardous materials including diesel fuel, gasoline, lubricating oils, grease, and hydraulic and other fluids. A discussion of the extent of these issues on public lands, and planned mitigation measures follows.

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Figure 7-3 Erosion Susceptibility – Water

Figure 7-4 Erosion Susceptibility – Wind

Figure 7-5 Hydrologic Units – Keystone XL Project

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Surface Water Resources

Table 7-6 indicates 53 ephemeral drainages, 8 intermittent streams, 2 seasonal drainages (as designated in the NHD database) and one perennial stream (unnamed tributary to Struple coulee) that will be crossed by the Project on federal lands.

Although not on Federal lands, the Missouri River will be crossed at the Valley-McCone County Line, just over 1 mile below the Fort Peck Dam, where the river is approximately 1,000 feet wide. A preliminary HDD crossing plan for this crossing is provided in Appendix D. The land on the south side of the river is owned by the USACE.

Water Quality

The Clean Water Act (CWA), Section 303(c), requires each state to review, establish, and revise water quality standards for all surface waters within a state. Each state developed a 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 waterbodies within the state.

There is no existing agency information to determine if any of the streams crossed on federal land meet their designated use. Eleven ephemeral, 7 intermittent, and 2 seasonal stream segments are listed as impaired by the USEPA (303c reports).

Table 7-6 Waterbodies Crossed on Federal Lands.

County	Crossing name	Waterbody Type	MP	Width at crossing (ft)
Phillips	UNNAMED TRIBUTARY TO EAST FORK WHITEWATER RIVER	Ephemeral	2.48	3.91
	UNNAMED TRIBUTARY TO DUNHAM COULEE		9.59	3.74
	UNNAMED TRIBUTARY TO COTTONWOOD CREEK		11.67	31.09
			11.88	16.25
			12.00	17.30
		Intermittent	13.74	48.69
Valley	PAPOOSE CREEK	Ephemeral	33.01	15.79
			33.07	6.49
	UNNAMED TRIBUTARY TO PASTURE COULEE		34.55	41.20
			35.36	52.28
			35.40	60.94
	HAY COULEE	Intermittent	37.83	44.86

Table 7-6 Waterbodies Crossed on Federal Lands.

County	Crossing name	Waterbody Type	MP	Width at crossing (ft)
	BLACK COULEE	Ephemeral	47.80	26.29
	UNNAMED TRIBUTARY TO BLACK COULEE		48.14	18.71
			48.20	14.26
	BRUSH FORK	Intermittent	51.17	18.09
	UNNAMED TRIBUTARY TO BRUSH FORK	Ephemeral	51.31	36.09
			51.40	12.33
			51.47	44.25
	BEAR CREEK	Seasonal	52.35	9.00
	UNNAMED TRIBUTARY TO BEAR CREEK	Intermittent	52.46	22.03
	UNGER COULEE		53.38	3.30
	UNNAMED TRIBUTARY TO UNGER COULEE	Ephemeral	54.02	6.72
	UNNAMED TRIBUTARY TO BUGGY CREEK		55.10	31.08
			55.55	5.56
			56.00	18.29
			56.15	64.63
	UNNAMED TRIBUTARY TO ALKALI COULEE		58.41	3.97
	UNNAMED TRIBUTARY TO WIRE GRASS COULEE		58.84	4.17
	WIRE GRASS COULEE		59.38	9.00
	UNNAMED TRIBUTARY TO WIRE GRASS COULEE		59.43	30.14
	SPRING CREEK	Intermittent	59.90	15.60
	UNNAMED TRIBUTARY TO MOONEY COULEE	Ephemeral	62.79	14.12
	UNNAMED TRIBUTARY TO CHERRY CREEK		65.51	36.58
	UNNAMED TRIBUTARY TO FOSS CREEK		67.10	4.78
	FOSS COULEE		67.91	6.48
McCone	UNNAMED TRIBUTARY TO STRUPLE COULEE		94.02	12.64
		Perennial	94.51	16.04
	STRUPLE COULEE	Seasonal	94.67	10.91
	UNNAMED TRIBUTARY TO JORGENSEN COULEE	Ephemeral	96.10	3.03
			96.20	2.33
			96.33	33.64
	UNNAMED TRIBUTARY TO SHADE CREEK		112.40	5.41
			112.41	6.79
			112.61	29.55
			112.83	21.56

Table 7-6 Waterbodies Crossed on Federal Lands.

County	Crossing name	Waterbody Type	MP	Width at crossing (ft)
	UNNAMED TRIBUTARY TO SOUTH FORK SHADE CREEK		116.50	3.16
			117.21	31.19
	UNNAMED TRIBUTARY TO FLYING V CREEK		120.42	24.04
			120.55	16.60
			120.55	2.22
Prairie	UNNAMED TRIBUTARY TO HAY CREEK		213.54	23.28
	UNNAMED TRIBUTARY TO CABIN CREEK		214.21	24.36
			214.31	12.32
			214.99	42.77
			215.75	16.24
			216.43	51.88
			216.97	5.90
			217.30	13.92
			218.02	13.85
			218.36	12.62
		Intermittent	218.90	31.85
		Ephemeral	219.45	15.54
Fallon	SODA CREEK	Intermittent	275.09	20.82
			275.11	22.08

Waterbody Crossings

To limit potential impacts at waterbody crossings, Keystone will use the following crossing techniques where water is present; dry-ditch flumed crossings, dry-ditch dam and pump crossings, or HDD (see construction details in the BLM-Specific CMRP [**Appendix B**]). The only waterbody adjacent to federal lands planned for HDD is the Missouri River. At present, Keystone is proposing open-cut dry crossings at all other dry and intermittent waterbody crossings in Montana.

Runoff and the resulting erosion of lands adjacent to waterbodies can lead to the introduction of solids into suspension and the deposition of sediment in-stream. The BLM-Specific CMR Plan includes extensive procedures to limit the extent of disturbed land adjacent to waterbodies, to control erosion, and methods to prevent sediments from entering waterbodies or wetlands.

These measures include Best Management Practices (BMPs), such as clearing limits, buffer strips, drainage diversion structures, and sediment barrier installations. In accordance with the CWA, Keystone will comply with NPDES general construction permit(s) with respect to pipeline construction and operation. Keystone will develop and file a Storm Water Pollution Prevention Plan to satisfy Notice of Intent(s) under NPDES. This plan will include BMPs to minimize soil erosion and sedimentation.

The BLM-Specific CMRP includes procedures for limiting the extent of this disturbance and the reclamation of disturbed areas. Reclamation includes grading, stabilization, and revetment BMPs. These BMPs embrace bioengineering concepts, which encourage the reclamation of natural stream banks.

The pipeline would be constructed under river channels with potential for lateral scour. The pipeline will be buried at an adequate depth 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.

Hydrostatic Test Water Withdrawal and Discharge

Hydrostatic test water will be discharged to the land surface at an approved location near the source or directly to the waterbody source with an approved energy dissipation device, depending on NPDES discharge permit requirements. Discharged water on the ground may evaporate or infiltrate into the soil or drainage where the water is released. The discharge of hydrostatic test water will follow state permit requirements, which would reduce potential effects on water quality or aquatic organisms. Energy dissipaters will be used to prevent erosion at discharge locations.

Spill Prevention

SPCC Plan procedures during construction are described in Appendix E and will be implemented in compliance with 40 CFR Part 112 (for oil spills) and corresponding state regulations.

Refueling and lubricating of most construction equipment will be restricted to upland areas at least 100 feet from the edge of any perennial waterbodies and at least 150 feet from groundwater wells. Wheeled and tracked construction equipment will be moved to an upland area more than 100 feet away from perennial waterbodies for refueling. In a few cases, such as for pumps or directional drill equipment located within or near a waterbody or wetland, refueling will be completed within or near a waterbody or wetland. In these situations, the specific measures identified in the SPCC Plan (Appendix F) will be followed.

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 waterbodies and wetlands.

7.6.2 Groundwater

The potential impact to groundwater associated with the Project on federal lands includes potential groundwater quality degradation during or after construction from disposal of materials, pipeline spills, or leaks that could seep into shallow aquifers used for domestic, agricultural, or public water supplies. Aquifer locations in areas where the Project crosses federal lands are shown in **Figure 7-6**.

Reductions in groundwater quality from spills, leaks, or disposal practices are not anticipated during construction. Most of the aquifers along the route will be at least temporarily isolated from any spills on the land surface and attending personnel will be able to respond to any incident before contaminants migrate into groundwater. In areas with near-surface groundwater or in areas adjacent to surface waterbodies, additional procedures and measures will be implemented as presented in the BLM-Specific CMRP. Adverse impacts are not anticipated due to pipeline construction.

Groundwater Resources

No groundwater impacts are anticipated due to construction or traffic on temporary or permanent access roads. The following discussion is focused on locations crossed by the pipeline. For discussion of all groundwater resources potentially impacted by the Project, regardless of land ownership, refer to the Environmental Report. Existing literature on the geology and groundwater hydrogeology of the states and counties affected by the Project was reviewed, with particular emphasis on the location of shallow aquifers (i.e., those with a depth of less than 200 feet), depth to the shallow groundwater table, and expected use of the shallow aquifers within 10 miles of the route. These locations include areas where estimates of the depth to the water table are based on regional groundwater elevation contours, and where water quality estimates are a general estimate of water quality based on regional or sometimes county-wide evaluations. Generally, areas where aquifers are heavily used or are potentially sensitive to contamination, including shallow alluvial aquifers along major river drainages where the river alluvium is a major source of domestic and irrigation water supply, have more complete and available information that was used in this assessment.

Federal lands affected by the Project lie within the Great Plains physiographic provinces (Thornbury 1965; Whitehead 1996). Continental glaciation during the Pleistocene covered parts of the Great Plains and most of the Central Lowlands provinces with a complex array of glacial drift and glacial outwash. This glacial material covers the bedrock aquifers in many areas and provides shallow alluvial groundwater for domestic and agricultural use in both current stream valleys and also from buried glacial paleochannels. In many cases, the buried paleochannels

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Figure 7-6 Aquifer Systems – Montana, Wyoming, South Dakota, and North Dakota

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are not continuous and serve as major sources of groundwater for local use. In many areas of the Great Plains, the glacial drift is fine-grained and relatively impermeable, thus it acts as a "confining layer" above the bedrock aquifers. Within this fine grained drift, local paleochannels can be found which can provide groundwater for ranches and small communities.

Federal lands on the Project route are within five counties in eastern Montana within the Great Plains physiographic province (Thornbury 1965), and are underlain by the Northern Great Plains aquifer system (Whitehead 1996). The two northernmost counties, Phillips and Valley, were glaciated during the Pleistocene, and thus have a thick veneer of glacial till. Three main aquifer types are found along the Project in eastern Montana: 1) unconsolidated alluvial and/or glacial aquifers, 2) lower Tertiary aquifers, mainly in the Fort Union Formation, and 3) upper Cretaceous aquifers, mainly in the Fox Hills and Hell Creek Formations. Shallow alluvial aquifers are found in unconsolidated alluvial and glacial sediments along major drainages, such as the Missouri River, crossed by the pipeline.

Phillips County

Phillips County is covered by a veneer of glacial till and drift, which generally is 20 to 40 feet thick, but can reach 100 feet (Whitehead 1996). This glacial till overlies the upper Cretaceous Judith River and Clagett Formations. The glacial till is relatively impermeable and acts as a "confining layer" above the upper Cretaceous bedrock aquifer found mainly in the Judith River Formation. The glacial till can contain locally permeable buried zones of coarse glacial outwash which may provide water for ranches.

The upper Cretaceous Judith River Formation is the main aquifer and consists of sandstone and siltstone. The aquifer is confined, and the water table elevation ranges from 2,600 to 2,800 feet amsl (Libmeyer 1985). Groundwater quality ranges from Montana Class II with total dissolved solids (TDS) content between 500 and 1,800 milligrams per liter (mg/L), to Montana Class III with a TDS between 1,800 and 10,000 mg/L. While the TDS limits applicable to agricultural uses can vary, and be very high (up to 10,000 mg/L in South Dakota), the federal limit for potable water is 500 mg/L (USEPA 2003). The water table is from 150 to 500 feet deep based on drilling depths for recorded water wells (Smith et al. 2000). According to the Montana Bureau of Mines and Geology GWIC database (downloaded 9/17/2012), there are an average of 0.68 wells per square mile in Phillips County. Well yields are in the range of 5 to 20 gallons per minute (gpm) (Whitehead 1996).

Valley County

Valley County, like Phillips County, once was glaciated and is covered by a veneer of glacial till up to 100 feet in thickness. This glacial till overlies the upper Cretaceous Judith River Formation in the northwest part of the county near the boundary with Phillips County, but over most of the county, the till lies above the impermeable upper Cretaceous Bearpaw Shale. According to the

Montana Bureau of Mines and Geology GWIC database (downloaded 9/17/2012), there are an average of 0.68 wells per square mile in Valley County and well yields are low. Water elevations in the Judith River Formation are in the range of 2,600 to 2,800 feet amsl (Libmeyer 1985). Water quality in the upper Cretaceous rocks has a TDS around 2,000 mg/L (Downey and Dinwiddie 1988) and is mostly dominated by sodium chloride (LaRique 1966), making it Montana Class III water.

Most groundwater used in Valley County comes from shallow alluvial aquifers along major drainages. The two main rivers in Valley County encountered by the proposed route are the Milk River and the Missouri River. The many wells in the alluvium along the Missouri River yield 100 to 500 gpm. The shallow alluvial water table is less than 50 feet below ground surface (bgs) (LaRique 1966), and the alluvium along the river in the area of the Project crossing is 30 to 150 feet thick. The TDS ranges from 800 to 2,700 mg/L (Swenson and Drum 1955), consistent with Montana Class II or Class III water.

Shallow groundwater exists along a number of drainages on federal lands in Valley County, including Rock Creek and the Missouri River. Keystone has identified no wells or springs on federal lands within 0.5 mile of the centerline in Valley County.

McCone County

The Project crosses two aquifers in McCone County, the upper Cretaceous Hells Creek/Fox Hills aquifer and the lower Tertiary Fort Union aquifer. Approximately one-third of the proposed route in McCone County is in the Hells Creek/Fox Hills outcrop area beginning south of the Missouri River in the dissected uplands. The remainder of the proposed route within McCone County is within the rolling upland plains underlain by the lower Tertiary aquifer.

The upper Cretaceous Hells Creek/Fox Hills aquifer has groundwater elevations in the range of 2,200 to 2,400 feet amsl (Whitehead 1996), with a TDS ranging from 500 to 1,800 mg/L dominated by sodium bicarbonate. The permeable sandstones of the lower one-third of the Hells Creek/Fox Hills aquifer contain a confined aquifer overlain by less permeable mudstones. Yields in the permeable sandstones of the Hells Creek/Fox Hills are in the range of 5 to 20 gpm and most wells are drilled to depths of 150 to 500 feet. Groundwater flows northeast and is part of regional flow in the northwestern flank of the Williston Basin.

The lower Tertiary Fort Union aquifer consists of interbedded sandstones, mudstones, shale, and coal seams. Groundwater elevations in the Fort Union aquifer in McCone County are in the range of 2,400 feet amsl in the northern part of the county to 2,800 feet amsl in the southeastern part of the county. Groundwater flow is to the northwest toward the Missouri River. The Fort Union aquifer is mostly a confined aquifer that is found in sandstones interbedded with shales and mudstones. Drilling depths for most wells are in the range of 50 to 300 feet (Libmeyer 1985), and well yields are 15 to 25 gpm. Water quality is highly variable with TDS ranging from

500 to as much as 5,000 mg/L, and sodium bicarbonate is the primary constituent (Busbey et al. 1995). Water depths in the Fort Union aquifer range from 100 to 150 feet bgs (Swenson and Drum 1955). Groundwater flow in the lower Tertiary Fort Union aquifer is mostly to local drainages from highland recharge areas.

Between Milepost 91 and Milepost 110, the pipeline route crosses dissected uplands underlain by the upper Cretaceous Hells Creek/Fox Hills aquifer system. From Milepost 93 to Milepost 98 within this system, the route passes within 2 miles of the Bear Creek recreational area, which is fed by ephemeral drainages crossed by the proposed route. Groundwater in the alluvium of Bear Creek also could flow into the Bear Creek recreational area. From Milepost 100 to the Dawson County line (approximately Milepost 156), the proposed route passes through rolling plains underlain by the lower Tertiary Fort Union aquifer and will be within five miles of mapped ranch wells or mapped springs. The proposed route in McCone County does not cross any streams or areas considered to have highly sensitive groundwater.

Prairie and Fallon Counties

Prairie and Fallon counties are part of the Lower Yellowstone aquifer system with groundwater resources in the lower Tertiary Fort Union Formation, linked to the lower Yellowstone River system. In parts of Fallon County, the upper Cretaceous Fox Hills and Hells Creek formations are exposed in the Cedar Creek anticline, however, the pipeline route will not go through the Cedar Creek anticline area.

The Fort Union Formation is a shallow bedrock aquifer and provides most of the groundwater used in all three counties. Major streams in the area, such as the Yellowstone, have considerable alluvial material along their banks and in terraces which contain important shallow aquifers which are used for water supply. The upper Cretaceous Fox Hills and Hells Creek formations underlie the lower Tertiary Fort Union at depths from 600 to 1,600 feet bgs. Groundwater flow in the Fox Hills and Hells Creek formations is confined and part of a regional flow system that directs groundwater flow to the lower Yellowstone River. Groundwater flow in the Fort Union Formation includes both local flow from higher topographic areas to local drainages and a general regional flow to the Yellowstone River.

Groundwater elevations in the lower Tertiary Fort Union aquifer range from 2,600 to 3,000 feet amsl. The Yellowstone River acts as a regional drain for groundwater in the Fort Union aquifer because a groundwater low area exists along the course of the river. Groundwater elevations in the underlying upper Cretaceous Fox Hills/Hells Creek aquifer range from 2,200 to 2,800 feet amsl. Groundwater levels in the alluvial aquifers adjacent to the lower Yellowstone River are in the range of 2,000 to 2,200 feet amsl (Smith 1998).

Well yields and groundwater quality vary depending on the aquifer and the depth of the well. Well yields in the shallow alluvial aquifers adjacent to the Yellowstone River range from 50 to

500 gpm (LaRique 1966). Water quality is similar to river water quality, consisting of calcium bicarbonate water with TDS ranges from 1,000 to 1,500 mg/L. Wells in the Fort Union aquifer yield an average of 10 gpm, and water is dominated by sodium bicarbonate, with a TDS range of 500 to 5,000 mg/L. Average TDS is about 1,670 mg/L (Smith et al. 2000). Wells in the Fox Hills aquifer usually yield below 15 gpm (Smith et al. 2000). Like water in the Fort Union aquifer, water in the Fox Hills aquifer also is sodium bicarbonate dominated, but the TDS ranges from 1,000 to 2,500 mg/L, averaging about 1,460 mg/L (Smith et al. 2000). About 60 percent of all wells in these three counties are less than 200 feet deep (Smith 1998), and the maximum well depth is around 400 feet (Smith et al. 2000).

Aquifer properties have been measured in the lower Yellowstone River system (Smith et al. 2000). Shallow alluvial aquifers have a hydraulic conductivity around 75 feet per day with a transmissivity that ranges from 3,600 to 5,800 gallons per day per foot. Slug tests in the Fort Union aquifer gave estimates of hydraulic conductivity in the range of 0.01 to 0.6 feet per day. For the Hells Creek aquifer, transmissivities range from 300 to 3,000 gallons per day per foot. Groundwater in wells less than 100 feet in depth has high tritium values, suggesting recent recharge from precipitation (Smith et al. 2000). Groundwater in deeper wells and especially in the Fox Hills/Hells Creek aquifer has low tritium values and probably has not been recharged in the past 40 to 50 years.

The proposed route through these counties crosses a few streams with shallow alluvial aquifers, which could be considered sensitive groundwater areas, although only one is on federal lands. At Milepost 215, the route passes a flowing well within 2 miles of the pipeline. Crossing the alluvial plains of ephemeral creeks also may involve shallow alluvial aquifers that have water during the spring but may be mostly dry during the late summer and fall.

7.6.3 Water Supplies and Wells

No potential public water supply sources have been identified within 1 mile of federal lands affected by the Project.

7.6.4 Floodplains

From a geomorphic perspective, floodplains are relatively low, flat areas of land that surround waterbodies and hold overflows during flood events. Floodplains are often associated with rivers and streams, where they consist of stream deposited sediments forming levels (or “terraces”) deposited at different times along the watercourse.

From a policy perspective, Federal Emergency Management Agency (FEMA) defines a floodplain as being any land area susceptible to being inundated by waters from any source (FEMA 2005). Much of the basic inventory, regulation, and mitigation effort for floodplains and flood mitigation (including the National Flood Insurance Program) are led by FEMA. Executive Order 11988, Floodplain Management, states that actions by federal agencies shall avoid to the

extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplain development wherever there is a practicable alternative. Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for: 1) acquiring, managing, and disposing of federal lands, and facilities; 2) providing federally undertaken, financed, or assisted construction and improvements; and 3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Within the Project area, low terraces occur at nearly every stream crossing. For smaller intermittent and ephemeral drainages, these are typically narrow and infrequently flooded. At crossings of rivers and larger perennial streams, floodplains are wider and may be more frequently flooded to a particular elevation depending on the magnitude of a given flood. One aboveground facility, an IMLV, will be located on federal lands outside the southern boundary of the floodplain.

7.6.5 Wetlands and Riparian Areas

In wetland areas on federal lands, the Project may have temporary impacts, limited to construction and reclamation that could include soil disturbance and short-term increases in turbidity and fluctuations in wetland hydrology. There is potential for both short- and long-term modifications in wetland vegetation community composition and structure from clearing and maintenance activities, as well as potential modifications in wetland productivity due to the potential changes to surface and subsurface flow patterns from pipeline construction.

Based on results of field surveys conducted in 2008, 2009, 2010, and 2011, and aerial photo interpretation, approximately one percent of construction disturbance associated with the Project on federal lands will occur in wetlands. Of this total, approximately four percent is palustrine emergent wetlands (marshlands and meadows), and the remainder (approximately 96 percent) is stream channels and open water. No palustrine forested or palustrine scrub-shrub lands are intersected by the Project on federal lands.

Effects on wetland vegetation will be greatest during and immediately following construction. To mitigate the potential for these impacts, Keystone will implement the procedures outlined in the BLM-Specific CMRP.

Keystone will restore or mitigate impacts to wetlands affected by construction activities, to the extent practicable. Pipeline construction through wetlands must comply, at a minimum, with USACE Section 404 nationwide permit conditions.

For the Missouri River, which will be crossed by the HDD method, streamside wetlands or floodplain forests will not be affected. Smaller streams and ephemeral or intermittent drainages

will likely be open cut and wetlands located in these areas will be crossed by trenching. No permanent loss of wetlands will occur as a result of the Project. Herbaceous vegetation in palustrine emergent wetlands is expected to reestablish to pre-construction levels within 3 to 5 years following the completion of reclamation, resulting in a short-term loss of vegetation and available habitat for some wildlife species.

As described in the BLM-Specific CMRP, specific construction techniques will be used to retain the hydrological and vegetation characteristics of wetlands that will be disturbed by construction. These techniques will include segregation and replacement of wetland soils (except in areas of standing water, saturated wetlands, or where no topsoil is evident) so that soil profiles and native vegetation seed and rootstock will be reestablished to help ensure successful reclamation and reestablishment of local drainage patterns to restore existing surface and subsurface water flow patterns.

Identified Wetlands

Wetlands were identified along the Project through field surveys and review of aerial photographs. Wetlands and Waters of the US on federal lands along the proposed route were delineated in accordance with the direction provided by the USACE – Omaha District. Federal lands associated with the Project are all within the USACE Omaha District.

In addition to collecting sufficient data for "routine on-site delineations" as per the USACE Wetlands Delineation Manual (USACE 1987) and channel characteristics data for drainage crossings, wetland survey teams collected sufficient data (e.g., defined bed and bank and connectivity to navigable waters) for the USACE to make jurisdictional determinations for all wetlands and drainage crossings surveyed in the field.

Wetland and riverine communities crossed by the pipeline on federal lands are summarized in **Table 7-7**. Wetlands and riverine habitats occupy approximately 1 percent of the pipeline route on federal lands. Of this, the majority of the waterbodies crossed are either ephemeral or intermittent; less than one percent (1,300 feet) of the waterbodies crossed by distance are perennial. The remaining wetlands crossed (approximately 21 feet) are classified as palustrine emergent wetlands, dominated by perennial rooted herbaceous vegetation. A number of wetland areas are located in actively grazed rangeland.

Table 7-7 Miles of Wetlands and Waterbodies Crossed by the Project on Federal Lands

Affected State	Wetland Types Crossed (miles)				Waterbody Types Crossed (miles)				
	Palustrine Emergent	Palustrine Forested	Riverine/ Open Water	Palustrine Scrub-Shrub	Ephemeral	Intermittent	Perennial	Seasonal	Total
Montana	0.004	0.00	0.00	0.00	0.20	0.04	0.003	0.004	**0.25**

Note: Delineations were based on field surveys wherever possible. Where surveys were not conducted, a combination of national data coverage (e.g., NWI) and aerial photo interpretation was used.

7.7 Vegetation Resources

7.7.1 General Vegetation Types

Vegetation types that occur along the Project route were identified and delineated based on review of literature, internet database resources, interpretation of aerial photography, general observations made during field reconnaissance activities, and detailed information collected during wetland and waterbody delineations.

Grassland/rangeland, upland forest, palustrine emergent, shrub-scrub, forested wetlands, streams, and open water habitats typically support naturally occurring terrestrial and aquatic vegetation. In general, residential and commercial/industrial areas are characterized as artificially created landscapes with minimal naturally occurring vegetation. Cropland and pivot-irrigated cropland areas primarily include introduced crop species, providing forage and grain for livestock and human consumption. Areas of existing ROW consist of previously disturbed areas associated with pipelines and other utilities which have been reclaimed. **Table 7-8** provides the approximate mileage of each vegetation cover types crossed by the Project ROW on federal lands.

Table 7-8 Miles of Vegetation Cover Types Crossed by the Project ROW on Federal Lands

State	Vegetation Communities Crossed (miles)								
	Agriculture	Previously Disturbed	Grassland/ Rangeland	Upland Forest	Riverine/Open Water	Palustrine Forested Wetlands	Palustrine Emergent Wetlands	Palustrine Scrub-Shrub Wetlands	Total
Pipeline									
Montana	0.03	0.41	45.36	0.23	0.25	0.00	0.00	0.00	46.29
Pipeline Subtotal	0.03	0.41	45.36	0.23	0.25	0.00	0.00	0.00	46.29
Access Roads									
Montana	0.00	14.23	0.83	0.00	0.03	0.00	0.00	0.00	15.09

Table 7-8 Miles of Vegetation Cover Types Crossed by the Project ROW on Federal Lands

State	Vegetation Communities Crossed (miles)								
	Agriculture	Previously Disturbed	Grassland/ Rangeland	Upland Forest	Riverine/Open Water	Palustrine Forested Wetlands	Palustrine Emergent Wetlands	Palustrine Scrub-Shrub Wetlands	Total
Access Road Subtotal	0.00	14.23	0.83	0.00	0.03	0.00	0.00	0.00	15.09
Project Total[1]	**0.03**	**14.64**	**46.19**	**0.23**	**0.28**	**0.00**	**0.00**	**0.00**	**61.38**

[1]Discrepancies in totals are due to rounding.

Pipeline construction will involve the temporary alteration of vegetation through ROW clearing and excavation and high traffic activity. Vegetation community recovery rates are estimated to range between three to five years for herbaceous-dominated cover types.

Reclamation, revegetation, and revegetation success monitoring, as outlined in the BLM-Specific CMRP, will be completed for disturbed areas within the construction ROW following the completion of Project construction activities. Under normal to above-normal precipitation conditions, vegetation cover within the reclaimed areas will consist primarily of herbaceous plant species within three to five growing seasons. Reclamation success is dependent upon several variables, including soil preparation, season of seed application, and precipitation levels following seed application and post-construction land management.

Keystone will monitor revegetation success along the pipeline ROW according to permits and approvals, including from the BLM on federal lands. Revegetation will be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation is similar in density and cover to adjacent, undisturbed lands. Reseeding will be based upon reclamation success and natural rainfall amounts received in the years following revegetation efforts. In agricultural areas, revegetation will be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.

Keystone will use seed mixtures approved by the BLM on federal lands. Consequently, the various vegetation types altered by the pipeline, other than forested communities, are expected to return to near pre-construction conditions. If desirable plant species are not established in the ROW within a short period of time, adverse impact might include, but are not limited to, the following: higher soil erosion rates, introduction and/or spread of noxious or invasive plant species, and reduced forage production.

Following the completion of construction activities, all disturbed areas (with the exception of one IMLV site and permanent access roads on federal lands) will be rehabilitated and revegetated to

its pre-construction land use, as described in the BLM-Specific CMRP and as required by BLM ROW Grant conditions for federal lands. BLM will approve successful reclamation on federal lands. (**Appendix B**).

7.7.2 Native Grasslands

Native grasslands are the most common vegetation cover type on federal lands crossed by the Project. The most common grassland community type on the Project was needle-and-thread/blue grama-western wheatgrass. Minor amounts of bluebunch wheatgrass/little bluestem-prairie sandreed were recorded on coarse or sandy soil in the southern part of Montana. Experienced plant ecologists and range scientists determined native grassland quality within the 300-foot field survey corridor by qualitatively assessing plant community composition, canopy cover, and grazing impacts. Primary indicators of poor grassland quality included:

- Invasion by non-native annual grasses such as cheatgrass (*Bromus tectorum* or *Bromus japonicas*);
- Invasion by non-native perennial grasses such as crested wheatgrass (*Agropyron cristatum*) or smooth brome (*Bromus inermis*);
- Invasion by state- or BLM-listed noxious weeds such as leafy spurge (*Euphorbia esula*);
- Dense amounts of clubmoss (*Selaginella densa*);
- Dominance of nuisance annuals such as tumblemustard (*Sisymbrium altissimum*); and
- Evidence of historically high livestock grazing levels (typically reflected in low density of native perennial grasses, high amounts of introduced species, high amounts of clubmoss, and minimal amounts of surface plant litter).

Grassland quality was categorized based on these indicators as low, medium, or high. Low quality grasslands included areas dominated by non-native species and/or high amounts of clubmoss with low density and cover of native perennial grasses. Medium quality grasslands included areas with minor amounts of non-native species, moderate amounts of clubmoss, and moderate density and cover of native perennial grasses. High quality grasslands included areas with few to no non-native species, little to no clubmoss, and high density and cover of native perennial grasses. **Table 7-9** summarizes grassland quality on BLM land crossed by the Project. Native grasslands will be revegetated with native perennial grasses appropriate to the region. Seed mixtures have been developed for the Project and will be provided to the BLM for review and comment. The location where seed mixtures will be applied will be shown on Project alignment sheets. Revegetation studies on a pipeline right-of-way in Montana found that about 91 percent of native grassland habitats (about 98 miles) were similar to adjacent conditions within 5 years (WESTECH, 2001).

Table 7-9 Grassland Quality on Federal Land Affected by the Project

	Miles			
	Low Quality	**Medium Quality**	**High Quality**	**Total**
BLM-Malta Field Office	11.7	8.5	0.2	20.4
BLM-Miles City Field Office	2.3	6.6	3.9	12.8
Total	**14.0**	**15.1**	**4.1**	**33.2**

7.7.3 Sensitive, Rare, Threatened, and Endangered Plant Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the Endangered Species Act (ESA), species of concern as identified by the US Fish and Wildlife Service (USFWS), and species designated as state sensitive by the BLM. The following information reflects federal sensitive plant species data from responses from the USFWS, BLM, various state Natural Heritage Programs, state wildlife agencies, and field surveys.

Based on preliminary responses from agencies, a total of 7 federally listed plant species (i.e., special status species and species of special concern) were identified as potentially occurring within the Project area on federal lands. Special status species and species of special concern, their associated habitats, potential for occurrence along the pipeline ROW and results of habitat surveys are listed in Appendix I-1 and updated 2011 surveys are summarized in **Appendix I-2**. Occurrence potential along the ROW was evaluated for each plant species based on its habitat requirements and/or known distribution. Based on these evaluations, certain sensitive plant species, special status species, and species of special concern were eliminated from detailed analysis.

Habitat surveys were conducted in the 2008, 2009, and 2011 growing seasons to identify suitable habitat. In accordance with agency stipulations, surveys for some species were conducted. Based upon agency consultation, additional surveys may be required for special status species or species of concern within suitable habitat during the growing season prior to construction (See **Appendix I-2**). Surveys for state listed species will occur on federal and state land where suitable habitat exists. If an individual or population of a listed species is identified within the construction ROW, suitable mitigation measures will be developed in consultation with the USFWS and BLM. The BLM has provided guidance to Keystone to assume that BLM reptile and amphibian species of concern are present and to develop mitigation measures with BLM prior to construction.

7.7.4 Noxious and Invasive Weeds

Surface disturbance associated with construction activities could contribute to the introduction or spread of noxious and invasive weed species and other undesirable plant species. Noxious and invasive weed species are typically fast growing and could displace native species and inhibit the establishment of native grass, forb, and shrub species. Increases in noxious and invasive weed species are particularly serious within areas where they were introduced by construction. Common locations for noxious weed infestations include riparian zones, livestock concentration areas, roads, and disturbed soils. Invasive and noxious plant species are most prevalent in areas of prior surface disturbance, such as agricultural areas, roadsides, existing utility ROWs, and wildlife concentration areas. 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 defined under 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 United States, the public health, or the environment” (USDA Animal and Plant Health Inspection Service [APHIS] 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” (APHIS 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). Each state is required to comply with the rules and regulations set forth by this Act and to manage its lands accordingly.

In addition to federally listed noxious weeds species, the Montana Department of Agriculture and various county weed boards each maintain a list of regulated and prohibited noxious and invasive weed species.

In **Table 7-10**, species found in 2008 and 2009 surveys to occur on federal lands along the Project route are noted. In addition, BLM identified potential weed issues for access roads between MP 38 and 44 and some weed management areas that need to be verified prior to construction. Additional surveys will be conducted prior to construction to document weed infestation areas in the project footprint. Keystone will prevent the spread of established weed populations as a result of the Project, and will mitigate to prevent the establishment of those species that are not currently present within the Project ROW.

Table 7-10 Noxious weeds found during surveys on Federal Lands

Common Name	Scientific Name	Milepost Enter	Milepost Exit
Valley County			
Leafy spurge	*Euphorbia esula*	35.21	35.21
		35.79	35.84
		35.93	36.02
		37.68	37.95
		38.19	38.20
Leafy spurge, Canada thistle	*Euphorbia esula, Cirsium arvense*	38.29	38.35
Leafy spurge	*Euphorbia esula*	38.74	38.81
		38.81	38.86
McCone County			
Field bindweed	*Convolvulus arvensis*	90.49	90.50
		90.62	90.65
Field bindweed, Canada thistle	*Convolvulus arvensis, Cirsium arvense*	117.11	117.29
Prairie County			
Canada thistle	*Cirsium arvense*	216.54	216.57
Leafy spurge	*Euphorbia esula*	216.97	216.98
		219.43	219.48
		219.65	219.67
Fallon County			
Field bindweed	*Convolvulus arvensis*	249.90	249.91

Where an individual or population is identified within the construction ROW, suitable techniques will be implemented pursuant to the BLM-Specific CMRP (**Appendix B**) to control the spread and establishment of noxious and invasive weed species. Noxious weed treatments may include mechanical, biological or chemical methods, as appropriate, and will be implemented as needed. Keystone will confer with the BLM and applicable county weed boards to ensure that noxious weed management practices enacted for the ROW are in compliance with BLM and county standards, and in accordance with the BLM's Programmatic EIS for Vegetation Treatments (BLM 2007b) Montana County Weed Control Act (Title 7, Chapter 22 Part 21 and Title 80, Chapter 7 Part 7).

7.8 Wildlife Resources

7.8.1 Terrestrial Wildlife Species

General Wildlife Habitat

Wildlife habitats along the Project on federal lands consist of grassland/rangeland, agriculture, palustrine emergent wetlands, riverine/open water, and upland forest. Descriptions of vegetation communities crossed by the Project are discussed in Section 7.7. **Table 7-8** indicates that 46 miles of grassland/rangeland, 0.2 mile of upland forest, 0.3 mile of riverine/open water, and less than 0.1 mile of palustrine emergent wetlands will be impacted by the Project. No palustrine scrub-shrub or palustrine forested wetland habitat is crossed by the Project on federal lands.

Big Game Species

Mule deer, white-tailed deer, and Pronghorn are the primary big game species occurring along the Project. To a lesser degree could be the occurrence of elk, moose and possibly wild bison (for the Canadian National Grasslands Park). Locations for big game winter ranges were determined using data received from Montana Fish Wildlife and Parks (MFWP) and the BLM. Certain habitat ranges for these species are considered crucial for maintenance of game populations. The MFWP has identified winter ranges for these game species in Montana (**Table 7-11**). Construction impacts to primary big game species will include the temporary loss of forage area, resulting in an increase in temporary habitat fragmentation within the proposed surface disturbance areas. These losses of vegetation would represent only a small percentage of the overall available habitat within the broader Project region. The loss of shrubland vegetation will be long term (greater than 5 years and, in some cases, more than 20 years). In the interim, grassland species may become established within 3 to 5 years, depending on weather conditions and grazing management practices. In most instances, suitable habitat adjacent to the disturbed areas will be available for wildlife species until grasses and woody vegetation are reestablished within the disturbance areas.

Indirect impacts would result from increased noise levels and human presence during surface disturbance activities. Big game animals (especially Pronghorn and mule deer) could decrease their use within 0.5 mile of surface disturbance activities due to increased noise levels (Ward et al. 1980; Ward 1976). This displacement would be short term and animals would return to the disturbance area following the completion of construction and reclamation activities. This would be applicable during operations for the four permanent access roads on Federal land for travel to and from IMLVs and one pump station.

Table 7-11 Winter Big Game Ranges on Federal Lands Potentially Affected by the Project in Montana

Species	Beginning MP	Ending MP	Total Length Crossed (miles)	Acreage Affected During Construction[1]
Antelope	11.40	12.33	0.93	12.45
	13.06	13.78	0.72	9.55
	15.38	15.42	0.04	0.49
	21.30	21.66	0.36	4.78
	24.99	25.11	0.13	1.69
	38.57	38.58	0.01	0.15
	38.58	38.86	0.28	3.74
	42.56	43.14	0.59	7.83
	45.82	46.19	0.37	4.95
	46.19	46.27	0.08	1.10
	46.27	46.59	0.32	4.31
	46.59	46.93	0.33	4.46
	46.93	46.96	0.03	0.39
	47.71	47.95	0.24	3.17
	47.95	48.47	0.52	6.90
	49.97	50.64	0.67	8.89
	50.64	50.69	0.05	0.70
	50.69	51.42	0.73	9.73
	51.42	52.01	0.59	7.87
	52.01	52.17	0.16	2.14
	52.17	52.36	0.18	2.44
	52.36	52.69	0.34	4.48
	52.69	52.94	0.24	3.25
	53.36	54.43	1.07	14.21
	54.43	54.45	0.02	0.32
	54.68	55.20	0.51	6.85
	55.53	56.00	0.47	6.21
	56.00	56.16	0.17	2.20
	56.79	56.83	0.04	0.50
	57.17	57.50	0.34	4.49
	58.28	58.79	0.51	6.82
	58.79	59.31	0.52	6.95
	59.31	60.14	0.83	11.07

Table 7-11 Winter Big Game Ranges on Federal Lands Potentially Affected by the Project in Montana

Species	Beginning MP	Ending MP	Total Length Crossed (miles)	Acreage Affected During Construction[1]
	60.14	60.59	0.44	5.93
	60.59	61.61	1.02	13.62
	62.45	62.84	0.39	5.16
	63.63	64.34	0.71	9.43
	65.22	65.71	0.49	6.56
	66.91	66.96	0.05	0.67
	112.91	113.01	0.11	1.40
	113.01	113.03	0.02	0.29
	115.89	116.31	0.42	5.58
	116.31	116.56	0.25	3.38
	117.11	117.43	0.32	4.31
	117.43	117.81	0.38	5.07
	118.68	118.77	0.10	1.30
	120.08	120.60	0.53	7.04
	120.76	120.97	0.21	2.81
	127.52	127.55	0.03	0.41
	129.84	130.33	0.49	6.50
	275.06	275.56	0.50	6.68
Mule Deer	9.20	9.74	0.54	7.16
	11.40	12.33	0.93	12.45
	13.06	13.78	0.72	9.55
	15.38	15.42	0.04	0.49
	21.30	21.66	0.36	4.78
	24.99	25.11	0.13	1.69
	28.84	28.87	0.03	0.43
	32.62	33.60	0.98	13.04
	33.60	33.61	0.01	0.12
	34.07	34.10	0.03	0.39
	34.10	34.84	0.74	9.80
	35.56	35.58	0.02	0.27
	35.58	36.32	0.75	9.95
	36.32	36.33	0.01	0.15
	37.07	37.34	0.27	3.65

Table 7-11 Winter Big Game Ranges on Federal Lands Potentially Affected by the Project in Montana

Species	Beginning MP	Ending MP	Total Length Crossed (miles)	Acreage Affected During Construction[1]
	37.68	38.57	0.89	11.84
	38.57	38.58	0.01	0.15
	38.58	38.86	0.28	3.74
	42.56	43.14	0.59	7.83
	45.82	46.19	0.37	4.95
	46.19	46.27	0.08	1.10
	46.27	46.59	0.32	4.31
	46.59	46.93	0.33	4.46
	46.93	46.96	0.03	0.39
	47.71	47.95	0.24	3.17
	47.95	48.47	0.52	6.90
	49.97	50.64	0.67	8.89
	50.64	50.69	0.05	0.70
	50.69	51.42	0.73	9.73
	51.42	52.01	0.59	7.87
	52.01	52.17	0.16	2.14
	52.17	52.36	0.18	2.44
	52.36	52.69	0.34	4.48
	52.69	52.94	0.24	3.25
	53.36	54.43	1.07	14.21
	54.43	54.45	0.02	0.32
	54.68	55.20	0.51	6.85
	55.53	56.00	0.47	6.21
	56.00	56.16	0.17	2.20
	56.79	56.83	0.04	0.50
	57.17	57.50	0.34	4.49
	58.28	58.79	0.51	6.82
	58.79	59.31	0.52	6.95
	59.31	60.14	0.83	11.07
	60.14	60.59	0.44	5.93
	60.59	61.61	1.02	13.62
	62.45	62.84	0.39	5.16
	63.63	64.34	0.71	9.43

Table 7-11 Winter Big Game Ranges on Federal Lands Potentially Affected by the Project in Montana

Species	Beginning MP	Ending MP	Total Length Crossed (miles)	Acreage Affected During Construction[1]
	65.22	65.71	0.49	6.56
	66.91	66.96	0.05	0.67
	66.96	67.27	0.31	4.11
	67.27	67.30	0.03	0.34
	67.30	68.33	1.04	13.85
	89.76	90.13	0.37	4.93
	90.47	90.48	0.01	0.09
	90.48	91.62	1.15	15.30
	91.62	91.64	0.01	0.19
	91.64	92.43	0.79	10.53
	92.43	93.09	0.66	8.86
	93.84	94.09	0.25	3.37
	94.09	95.16	1.07	14.21
	95.16	95.50	0.34	4.55
	95.80	96.44	0.64	8.57
	96.44	97.07	0.63	8.38
	99.73	100.04	0.32	4.23
	104.19	104.46	0.27	3.63
	107.31	107.55	0.24	3.15
	107.86	108.08	0.22	2.97
	109.78	110.43	0.65	8.67
	111.13	111.22	0.09	1.20
	112.40	112.91	0.51	6.74
	112.91	113.01	0.11	1.40
	113.01	113.03	0.02	0.29
	115.89	116.31	0.42	5.58
	116.31	116.56	0.25	3.38
	117.11	117.43	0.32	4.31
	117.43	117.81	0.38	5.07
	118.68	118.77	0.10	1.30
	120.08	120.60	0.53	7.04
	120.76	120.97	0.21	2.81
	127.52	127.55	0.03	0.41

Table 7-11 Winter Big Game Ranges on Federal Lands Potentially Affected by the Project in Montana

Species	Beginning MP	Ending MP	Total Length Crossed (miles)	Acreage Affected During Construction[1]
	129.84	130.33	0.49	6.50
	214.02	214.45	0.43	5.74
	249.20	249.91	0.71	9.50
	275.06	275.56	0.50	6.68
White Tailed Deer	54.43	54.45	0.02	0.32
	54.68	55.20	0.51	8.41
	55.53	56.16	0.63	6.21
	56.79	56.83	0.04	0.50
	57.17	57.50	0.34	4.49
	66.96	67.27	0.31	4.11
	89.76	90.62	1.87	24.87
	249.20	249.91	0.71	9.50

[1]Acres Affected by Construction calculated from ROW of 110 ft

Small Game Species

Small game species that could occur along the Project and possible alternatives include upland gamebirds, waterfowl, furbearers, and small mammals. Specific species could 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, sandhill 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.

Potential indirect impacts to small game from the Project could result in the temporary loss of and fragmentation of habitat until vegetation is re-established. Indirect impacts could include the temporary displacement of small game from the disturbance areas as a result of increased noise and human presence. Although habitats adjacent to the Project may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortalities due to displacement. Displacement or loss of small game animals from disturbance areas would be short-term because of their generally high reproductive rates and ability to return to the disturbance areas following completion of construction and reclamation activities.

Potential direct impacts to small game species could include nest or burrow abandonment and loss of eggs or young where construction occurs during the breeding season. Of greatest concern is the potential for disturbance or loss of lekking mating grounds and nesting habitat for

greater sage-grouse, sharp-tailed grouse, and greater prairie-chicken. Based on the BLM and MFWP sharp-tailed grouse lek sites that have been identified as occurring within 2 miles of the Project on federal lands and based upon the results of aerial surveys conducted in April of 2011 proposed construction window restrictions have been developed as shown **Table 7-12**. Historic leks are also found along the route in Montana.

Table 7-12 Sharp-Tailed Grouse Lek Site Restrictions on Federal Lands

Milepost Locations		Buffer Zone Length Crossed (miles)	Buffer Zone Acreage Affected During Construction[1]
Beginning Milepost	Ending Milepost		
13	68		0.00
90.6	93	2.4	32.00
93.8	95.4	1.6	21.33
95.7	97	1.3	17.33
99.6	100	0.4	5.33
104.1	104.4	0.3	4.00
109.6	110.4	0.8	10.67
110.99	111.2	0.2	2.80
112.3	112.9	0.6	8.00
115.7	116.5	0.8	10.67
116.9	117.8	0.9	12.00
211.4	211.7	0.3	4.00
212.2	212.9	0.7	9.33
213	215.1	2.1	28.00
215.2	220	4.8	64.00
231.4	232.1	0.7	9.33
232.9	233.6	0.7	9.33
274.8	275.3	0.5	6.67

[1]Based on a nominal ROW width of 110 feet.
Source: Draft Exhibit B Stipulations – 22 March 2012
Note: Construction activity and surface disturbance will be prohibited on BLM-administered land during the period from March 1 to June 15 for the protection of sharp-tailed grouse dancing grounds and a two-mile buffer around them.

Greater Sage-Grouse

The greater sage-grouse is considered the most sensitive small game species along the Project and is discussed further as a special status species in **Appendices I, J-3** and **J-4**. To avoid construction-related impacts on nearby sage-grouse and sharp-tailed grouse leks, prior to construction the Project would coordinate with regulatory agencies regarding activities allowed within lek buffer zones during breeding periods. Construction buffers would not be established around historic leks that have no record of sage grouse activity within the two years preceding construction. A seasonal no-construction buffer would be implemented on federal land within a two-mile radius of an active sage grouse lek. Current research into sage grouse avoidance of disturbances associated with coal bed methane development indicates that sage grouse avoid suitable winter range sagebrush within a 4 km^2 (1.5 m^2) area (Doherty et al. 2008). This area equates to a 0.70-mile radius, or buffer.

In accordance with Greater Sage-Grouse Interim Management Policies and Procedures issued via Instruction Memorandum (IM) No. 2012-043 by the Department of the Interior Bureau of Land Management on December 22, 2011, the BLM district field offices in Montana have agreed to certain mitigation procedures to minimize and/or mitigate potential impacts to greater sage-grouse Preliminary Priority Habitats.

Relative to pipeline ROW, the IM specifies the following procedures to minimize adverse effects:

- Work with applicants to minimize habitat loss, fragmentation, and direct and indirect effects to Greater Sage-Grouse and its habitat.
- Implement measures to minimize impacts to sage-grouse habitat.
- In coordination with the respective state wildlife agency, cooperate with project proponents to develop and implement appropriate offsite mitigation that the BLM, coordinating with the wildlife agencies of the state crossed proposes.

To comply with these objectives, Keystone XL, MDEQ, and the Montana BLM have agreed to the following measures set forth in Exhibit B, Stipulations; ROW Application MTM-98191:

- The Project shall avoid construction activities and surface disturbances on BLM-administered lands in the vicinity of sage-grouse lek sites and within a 2-mile buffer between March 1 to June 30. These locations referenced by pipeline milepost are listed in **Table 7-13**;
- Construction activity and surface disturbance will be prohibited on BLM-administered land during the period from December 1 to May 15 for the protection of greater sage-grouse winter range between pipeline mileposts 10 – 27 and mileposts 37 – 65;

- Keystone shall establish a compensatory mitigation fund to be used by BLM, Montana (MT) Department of Environmental Quality, and MT Fish, Wildlife, & Parks (FWP) to enhance and preserve sagebrush communities for greater sage-grouse and other sagebrush-obligate species in eastern Montana. The size of the fund will be based on the acreage of silver sagebrush and Wyoming big sagebrush habitat disturbed during pipeline construction within greater sage-grouse core habitat mapped by FWP and important habitat between approximate mileposts 96.5 to 130.5. For each acre disturbed (based on as-built survey), Keystone shall contribute $600 to the fund.

These mitigation measures have been accepted by the Montana Department of Fish Wildlife and Parks via letter dated June 20, 2012. The sage-grouse mitigation plan that was accepted by MDEQ is included in **Appendix N**.

Table 7-13 Sage-Grouse Lek Site Restrictions on Federal Lands

Milepost Locations		Buffer Zone Length Crossed (miles)	Buffer Zone Acreage Affected During Construction[1]
Beginning Milepost	Ending Milepost		
20.0	22.0	2.0	26.67
47.0	47.1	0.1	1.33
104.1	104.4	0.3	4.00
107.2	107.5	0.3	4.00
107.7	108.0	0.3	4.00
109.6	109.8	0.2	2.67
111.0	111.1	0.1	1.47
115.7	116.5	0.8	10.67
116.9	117.8	0.9	12.00
118.5	118.7	0.2	2.67
119.9	120.2	0.3	4.00
120.6	120.9	0.3	4.00
215.6	220.0	4.4	58.67
239.4	239.6	0.2	2.67
256.4	256.7	0.3	4.00

[1]Based on a nominal ROW of 110 feet.

Source: Draft Exhibit B Stipulations – 22 March 2012

Note: Construction activity and surface disturbance will be prohibited on BLM-administered land during the period from March 1 to June 30 for the protection of greater sage-grouse strutting grounds and a two-mile buffer around them.

Note: Table indicates locations on federal lands only. For complete list of sage grouse leks crossed by the Project, refer to the Environmental Report.

Sagebrush Habitats

Sagebrush community types were mapped on lands crossed by the Project. Sagebrush habitat on federal lands crossed by the project is presented in **Table 7-14**. Approximately 5 miles of sagebrush habitat are crossed by the project on land administered by the BLM. Silver sagebrush

was the most common sagebrush species encountered on federal land. Wyoming big sagebrush was recorded in more limited areas, primarily south of the Missouri River crossing. Canopy cover and height of sagebrush were qualitatively assessed for the entire stand. Average canopy cover of sagebrush was typically less than 30 percent while average height was typically two feet or less. Sagebrush usually occurred as a relatively limited community type within a dominant grassland matrix. Scattered plants of sagebrush frequently occurred outside sagebrush stands but represented a relatively minor component of the surrounding grassland community.

Table 7-14 Sagebrush Habitat on Federal Lands Affected by the Project

MP Start	MP End	Length (mi)	Sagebrush Species[1]	Average Canopy Cover(%)[2]	Average Height (in)[2]	Associated Species[3]
BLM- Glasgow Field Office						
53.36	53.56	0.20	Silver sagebrush	5-10	12-36	Sandberg bluegrass, western wheatgrass, rubber rabbitbrush
55.19	55.20	0.01	Silver sagebrush	5-10	12-36	Sandberg bluegrass, western wheatgrass, rubber rabbitbrush
55.53	55.70	0.17	Silver sagebrush	20-30	18-30	Western wheatgrass, Sandberg bluegrass
Subtotal		**0.38**				
BLM-Miles City Field Office						
93.99	94.50	0.52	Silver sagebrush	10-20	18-24	Bluebunch wheatgrass, blue grama, threadleaf sedge
104.18	104.45	0.27	Silver sagebrush/big sagebrush	10-15	24-30	Needle-and-thread, western wheatgrass, green needlegrass
107.31	107.55	0.24	Silver sagebrush/big sagebrush	10-40	18-30	Needle-and-thread, western wheatgrass, blue grama, prairie sandreed
109.78	110.43	0.65	Big sagebrush/Silver sagebrush	20-35	18-36	Western wheatgrass, blue grama, needle-and-thread

Table 7-14 Sagebrush Habitat on Federal Lands Affected by the Project

MP Start	MP End	Length (mi)	Sagebrush Species[1]	Average Canopy Cover(%)[2]	Average Height (in)[2]	Associated Species[3]
112.40	113.01	0.61	Silver sagebrush	10-15	18-24	Western wheatgrass, blue grama
116.41	116.56	0.16	Silver sagebrush/big sagebrush	10-20	24-36	Crested wheatgrass, blue grama, needle-and-thread
120.07	120.57	0.50	Silver sagebrush/big sagebrush	5-20	12-30	Bluebunch wheatgrass, saltgrass, western wheatgrass, blue grama, needle-and-thread
127.52	127.55	0.03	Silver sagebrush	10-15	18-30	Kentucky bluegrass, saltgrass, western wheatgrass, crested wheatgrass, creeping juniper
213.49	213.57	0.08	Silver sagebrush	15-25	24-36	Western wheatgrass, blue grama, needle-and-thread
214.06	214.11	0.05	Silver sagebrush	10-20	30-40	Needle-and-thread, western wheatgrass, blue grama
214.17	214.70	0.52	Silver sagebrush	5-20	12-48	Western wheatgrass, blue grama, needle-and-thread
218.71	218.86	0.16	Silver sagebrush	20-30	12-30	Western wheatgrass, blue grama, needle-and-thread
233.71	233.76	0.05	Silver sagebrush	30-35	24-36	Western wheatgrass, needle-and-thread, little bluestem
249.20	249.24	0.04	Big sagebrush/silver sagebrush	15-20	12-36	Needle-and-thread, western wheatgrass, blue grama
256.35	256.46	0.11	Big sagebrush	10-15	6-18	Needle-and-thread, western wheatgrass, blue grama
256.66	256.83	0.17	Big sagebrush	10-15	6-18	Needle-and-thread, western wheatgrass, blue grama

Table 7-14 Sagebrush Habitat on Federal Lands Affected by the Project

MP Start	MP End	Length (mi)	Sagebrush Species[1]	Average Canopy Cover(%)[2]	Average Height (in)[2]	Associated Species[3]
Subtotal		**4.16**				
Total		**4.54**				

[1]Silver sagebrush (*Artemisia cana*), big sagebrush (*Artemisia tridentata* spp. *wyomingensis*).
[2]Estimated range of canopy cover and height within sagebrush stand.
[3]Common grass indicator species within sagebrush stand.

Although the Project will not result in a permanent loss of sagebrush habitat along the pipeline ROW, the regeneration of sagebrush may be slow, depending on site-specific conditions such as slope, aspect, temperature and rainfall, and particularly the definition of "recovery" at the site in question. The recovery periods for various sagebrush species are: 1) Wyoming big sagebrush ranges from 6-10 (Hild et al. 2006; Schuman et al. 2005) to 30 years (Connelly et al. 2000); 2) mountain big sagebrush ranges from 5 (Wyoming Interagency Vegetation Committee 2002) to 20 years (Connelly et al. 2000); and 3) silver sagebrush may recover very quickly, sprouting in 1-2 years (Wyoming Interagency Vegetation Committee 2002). Plants respond dramatically to moisture conditions and may reach 35 to 50 cm (14-20 inches) in one year (McArthur and Taylor 2004). While the potential impacts on sage-grouse habitat would be minimized by locating the pipeline ROW within previously disturbed areas (i.e., adjacent to existing pipelines and roads) to the extent possible, the remote locations of many of the federal lands crossed precludes avoidance. Given the abundant suitable habitat in the general area, and the relatively quick response of silver sagebgrush following construction, the dominant species of sagebrush on federal lands crossed by the Project, it is unlikely that the minor loss of habitat along the pipeline ROW will affect sage-grouse populations in the vicinity of the Project.

Coal bed methane development is substantially different than construction of a solitary, cross-country pipeline. Above ground facilities, maintenance, and year-round activity occur in coal bed methane fields. This level of activity occurs for the life of the project, often years. Construction of the Project would produce a substantial amount of activity within a relatively limited area for 6 to 8 months. Post-construction activity within the ROW would be extremely limited for the life of the project. Above ground facilities would be few and located more than 0.25-miles from an active lek.

Based on the demonstrated effects of coal bed methane development on sage grouse within buffers less than 0.70-mile, and the substantial differences between coal bed methane and solitary pipeline construction, a 4-mile seasonal no-construction buffer appears inconsistent with probable effects of the Project on sage grouse. The Project proposes to use a 2.0-mile no

construction buffer around active leks between March 1 to June 30 to minimize impacts to sage grouse.

Operational impacts are related to noise from nearby pump stations and use of existing roads for periodic personnel use. Both of which are minor sources of noise.

Non-game 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 associated with open, grassland habitat, although woodland species also are represented along woodland riparian corridors and upland forests 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. The burrowing owl is a below-ground nesting species.

Aerial raptor surveys were conducted for the Project between April 7 and 10, 2008, spring 2009, spring 2010 and spring 2011 along the ROW in Montana to identify nest sites along the Project ROW (ENSR 2008, 2009, 2010; Westec 2011). The results of these surveys are found in **Appendix J**. On federal lands, a total of 13 nests were documented within 1.0 mile of the Project ROW in 2008, 11 nests in 2009, and 15 nests in 2010, and 10 actives nests in 2011. In February of 2009, a winter Bald eagle roost survey was conducted by helicopter. No Bald eagle winter roost sites were found on Federal lands.

In 2008, only one nest was active at the time of the surveys; 2 in 2009, 3 in 2010 and 10 in 2011. All but 9 of the nests were occupied by red-tailed hawks. This species is known to be relatively tolerant of human activity and development (Beeler 2004; Call 1978; Johnsgard 1990, 1988; Kingery 1998). The others were occupied by the Great Horned Owl Ferruginous hawk, Buteo, and Golden Eagle. None of the nests are on the project footprint. Impacts resulting from increased noise and human presence are expected to be minor and short-term.

The majority of the songbirds inhabiting the region, particularly in woodland areas, are neotropical migrants. These are birds that breed in North America but winter in neotropical regions of Central and South America. Examples of neotropical migrants in the area of the proposed 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 shrublands and woodlands.

Direct impacts to non-game species from surface disturbance activities would result from temporary loss of habitat and increased fragmentation until vegetation is reestablished. Potential impacts also would result in mortalities of less mobile or burrowing non-game species (e.g., small mammals, birds, reptiles, amphibians, invertebrates) due to exposure to vehicle and construction equipment traffic. Potential direct impacts also would include nest or burrow abandonment or loss of eggs or young when construction occurs during the breeding season. Other impacts would include the short-term displacement of some of the more mobile species (e.g., medium-sized mammals, adult birds) as a result of surface disturbance. Although the habitats adjacent to the proposed disturbance area may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortalities. Displacement or loss of non-game species from disturbance areas will be short-term due to repopulation of adjacent lands and high reproduction rates of the species involved.

If surface disturbance activities occur during the breeding season for passerines, raptors, and other summer avian residents (approximately March 1 through August 31), nest or territory abandonment or the loss of eggs or young (loss of productivity) for the breeding season could result. Impacts to nesting birds would depend on the nest location relative to the proposed disturbance area, the phase of the breeding period, and the level and duration of the disturbance. Keystone is applying to the USFWS for a Special Purpose permit for incidental take of migratory birds under the MBTA. In the absence of that permit, Keystone will adhere to the windows to the extent practicable during 2013 and 2014 construction. In addition, Keystone will remove raptor nests in the construction ROW in the winter prior to construction to avoid impacts to nesting raptors.

Habitat Disturbance

Habitat fragmentation is frequently a concern when clearing ROWs. In general, fragmentation results in an altered wildlife community as species more adaptable to edge habitats establish themselves, while species requiring undisturbed habitats are subject to more negative effects. These effects would result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife and migratory bird numbers, and changes in species composition. The severity of these effects on migratory birds depends on factors such as sensitivity of the species, seasonal use, type and timing of construction activities, and physical parameters (e.g., topography, cover, forage, and climate). The effects of fragmentation on native wildlife populations will be relatively small since the majority of the Project will cross relatively open habitat types (e.g., shrubland, grassland, and cultivated land).

The effects of long-term habitat loss on native wildlife populations would be relatively small since the majority of habitat disturbance would be restored to the pre-disturbance condition. Agricultural lands would continue to be used for pre-construction uses while native habitats would be reclaimed to primarily herbaceous communities using appropriate seed mixes prescribed by local, state, and federal agencies. Loss of shrub communities would be long-term (5 to 20 years or more) within reclaimed areas of the construction ROW since these communities would become reestablished through the natural reinvasion of woody species. Loss of woodland vegetation would be permanent since trees would not be allowed to reestablish within 15 feet of either side of the pipeline centerline. Habitat losses also would be long-term at permanent aboveground pipeline facility locations such as pump stations and access roads. Noise impacts from nearby pump stations (10 and 14) to sage-grouse and other nesting birds would be evaluated through studies to determine anticipated operational noise levels and consultation with BLM and other agencies.

To reduce impacts associated with construction to wildlife resources including big game, greater sage-grouse, sharp-tailed grouse, migratory birds, and raptors, agency-recommended seasonal buffers and timing restrictions are provided in **Table 7-15**. However, development of construction restrictions would occur through consultation with the regulatory agencies. Location information, timing restrictions, and buffer distances for these species were obtained from the BLM, MFWP, SDGFP, and 2008, 2009, 2010, and 2011 aerial surveys (see Appendix J).

Table 7-15 Seasonal Timing Restrictions and Buffers for Big Game, Game Birds, and Raptors

Milepost Locations		Buffer Zone Length Crossed (miles)	Seasonal Timing Restrictions
Beginning Milepost	Ending Milepost		
Raptor Nest Sites			
8			March 15 to July 15 for the protection of raptor nests and a 0.5-mile buffer around them
25			
39			
40			
55			
67			
89.7	91.1	1.4	March 1 to August 1 for the protection of raptor nests and a 0.5 mile buffer around them
94.2	95.4	1.2	
95.7	97	1.3	
99.6	100	0.4	

Table 7-15 Seasonal Timing Restrictions and Buffers for Big Game, Game Birds, and Raptors

Milepost Locations		Buffer Zone Length Crossed (miles)	Seasonal Timing Restrictions
Beginning Milepost	Ending Milepost		
110.99	111.2	0.2	
120.7	120.9	0.2	
129.7	130.2	0.5	
213.4	214.5	1.1	
217.2	217.8	0.6	
218.6	219.7	1.1	
225			
231.6	232.1	0.5	
232.9	233.6	0.7	
248.9	249.4	0.5	
266			
282			
Ferruginous Hawk Nest Sites			
129.7	130.2	0.5	Construction activity and surface disturbance will be prohibited on BLM-administered lands within 0.5 miles of ferruginous hawk nests active within the last two years
233.4	233.6	0.2	
Sage Grouse Winter Range			
10	27	17.0	Construction activity and surface disturbance will be prohibited on BLM-administered land during the period from December 1 to May 15 for the protection of greater sage-grouse winter range
37	65	28.0	
Big Game Winter Range			
10	27	17.0	Construction activity and surface disturbance will be prohibited on BLM-administered land during the period from December 1 to May 15 for the protection of designated big game winter range.
37	65	28.0	
89.70	93.00	3.3	Construction activity and surface

Table 7-15 Seasonal Timing Restrictions and Buffers for Big Game, Game Birds, and Raptors

Milepost Locations		Buffer Zone Length Crossed (miles)	Seasonal Timing Restrictions
Beginning Milepost	Ending Milepost		
93.80	95.40	1.6	disturbance will be prohibited on BLM-administered land during the period from December 1 to March 31 for the protection of designated big game winter range.
94.20	95.40	1.2	
95.70	97.00	1.3	
99.60	100.00	0.4	
104.10	104.40	0.3	
107.20	107.50	0.3	
107.70	108.00	0.3	
109.60	110.40	0.8	
110.99	111.20	0.2	
112.30	112.90	0.6	
115.70	116.50	0.8	
116.90	117.80	0.9	
118.50	188.70	70.2	
119.90	120.50	0.6	
120.60	120.90	0.3	
127.30	127.50	0.2	
129.70	130.20	0.5	
197.00		-197.0	
214.60	216.10	1.5	
216.40	220.00	3.6	
274.80	275.30	0.5	

Source: Draft Exhibit B Stipulations – 22 March 2012

7.8.2 Aquatic Resources

Aquatic biology resources are defined in this study 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 on federal lands. Special status aquatic species are discussed in Section 7.8.3. The study area for aquatic resources includes the perennial streams, rivers, and ponds/lakes that would be crossed by the Project on federal lands. Other waterbodies 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 in waterbodies 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 waterbody. 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 waterbodies.

The Project will cross 11 waterbodies on federal lands that are known to support or are capable of supporting warm water fisheries (**Table 7-16**). These include the Missouri River, a Class II fishery. The remaining streams are smaller in width.

Table 7-16 Waterbodies Supporting Fisheries Crossed by the Project or Downstream of Crossings on Federal Lands in Montana

Waterbody	County	Fishery Class[1]	Number of Crossings
Unnamed tributary to Pasture Coulee	Valley	Non-Salmonid	1
Hay Coulee	Valley	Non-Salmonid Fishery	1
Black Coulee	Valley	Non-Salmonid Fishery	1
Brush Fork	Valley	Non-Salmonid Fishery	1
Bear Creek	Valley	Non-Salmonid Fishery	1
Unger Coulee	Valley	Non-Salmonid Fishery	1
Wire Grass Coulee	Valley	Non-Salmonid Fishery	1
Missouri River	McCone	Marginal Salmonid Fishery	
		Red Ribbon, Class II	1
Unnamed tributary to Struple Coulee	McCone	Non-Salmonid Fishery	1
Unnamed tributary to Shade Creek	McCone	Non-Salmonid Fishery	1
Soda Creek	Fallon	Non-Salmonid Fishery	2

Table 7-16 Waterbodies Supporting Fisheries Crossed by the Project or Downstream of Crossings on Federal Lands in Montana

Waterbody	County	Fishery Class[1]	Number of Crossings

[1]Fishery classifications, as part of surface water classifications, are defined in **Table 7-17**.

Sources: Berry et al. 2004; MRIS 1999; MTDEQ 2006; NDEQ 2006; SDDENR 2008.

Representative game fish that occur within these waterbodies include a variety of warm water species such as catfish, sauger, walleye, bass, and bullhead. These recreationally important fish species or groups that occur within these waterbodies are listed in **Table 7-18**. **Table 7-18** also includes the associated spawning periods and habitats.

Potential impacts to aquatic resources could include; short-term physical disturbance to stream channels, short-term increases in suspended solids concentrations from in-stream activities and erosion from adjacent disturbed lands, one-time increases in downstream sedimentation from in-stream activities and erosion from adjacent disturbed lands, potential fuel spills from equipment and toxicity to aquatic biota if fuel reached a waterbody, local short-term reductions in habitat if surface water is used for hydrostatic testing and loss of individuals during pumping, and potential loss of individuals as a result of acute and chronic toxicity from exposure to accidental crude oil releases. These potential impacts would primarily be due to construction.

Table 7-17 Surface Water Classification

State	Classification	Definition
Montana	Non-Salmonid	Waters that do not provide habitat for trout and salmon species. Non-salmonid species include sturgeons, suckers, minnows, etc.
	Marginal Salmonid	Waters that provide marginal habitat for trout and salmon species. Non-salmonid species include sturgeons, suckers, minnows, etc.
	Blue Ribbon – Class I	Recreational fishery of outstanding value.
	Red Ribbon – Class II	Recreational fishery of high value.

At the Missouri River, Keystone plans to use the HDD technique to cross; therefore, construction-related impacts on aquatic biota and their habitat will be minor. HDD would minimize impacts to important game and commercial fish species and special status species. Additionally, directional drilling would not alter or remove stream bank or aquatic habitat because

construction within the channel would not be required. It is possible that mud from directional drilling inadvertently could enter the active stream along the drilling path. However, if mud seepage (frac-out) is detected Keystone would implement the HDD frac-out contingency plan, and corrective measures would be implemented to eliminate or minimize seepage. If any seepage enters the stream, increased turbidity or physical impact to the covering substrate would be localized and short-term (less than one day). All preventive and response measures to frac-outs will be enumerated in a frac-out contingency plan.

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. In the unlikely event of a pipeline release, Keystone will initiate its Emergency Response Plan 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 human health and environmental quality.

Table 7-18 Game and Commercial Fish Spawning Periods and Habitat

Species or Group [1]	Months [2]												Habitat
	J	F	M	A	M	J	J	A	S	O	N	D	
Burbot													Eggs are scattered over sand or gravel substrates.
Bass													Shallow areas over clean gravel and sand bottoms.
Brown bullhead													Spawn in shallow areas by building nests in mud substrate.
Bullhead (yellow and black)													Usually spawn in weedy or muddy shallow areas by building nests.
Buffalo													Spawn at depths of four to 10 feet over gravel or sand substrates.

Table 7-18 Game and Commercial Fish Spawning Periods and Habitat

Species or Group [1]	Months [2]												Habitat
	J	F	M	A	M	J	J	A	S	O	N	D	
Carp													Adhesive eggs scattered in shallow water over vegetation, debris, logs, or rocks.
Channel catfish													Prefers areas with structure such as rock ledges, undercut banks, logs, or other structure where it builds nests.
Crappie													Eggs deposited in depressions on bottom in cove or embayments.
Freshwater drum													Buoyant eggs drift in river currents during development.
Northern pike													Small streams or margins of lakes over submerged vegetation.
Paddlefish													Moves into rivers and spawns over flooded gravel bars.
Sauger													Moves into tributary streams or backwaters where they spawn over rock substrates.
Shovelnose sturgeon													Spawning occurs in open water channels of large rivers over rocky or gravelly bottoms.

Table 7-18 Game and Commercial Fish Spawning Periods and Habitat

Species or Group [1]	Months [2]												Habitat
	J	F	M	A	M	J	J	A	S	O	N	D	
Walleye													Spawn in lakes and streams in shallow water over rock substrates.
White bass													Egg masses deposited over sand bars, submerged vegetation, or other instream debris.
Yellow perch													Shallow open water over weedy areas.

[1]Rainbow trout is not included because the species does not spawn in streams crossed by the pipeline route.
[2]Spawning periods are approximate and could occur in only a portion of a particular month.
Sources: Eddy and Underhill 1974; Harlan et al. 1987; Skaar 2001; MFWP 2008c.

A discussion of potential effects from open-cut crossings follows.

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 would 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 and the active bottom substrate sorting by a river suggest any such habitat modification would be small and of short duration in most stream environments.

Bank Cover

Vegetation cover along the stream banks of a waterbody provides cover for fish, shading, bank stability, erosion control, and an increased food and nutrient supply due to the deposition of insects and vegetation matter into the watercourse. Loss of bank cover may 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 BLM-Specific CMRP provides stream bank reclamation measures that would ensure short-term bank stability (temporary erosion control structures) and rapid vegetation recovery (replanting woody species where appropriate).

Interruption of Fish Movement

Most water crossing methods allow movement of fish across the ROW, however, some techniques such as dry crossing procedures, may temporarily block or delay normal movements. Long-term interruption of fish movement in a watercourse or a relatively short-term 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 seven days) should not affect fish growth and behavior. Delays of less than three days would 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. Keystone will work with agencies as necessary to further define spawning periods and to refine construction schedules to avoid, where possible, in stream activities during sensitive periods. As shown in **Table 7-18**, spawning periods 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 Total Suspended Solids (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 one day. Additionally, the waterbodies 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 natural peaks in suspended solids concentrations. The aquatic systems supported by these waterbodies are adapted to such increases.

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 BMP's also address upland erosion and sediment control procedures to limit the potential for runoff from disturbed areas to contribute to increase in-stream TSS levels.

Sedimentation Effects

Solids introduced into suspension in a waterbody ultimately would settle on the streambed downstream of the crossing. The distance from the crossing depends on the depth of flow, flow velocity, particle diameter and flow characteristics. Coarser materials (sands and gravels) 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 tend to settle in natural depositional areas downstream of the crossing.

The channel substrates of the streams and rivers that would be crossed by the project consist primarily of fine-grained materials (clay, silt, and sand). Fine-grained excavated materials that become deposited downstream are expected to be similar to the existing substrate. Stream flows would re-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 one to two 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 BLM-Specific CMRP would mitigate the short-term effects of downstream sedimentation, as discussed under Water Quality Effects.

Hydrostatic Testing

Section 8.2 of the BLM-Specific CMRP (**Appendix B**) -streams or rivers as that may be used as potential water sources for hydrostatic testing for the Project. Of these, one location, the Missouri River, is located on or associated with federal lands, while tributaries to another, Cabin Creek, are on federal lands. The water is likely to be withdrawn during summer and fall months.

Compared with stream base flow, relatively small one-time withdrawals would occur from the streams or rivers designated for hydrostatic test water in accordance with withdrawal permits.

Withdrawal rates and volumes would be designed to avoid impacts to aquatic life and downstream water users. Hydrostatic test water would be discharged to the land surface at an approved location or be returned to the source with an approved energy dissipation device. Discharged water may evaporate or infiltrate into the soil or drainage where the water is released. Hydrostatic test water would be returned to the same water source.

Water withdrawal could 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. Hydrostatic testing would result in minor impacts to aquatic biota. The discharge of hydrostatic test water would follow state permit requirements, which will reduce potential effects on water quality or aquatic organisms. Energy dissipaters also would be used to prevent erosion at discharge locations.

7.8.3 Sensitive Wildlife and Aquatic Species

Using the initial route, existing agency data bases, land use/land cover data, literature, and agency website information, a list of potential threatened, endangered, and/or species of concern (sensitive species), designated by state or federal agencies, was created for the Project area. Keystone then reviewed aerial photography, USGS maps, and previous field studies from the Project area and eliminated species not likely to occur based upon habitat traversed or a species historical range. This list was then used as a basis for discussion with the regulators to further refine and eliminate species not likely to occur and/or will not likely be impacted. This resulted in the development of survey protocols (see **Appendix K**) for the final list of species that could potentially occur in the project area on federal lands. Surveys in 2008 and 2009 were then undertaken to survey for species presence/absence (if in the suitable survey window) and/or to survey for potential habitat to refine the locations where presence/absence surveys will occur prior to construction. **Appendix K** contains all contact reports, meeting minutes, and correspondence to/from agencies concerning this effort. **Appendix K** also contains copies of the survey protocols and the master list of species requiring survey.

Coordination with state wildlife agencies, USFWS, and BLM was initiated in March 2008, in a series of overview and information request meetings conducted state by state. Follow-up meetings were then arranged by state to discuss wildlife impacts specifically. Agencies were given sensitive species packages ahead of the meetings to review prior to approval. For migratory birds protected by the MBTA, Keystone is applying to the USFWS for a Special Purpose permit for incidental take of migratory birds under the MBTA. In the absence of that permit, Keystone will adhere to the windows to the extent practicable during 2013 and 2014 construction.

Terrestrial Species

A total of 95 sensitive (federally listed, state listed, and species of concern) terrestrial wildlife species (mammals, birds, reptiles, and amphibians) could potentially occur within the Project area. Further analysis limited to federally listed species, originally identified at total of 42 sensitive species including 4 federally listed as threatened and endangered under the ESA (whooping crane, black-footed ferret, interior least tern, and piping plover) and 38 listed as BLM special status wildlife species (**Appendix I**). These species, their associated habitats, and their potential for occurrence along the Project route on federal lands was evaluated for each species based on its habitat requirements and/or known distribution. Based on these evaluations, five species (interior least tern, piping plover, peregrine falcon, harlequin duck, and Northern goshawk) were eliminated from detailed analysis as not occurring on federal lands crossed by the project (see **Appendix I** for rationale).

Based on correspondence and consultation with the USFWS, BLM, MFWP, and species specific surveys will be required for these species within suitable habitat (USFWS 2008a,b; BLM 2008d,e; MFWP 2008d,e). Biological surveys were conducted in 2008 and 2009 to identify suitable habitat. Additional agency consultations will be conducted prior to construction. In addition, species specific surveys were conducted for nesting and roosting bald eagles and nesting raptors along the entire Project route. The results are presented in **Appendix J**. **Table 7-19** outlines the timing of surveys that will occur prior to construction.

Potential impacts to sensitive wildlife resources will parallel those discussed in Section 7.8.1. Direct impacts to sensitive species from surface disturbance activities include the short term loss or alteration of potential breeding and foraging habitats and temporary habitat fragmentation until native vegetation is reestablished. Potential impacts also could include the loss of less mobile species as the result of exposure to vehicle and construction equipment traffic and the potential abandonment of a nest site or territory, including the loss of eggs or young. Other impacts would include short-term displacement of some of the more mobile species from the disturbance areas as a result of increased noise and human presence.

A number of occurrences of state-listed threatened or endangered species or species of special concern were identified by the state NHPs as occurring near or within the Project. BLM indicated that for sensitive reptile and amphibian species on BLM land Keystone should assume their presence and not conduct surveys. Keystone would be required to establish off-site mitigation for impacts to these species. Recommendations also include setting up mitigation measures for protecting snake hibernacula and preventing snakes from entering or being trapped in the open ditch. For terrestrial wildlife, most sensitive species may be rare within a given state but their populations are relatively secure elsewhere. In addition, most are relatively mobile species that could avoid short-term construction disturbance with no resulting long-term adverse effects on local populations. Increased mortality rates could 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 associated with pipeline construction is unlikely to have measurable adverse effects on local populations of sensitive species. For a few species, however, such as the greater sage-grouse, construction through an important habitat feature, such as a lek, may result in the loss of a local breeding population. This could result in extirpation of a remnant population and contribute to a trend leading to federal listing without the implementation of appropriate mitigation. Greater sage-grouse is listed as BLM sensitive species and a species of concern in Montana.

Table 7-19 Potential Species Survey Windows on BLM Land

Species	Locations	Time of Survey
Black-footed ferret*	MT	July 1- October 31
Raptors (including bald eagle)		
Swift fox	MT	April – August
Burrowing owl	MT	March 15 – October 31
Mountain plover	MT	May 1 – June 15
Townsend's big-eared bat / Long-legged myotis*	MT	To be determined
BLM sensitive fish species*	MT	To be determined

Surface disturbance activities along the pipeline ROW would result in the temporary disturbance of portions of native prairie, wetland, and long-term disturbance of woodland habitats which may contain potentially suitable habitat for a number of sensitive species. Habitat surveys were completed in 2008, -2009, and 2011 to locate areas where suitable habitat may exist for follow-up species presence/absence surveys. The results of this effort are provided in **Appendix I**.

In coordination with federal and state agencies, Keystone is developing threatened and endangered species specific mitigation to reduce impacts to these sensitive terrestrial and aquatic resources. Based on those consultations, Keystone will work with the relevant regulatory authorities to determine any avoidance, minimization, or mitigation measures required. Outlined below is a summary of some of this analysis based upon what was found in 2008 and 2009 surveys. Detailed further in this section are current recommended mitigation measures for specific sensitive terrestrial and aquatic species potentially occurring along the Project.

Mammals

Townsend's Big-eared Bat, Long-legged Myotis

No historic communal bat roost sites (e.g., hibernacula, nursery colonies, bachelor roosts) have been recorded along the Project route, thus direct impacts to communal roosts are not anticipated. Impacts could result from the short-term reduction of potential foraging habitat including habitat fragmentation until reclamation is completed and native vegetation has become reestablished. The BLM, Miles City Field Office, recommends surveys for the Townsend's big-eared bat and the long-legged myotis if suitable habitat exists along the project. Habitat surveys have been completed and agency consultation is required to determine the need for species specific surveys.

Black-footed Ferret

If ferrets are present in prairie dog colonies along the Project route, direct impacts would include increased habitat loss and fragmentation from the disturbance of prairie dog colonies or complexes along the Project route. Impacts also could result in direct mortalities of black-footed ferrets as a result of crushing from surface disturbance, vehicles, and heavy equipment. Indirect impacts to black-footed ferrets would include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic. Indirect effects also could result in a reduction in habitat quality from the spread of infectious diseases (e.g., plague) within otherwise healthy prairie dog colony complexes.

Currently there are no active prairie dog towns that are crossed by the Project in Montana. Due to the low probability of occurrence in the vicinity of the Project route, it is anticipated that the Project would not likely adversely affect black footed ferrets in Montana.

Black-tailed Prairie Dog

The potential effects of construction through a prairie dog colony include temporary loss of forage and shelter due to vegetation clearing, collapsing of burrows, and temporary disruption of foraging and resting activities due to disturbance associated with construction equipment. Direct mortality of prairie dogs could result if active burrows are occupied at the time of construction. If construction occurs later in the prairie dog reproductive season (late May to early June), most prairie dogs would be mobile and able to avoid construction traffic; however, some individual prairie dogs may be injured or lost during construction. In addition, there is a potential for destroying active dens with young if construction occurs during the reproductive season. Following construction and reclamation, the revegetated ROW would provide foraging habitat for prairie dogs, and the unconsolidated soils along the trench would likely provide a good substrate for burrowing. The Project may impact individuals but would not likely cause a trend to federal listing or loss of viability to black-tailed prairie dogs.

Swift Fox

As a result of discussions with the MFWP and BLM and as detailed in **Appendix I**, the Project traverses current swift fox distribution on federal lands in Phillips, Valley, and Prairie counties in Montana (Kahn et al. 1997). Additionally, the Project crosses suitable habitat on federal lands in Fallon and McCone counties in Montana (Kahn et al. 1997). Data from the Montana Natural Heritage Program indicates that the proposed route is not within 5 miles of any swift fox occurrence records.

Potential impacts to swift fox potentially occurring along the pipeline route include a temporary incremental loss of foraging and/or denning habitat. These animals would be disturbed by increased human presence and associated construction activities (noise, dust); however, since they are mobile species their displacement would be temporary and they would most likely return to the Project area when the Project is completed. If swift fox dens occur within the Project construction ROW, Project construction could result in a loss of individual animals if occupied. It is assumed that both adults and young would not avoid construction activities and would remain in natal den sites that could be directly removed by trenching activities or lost to vehicle operation. Construction activities prior to March would avoid direct effects to pups, if present. Loss of individual animals would result in an incremental reduction in the local population; however, no significant population effects are anticipated. If construction activity occurs during the breeding season (spring/summer) in the counties mentioned above, surveys for active dens would be required . If no active dens are found, construction would proceed. If an active den is found, construction activities would adhere to the recommended timing restrictions.

Birds

Raptors and other Migratory Birds

Sensitive raptor species identified as potentially occurring along the route include the ferruginous hawk, Swainson's hawk, bald eagle, and the burrowing owl. No active Swainson's hawk, ferruginous hawk, or bald eagle nests were observed on federal lands during the 2008, 2009, 2010, and 2011 surveys.

Aerial raptor surveys did not include the identification of burrowing owl nests. Burrowing owls typically use burrows made by prairie dogs and other small mammals. Destruction of burrows could result in displacement of owls into less suitable habitats, potentially increasing susceptibility to predation, reducing cover or forage habitat, or reducing reproductive success. Displacement, injury, or direct mortality could result if active burrows are occupied at the time of construction.

Surveys for active burrowing owl nests are recommended by MFWP, USFWS, and BLM if construction is to occur during the nesting season (April 15 – October 1) (BLM 2008e). Species-specific surveys for burrowing owl nests would occur prior to construction. Should an active

burrowing owl nest be identified within the Project area, adherence to seasonal and spatial buffers for burrowing owls would be required as determined through agency consultation.

There are a number of migratory bird species listed as BLM sensitive or special status that may be impacted by the Project. They include:

- Long-billed Curlew
- White-faced Ibis
- Loggerhead Shrike
- Chestnut-collared Longspur
- Red-headed Woodpecker
- McCown's Longspur
- Brewer's Sparrow
- Baird's Sparrow
- Sprague's Pipit
- Common Loon
- Dickcissel
- Willet
- Franklin's Gull
- Marbled Godwit
- Wilson's Phalarope
- Yellow Rail

Potential impacts to these migratory species would be the same as discussed in Section 7.8.1for non-game species. No further species specific surveys are proposed for these migratory bird species. However, BLM may conduct nest dragging prior to construction as a mitigative measure to determine species presence on federal land.

For migratory birds protected by the MBTA, Keystone is applying to the USFWS for a Special Purpose permit for incidental take of migratory birds under the MBTA. In the absence of that permit, Keystone will adhere to the windows to the extent practicable during 2013 and 2014 construction.

Mountain plover

Mountain plover surveys are recommended in Montana within prairie dog towns only. According to 2002 USFWS mountain plover survey guidelines; surveys will be required between mid-April and early July prior to construction (USFWS 2002). Since no prairie dog towns have been found on federal lands, it is unlikely the mountain plover will be impacted by the project. Species-specific surveys for mountain plover nests would occur prior to construction. Should an active nest be identified within the Project area, adherence to seasonal and spatial buffers for mountain

plovers would be required as determined through agency consultation. Potential impacts to these migratory species would be the same as discussed in Section 7.8.1for non-game species.

Piping Plover and Interior Least Tern

No suitable habitat was located on federal lands. For discussion of potential habitat and results of 2008 and 2011 surveys, refer to the Environmental Report.

Greater Sage-Grouse

The greater sage-grouse is designated as a sensitive species by the state of Montana and by the BLM and has been petitioned for federal listing consideration. In April 2004, the USFWS determined that listing the sage-grouse under the ESA may be warranted and initiated a status review. However, based on a 12-month finding for petitions to list the greater sage-grouse as threatened or endangered, the USFWS has subsequently determined that the listing is not warranted (70 FR 2244). Recently, the USFWS has reopened a 90-day status review to determine whether or not listing under the ESA is warranted.

Locations of active historic lek sites were identified by the MTNHP and BLM, and specific timing restrictions and buffer zones are shown in **Table 7-13**. In addition, the BLM and MFWP have recommended aerial lek surveys during the breeding season prior to construction in order to identify active sage-grouse leks and to subsequently develop recommended mitigation measures that would allow pipeline construction to proceed. The surveys resulted in the mitigation plan provided in Appendix N. It was developed through the consultation with the MDFWP, BLM and MDEQ.

Reptiles/Amphibians

Six species of reptiles and amphibians (western hog-nosed snake, milk snake, spiny softshell, great plains toad, plains spadefoot, and northern leopard frog) were initially identified as occurring within the Project area; all but the milk snake could occur on federal lands (**Appendix I**). Further consultation with the MTNHP indicated historic occurrence records for four species (northern leopard frog, plains spadefoot, spiny softshell, and western hog-nosed snake).

Potential impacts to amphibian and reptile species include direct mortalities of individuals from construction activities, ground compaction, and vehicle traffic within suitable habitat. Impacts also would result from the incremental long-term reduction of potential habitat until reclamation is complete and vegetation reestablished.

The BLM recommended that surveys not take place, but that Keystone assume species presence and develop mitigative measures with BLM on off-site mitigation as well as species handling procedures if they come onto the construction ROW.

Aquatic Species

Sensitive aquatic species identified as potentially occurring in waterbodies crossed by the Project on federal lands include 9 fish species (**Appendix I**). Based on evaluations of associated habitats and known distribution, two species (the northern redbelly finescale dace and pearl dace) were eliminated from detailed analysis as not occurring on federal lands crossed by the Project (see **Appendix I** for rationale). The Project would cross one stream or river (Missouri River) that contains known or potential habitat for special status fish species on federal lands. The Missouri River contains historic occurrence data for the sicklefin chub, shortnose gar, sauger, blue sucker, paddlefish, sturgeon chub, and the pallid sturgeon, a USFWS endangered species (MFWP 2008a). However, impacts to special status species at the Missouri River would be avoided using HDD crossing methods.

7.9 Land Use

Approximately 6 percent of overall Project disturbance will occur on federal lands. The principal land use affected by the Project on federal lands is rangeland, comprising over 96 percent of land use on the federal lands. Other land use categories that would be affected by construction of the Project on federal lands include developed, agriculture, forest, water, and wetlands. Miles of surface disturbance to various land uses on federal lands caused by construction of the Project are summarized in **Table 7-20**.

A relatively small, temporary loss of forage land will occur in many rangelands during construction. Keystone will repair or restore fences and habitat that are temporarily disturbed during pipeline construction, as described in the BLM-Specific CMRP. The BLM-Specific CMRP also describes topsoil handling and reclamation practices designed to restore land productivity to its prior use.

Table 7-20 Land Uses Affected by Construction of the Project on Federal Land (Miles)

	Developed	Agriculture/ Cropland	Rangeland	Forest	Water	Wetland/ Riparian	Total
Pipeline							
Montana	0.41	0.03	45.36	0.23	0.25	0.00	46.29
Pipeline Subtotal	0.41	0.03	45.36	0.23	0.25	0.00	46.29
Access Roads							
Montana	14.23	0.00	0.83	0.00	0.03	0.00	15.09
Access Road Subtotal	14.23	0.00	0.83	0.00	0.03	0.00	15.09
Federal Lands	**14.64**	**0.03**	**46.19**	**0.23**	**0.28**	**0.00**	**61.38**

Table 7-20 Land Uses Affected by Construction of the Project on Federal Land (Miles)

	Developed	Agriculture/ Cropland	Rangeland	Forest	Water	Wetland/ Riparian	Total
Total[1]							

[1] *Discrepancies in totals are due to rounding.*

The following overview of land use types within the proposed ROW on federal lands represents information gathered from field surveys conducted in 2008 and 2009, input from federal, state, and local agencies, and review of current aerial photography. Land use was defined in the following groups:

- Developed: lands on federal lands that have previously been developed ROW for roads or other power lines;
- Agriculture/cropland: land suitable for or used for the cultivation of crops;
- Grassland/Rangeland: land that is occupied by native herbaceous or shrubby vegetation, which is grazed by domestic or wild herbivores. Grasslands can be native or improved land;
- Forest Land: land consisting of wooded upland forests. This land is dominated by trees and shrubs and includes areas planted with trees for the pulp and/or paper industry;
- Water: rivers, streams, creeks, bayous, ponds, lakes, etc.; and
- Wetlands: low-lying areas of land that are saturated with moisture, especially when regarded as the natural habitat of wildlife. These lands include emergent wetlands, scrub/shrub wetlands, and forested wetlands.

Based on preliminary assessments, no habitable structures are located within 500 feet of the Project ROW and access roads on federal lands.

There is the potential, if construction occurs during the hunting season, for short-term recreational disruptions as construction passes through. Hunting opportunities will still exist nearby on state and federal lands, which construction will not affect. Any disrupted hunting opportunities on these lands will resume in the long-term as the land is reclaimed.

Construction of the Project will have temporary impacts on recreational traffic and use patterns during construction activities in special management areas and recreational areas. Access to the immediate area will be restricted during construction. Keystone will continue to coordinate with agency managers to minimize conflicts between construction activities and recreational uses for which these special areas were established. These impacts will be of short duration with no long-term impacts.

7.9.1 Traffic Control Plan

When construction occurs on or adjacent to roadways, Keystone will ensure the Contractor will furnish, install, and maintain all temporary traffic controls to provide adequate warning for all potentially affected motorists. Additionally, the contractor will be required to maintain access to roads during construction activities, particularly for emergency vehicles. A project specific Traffic Control Plan will be prepared by Keystone and approved by BLM prior to commencing construction. Flagmen and devices shall be as specified in the "Manual on Uniform Traffic Control Devices for Streets and Highways" (MUTCD).

7.9.2 Visual Resources

Project impacts could include the physical disturbance during construction of the visual environment's landform, vegetation and/or structures. Construction activities have visual components that may contrast with the existing visual environment. A generally positive consideration regarding pipeline construction is that the activity moves relatively rapidly along the approved route. Topographic modifications will be minor; for the most part, the pipeline will follow native terrain and the backfill will restore the surface to natural levels. Upon completion of construction, the disturbed ROW will be revegetated with approved seed mixes to provide native grasses in grassland areas. The pipeline will not cross heavily forested areas on federal lands, so permanent clearing will not occur. After reclamation, visual effects of the pipeline will be essentially eliminated with the first crop grown on those portions of the ROW.

Aboveground facilities will be limited to one MLV, to be located on BLM land south of the Missouri River crossing.

Descriptions of visual resources include the aesthetic value of the natural and developed landscape, the public value of viewing the natural landscape, and the visibility of the landscape from sensitive viewpoints (e.g., residences, recreation areas, rivers, and highways). Documentation of potential visual effects of the pipeline includes evaluation of physical features of the landscape, with particular attention to the ability of the particular landscape to absorb the visual modifications that will be introduced, together with the level of concern, or sensitivity, people have for scenic quality. Together these factors define the degree of landscape modification that will acceptable. The BLM is responsible for identifying and protecting scenic values on public lands under several provisions of the FLPMA and the NEPA. The BLM Visual Resource Management (VRM) system was developed to facilitate the effective discharge of that responsibility in a systematic, interdisciplinary manner.

The VRM system, documented by the BLM in the 8400 series VRM Manual (BLM 1986), was used as the basis for both the visual resources inventory and the assessment of visual impacts of Project route alternatives. The VRM system includes an inventory process, based on a matrix of scenic quality, viewer sensitivity to visual change, and viewing distances, which leads to

classification of public lands and assignment of visual management objectives. Four VRM classes have been established, which serve two purposes: 1) as an inventory tool portraying relative value of existing visual resources and 2) as a management tool portraying visual management objectives for the respective classified lands to establish the guidelines for the level of acceptable visual change allowed in the landscape. The management objectives for each of the VRM classes are displayed in **Table 7-21**.

The VRM system also includes a "contrast rating" procedure for evaluating the potential visual effects of a proposed project or management activity. The VRM system was used to evaluate the visual impact of the Project on BLM lands as well as the potential cumulative visual effects of the project in the context of other activities that have taken place or may take place in the area in the reasonably foreseeable future (**Table 7-22**).

Table 7-21 Bureau of Land Management Visual Resource Management Class Objectives

Classification Objectives	Requirement
Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic (design) elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic (design) elements.
Rehabilitation Areas	Areas in need of rehabilitation from a visual standpoint should be flagged during the inventory process. The level of rehabilitation will be determined through the RMP process by assigning the VRM class approved for that particular area.

Source: BLM 1986.

Table 7-22 VRM Classes Crossed by the Pipeline Centerline on Federal Lands

Federal Lands Crossed	From MP	To MP	Miles by VRM Class			
			Class II	Class III	Class IV	Total
	0.00	0.93		0.93		**0.93**
	2.47	2.64		0.17		**0.17**
	6.03	6.25		0.23		**0.23**
	9.20	9.74		0.54		**0.54**
	11.40	12.33	0.93			**0.93**
	13.06	13.78	0.72			**0.72**
	15.38	15.42	0.04			**0.04**
	21.30	21.66	0.36			**0.36**
	24.99	25.11	0.13			**0.13**
	28.84	28.87			0.03	**0.03**
	32.62	33.60			0.98	**0.98**
	33.60	34.10			0.50	**0.50**
	34.10	34.84			0.74	**0.74**
	35.21	35.58	0.37			**0.37**
	35.58	36.32	0.75			**0.75**
	36.32	36.67	0.34			**0.34**
	37.07	37.34	0.27			**0.27**
	37.68	38.58	0.90			**0.90**
	38.58	38.86	0.28			**0.28**
	42.56	43.14	0.59			**0.59**
	45.82	46.19			0.37	**0.37**
	46.19	46.27			0.08	**0.08**
	46.27	46.59			0.32	**0.32**
	46.59	46.93			0.33	**0.33**
	46.93	46.96			0.03	**0.03**
	47.71	47.95			0.24	**0.24**
	47.95	48.47			0.52	**0.52**
	49.97	50.64			0.67	**0.67**
	50.64	50.69			0.05	**0.05**
	50.69	51.42			0.73	**0.73**
	51.42	52.01			0.59	**0.59**
	52.01	52.17			0.16	**0.16**
	52.17	52.36			0.18	**0.18**
	52.36	52.69			0.34	**0.34**
	52.69	52.94			0.24	**0.24**
	53.36	54.45			1.09	**1.09**
	54.68	55.20			0.51	**0.51**
	55.53	56.00			0.47	**0.47**
	56.00	56.16			0.17	**0.17**
	56.79	56.83			0.04	**0.04**
	57.17	57.50			0.34	**0.34**
	58.28	58.79			0.51	**0.51**
Bureau of Land Management	58.79	59.31			0.52	**0.52**

Table 7-22 VRM Classes Crossed by the Pipeline Centerline on Federal Lands

Federal Lands Crossed	From MP	To MP	Miles by VRM Class			
			Class II	Class III	Class IV	Total
	59.31	60.14			0.83	**0.83**
	60.14	60.59			0.44	**0.44**
	60.59	61.61			1.02	**1.02**
	62.45	62.84			0.39	**0.39**
	63.63	64.34			0.71	**0.71**
	65.22	65.71			0.49	**0.49**
	66.91	67.30			0.38	**0.38**
	67.30	68.33			1.04	**1.04**
	89.76	90.15	0.39			**0.39**
	90.15	90.19	0.04			**0.04**
	90.19	90.48	0.28			**0.28**
US ARMY CORPS OF ENGINEERS	90.48	91.64	1.16			**1.16**
BUREAU OF LAND MANAGEMENT	91.64	92.10	0.46			**0.46**
	92.10	92.43			0.33	**0.33**
	92.43	93.09			0.66	**0.66**
	93.84	93.93			0.09	**0.09**
	93.93	94.09		0.16		**0.16**
	94.09	95.16		1.07		**1.07**
	95.16	95.50		0.34		**0.34**
	95.80	96.44		0.64		**0.64**
	96.44	97.07		0.63		**0.63**
	99.73	100.04		0.32		**0.32**
	104.19	104.32		0.14		**0.14**
	104.32	104.46			0.13	**0.13**
	107.31	107.55			0.24	**0.24**
	107.86	108.08			0.22	**0.22**
	109.78	110.43		0.65		**0.65**
	111.13	111.22			0.09	**0.09**
	112.40	113.01			0.61	**0.61**
	113.01	113.03			0.02	**0.02**
	115.89	116.31			0.42	**0.42**
	116.31	116.56			0.25	**0.25**
	117.11	117.43			0.32	**0.32**
	117.43	117.81			0.38	**0.38**
	118.68	118.77			0.10	**0.10**
	120.08	120.60			0.53	**0.53**
	120.76	120.97			0.21	**0.21**
	127.52	127.55	0.03			**0.03**
	129.84	130.33	0.49			**0.49**
	211.19	211.84			0.65	**0.65**
	212.44	212.50			0.05	**0.05**
	212.50	213.14			0.65	**0.65**
	213.23	214.00			0.78	**0.78**
	214.00	214.45			0.45	**0.45**

Table 7-22 VRM Classes Crossed by the Pipeline Centerline on Federal Lands

Federal Lands Crossed	From MP	To MP	Miles by VRM Class			
			Class II	Class III	Class IV	Total
	214.45	215.68			1.22	**1.22**
	215.68	215.68			0.01	**0.01**
	215.68	216.88			1.19	**1.19**
	216.88	217.66			0.79	**0.79**
	217.66	218.53			0.87	**0.87**
	218.53	218.88			0.35	**0.35**
	218.88	220.18			1.30	**1.30**
	231.66	232.28			0.63	**0.63**
	233.16	233.20			0.04	**0.04**
	233.20	233.76			0.56	**0.56**
	239.60	239.78			0.18	**0.18**
	249.20	249.91			0.71	**0.71**
	256.35	256.46			0.11	**0.11**
	256.66	256.89			0.23	**0.23**
	275.06	275.56			0.50	**0.50**
TOTAL			**8.53**	**5.81**	**31.95**	**46.29**
Percent of Total			**18.4%**	**12.6%**	**69.0%**	**100.0%**

Scenic Quality

With only a few exceptions, scenic quality for the Project is rated Class C – Common. Terrain generally is flat to rolling. Vegetation is mainly high prairie grassland. The Missouri River corridor at Milepost 88.9 warrants Class B scenic designation; the corridor is narrow where the pipeline will cross. The availability of perennial water along the river has sustained stands of larger trees than are typically found in the region, most of which are cottonwoods and willows.

As identified in **Table 7-22**, the Project will cross federal lands that the BLM has designated VRM Class II, but that are not on major rivers or high standard roadways. They were apparently designated Class II to protect areas the agency has determined to have unusual value. Federal lands between Milepost 12.0 and Milepost 25.8 will cross through the edge of an area of some 200 square miles encompassing the French Creek drainage. The landscape at the southwesterly edge of the Class II area, where the pipeline will cross, will be considered mostly common except where associated with the larger drainage. The second Class II area is focused on Rock Creek Canyon and includes most of the Bitter Creek WSA. The area is slightly larger than the French Creek Class II area. The project will cross federal lands associated with Rock Creek and Willow Creek from Milepost 35.1 to Milepost 43.5 in the southerly quarter of the area. Except for the creek crossings, primarily on lands without extensive wetlands, most of the terrain crossed by this alternative is fairly common rolling grassland with some hummocky areas. The Project will pass approximately 4 miles southwest of the WSA. The last Class II area is smaller; the Project will cross federal lands between Milepost 125.4 and Milepost 128.9, where the pipeline will

parallel the East Fork Prairie Elk Creek and will cross several small tributary drainages in addition to the creek. The landscape is prairie grassland with a complex network of excised drainages. It is not apparent what warranted the Class II designation and BLM records are not complete regarding the designation.

Recreation Use

Most of the BLM land crossed is currently leased for grazing rights by area ranchers. During construction, hunting on some of this land will not be available. The hunting season following completion of the pipeline ROW the area will be open for continued hunting.

Depending on access, BLM lands crossed by the Project may be used for dispersed recreation such as hunting, camping, hiking and bird watching. Recreational users may temporarily relocate to surrounding areas if access roads are congested due to construction. Hunting would be expected to be the predominant recreational use of most affected BLM lands. Construction and reclamation work during hunting seasons would temporarily exclude hunters from comparatively small areas. After ROW reclamation is complete, hunter use of BLM lands would return to pre-construction levels. Therefore hunter opportunities, harvest rates or the number of hunter days would not be affected over the long-term.

7.9.3 Wilderness Areas

No wilderness areas will be crossed by the Project.

7.9.4 Transportation

No impacts to airports, railways, or future construction projects will occur on federal lands.

Roadways and Railways
No paved roads or highways, and no railroads are crossed on federal lands.

Minor roads are those transportation corridors having less volume and use than major roads. They are mainly established for local travel within the state. There are 11 minor road crossings (local neighborhood or rural roads) will be crossed on federal lands.

7.10 Cultural Resources

Protection of cultural 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, and Section 106 of the NHPA of 1966, as amended. Together, these federal guidelines provide necessary guidance on the protection of cultural resources.

In compliance with the mandates listed above, cultural resource investigations commenced for the Steele City Segment in April 2008 and are ongoing. For complete results of these surveys, see the cultural survey reports for Montana (**Appendix L**).

7.10.1 Results of Records Search

To date, Keystone has conducted several Class I files/records searches for the project area at the Montana SHPO office, and at the BLM Miles City Field Office. These Class I searches yielded 369 previously recorded sites on federal lands on the pipeline centerline, access roads, transmission lines, and within ancillary facility survey areas in Montana. Results of this search are included in **Appendix L** (Berg et al. 2008; Cooper et al., 2009; Zietz et al., 2009; Baer et al. 2010; Crossland et al. 2010).

7.10.2 Results of Field Investigations

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.

Only those cultural resources located in the APE were reviewed to determine if any will be subject to impacts that could affect their eligibility for the NRHP based on NRHP criteria for evaluation. For the Project, the APE is the 200-foot survey corridor in areas where the Project parallels an existing pipeline, the 300-foot survey corridor in greenfield areas, the footprint of proposed pump stations, access roads to be used or upgraded during construction, pipe yards, contractor yards, and any other temporary use or staging areas, plus a 100-foot buffer.

Cultural resource field surveys commenced in June 2008 and currently are ongoing. This POD includes information associated with survey of the Project centerline, access roads, transmission lines, and ancillary facilities on federal lands (**Appendix L**). Keystone archaeologists have located 64 sites and isolated resources on federal lands within the survey corridor. Of these 64 resources, 27 are located within the centerline survey corridor, 3 are located on proposed access roads, and 34 are located on proposed transmission lines (**Appendix L**). Preliminary information regarding potential cultural sites on transmission power line routes was collected for the 2011 DOS FEIS and is addressed in the following reports: Cooper et al. 2009 and Zietz et al. 2009 and Baer et al. 2010. Of the 59 cultural resources located on federal land that are still considered part of the Project, 31 are prehistoric, 16 sites are historic, five are multicomponent (historic and prehistoric) and 7 are of unknown age. Keystone is recommending 46 potentially eligible sites and three eligible sites for potential listing on the NRHP, and ten sites as being ineligible for listing or of an unknown determination. These sites were determined to be located within or adjacent to the immediate Project APE. Avoidance or evaluation to definitively determine NRHP eligibility was recommended for sites listed as potentially eligible or eligible. In addition to further

evaluation, re-routes, boring, or construction ROW reductions are currently being evaluated for all eligible or potentially eligible sites. The remainder of these sites will not require any additional work. Forty resources on Federal lands have been avoided through infrastructure revisions and are no longer within the project APE. Additional cultural resource surveys for transmission line are being conducted by electrical power providers.

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, as appropriate, with the appropriate SHPOs, the BLM, and DOS.

Construction activities and associated operations could adversely affect undiscovered archaeological sites. If previously undocumented sites are discovered within the construction corridor during construction activities, all 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 (human remains or other cultural materials) is recommended as being eligible for NRHP listing, impacts will be mitigated through the steps outlined in an approved Unanticipated Discovery Plan, which will be provided after agency comments on the Class III cultural survey reports (**Appendix L**) are incorporated.

The primary impact of the operation phase of the Project is the potential introduction of visual or audible elements (e.g., MLV), which could alter the setting associated with historic properties.

7.11 Native American Consultation

Federal statutes and implementing regulations require consultation with Native American tribes concerning the identification of cultural values, religious beliefs, and traditional practices of Native American people that may be affected by federally approved actions. These federal statutes include, but are not limited to:

- Section 106 of the NHPA, as amended, including Advisory Council on Historic Preservation's implementing regulations, specifically 36 CFR Part 800.2(c)(2)(ii);
- Executive Order 13007, which requires federal agencies to accommodate access to and ceremonial use of Native American sacred sites by Native American religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites;
- American Indian Religious Freedom Act (1978); and
- The Native American Graves Protection and Repatriation Act (1990).

Consultation with federally recognized Native American tribes must occur on a government-to-government basis [36 CFR Part 800.2(c)(2)(ii)]; therefore, tribal consultation is the responsibility of the lead federal agency. Under 36 CFR Part 800.3(f)(2), it is the lead federal agency's duty to make a reasonable and good faith effort to identify any Native American tribes that might attach religious and cultural significance to historic properties in the APE and invite them to be

consulting parties. Some tribes have a Tribal Historic Preservation Officer (THPO), others have a tribally designated individual or group of individuals responsible for consultation, such as elected tribal officials (e.g., the chief or council) or other respected community leaders, such as elders.

The DOS conducted extensive government-to-government consultation with Native American tribes. This consultation is summarized in the August 2011 DOS FEIS.

7.11.1 Tribal Engagement

Keystone initiated Native American engagement by sending letters to the Native American tribes listed below. These tribes were identified as potentially falling within the consultation requirements of the above discussed statutes. The letters were sent to inform the various tribes of the proposed undertaking and to develop an interactive relationship with the tribes. Keystone made clear that this engagement did not represent government-to-government consultation, which is the jurisdiction of the lead federal agency. Tribes that were contacted as part of the initial undertaking are summarized in **Table 7-23**, along with their responses. Continued cooperation between the various SHPOs, state and federal agencies, Keystone archaeologists, various THPOs, and Native American tribal elders is essential to continued protection of historical properties and respect of tribal issues.

Table 7-23 Tribal Contact List for the Steele City Segment of the Project

Tribe	Date of Contact	Status
Blackfeet Nation	May 27, 2008	Written reply as of July 24, 2008. Consultation desired.
Fort Peck Tribes	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Northern Cheyenne Tribe	May 27, 2008	Written reply as of July 24, 2008. Consultation desired.
Salish & Kootenai Tribes	May 27, 2008	No reply.
Little Shell	May 27, 2008	No reply.
Crow	May 27, 2008	No reply.
Chippewa Cree	May 27, 2008	No reply.
Standing Rock	May 27, 2008	Written reply as of July 24, 2008. Consultation desired.
Fort Berthold Tribe	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Turtle Mountain Band of Chippewa	May 27, 2008	No reply.
Spirit Lake Nation	May 27, 2008	No reply.
Mandan, Hidatsa, and Arikara	May 27, 2008	No reply.

Table 7-23 Tribal Contact List for the Steele City Segment of the Project

Tribe	Date of Contact	Status
Nations		
Sisseton-Wahpeton	May 27, 2008	Written reply as of July 24, 2008. Consultation desired.
Yankton Sioux	May 27, 2008	No reply.
Rosebud Sioux	May 27, 2008	No reply.
Ogalala Sioux	May 27, 2008	No reply.
Flandreau Santee Sioux	May 27, 2008	No reply.
Crow Creek Sioux	May 27, 2008	No reply.
Cheyenne River Tribe	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Lower Brule Tribe	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Ponca Tribe	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Santee Sioux Tribe	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Omaha Tribe	May 27, 2008	Verbal reply as of July 24, 2008. Consultation desired.
Winnebago	May 27, 2008	No reply.
Sac & Fox of the Missouri	May 27, 2008	No reply.

Note: for Tribal Contacts associated with the entire Project, refer to the Environmental Report.

7.12 Health and Safety

The Project Safety Plan applies to activities prior to and during pipeline construction, and will be implemented to protect employees, contractors, and the general public. Keystone will develop and submit a comprehensive safety plan, prior to start of construction.

Pipeline markers would be provided for identification of the pipeline location for safety purposes in accordance with the requirements of 49 CFR 195.410 (Line Markers) and PHMSA Project-specific Special Condition 40 (see Appendix U of the August 2011 DOS FEIS), including the following:

- Pipeline markers would be installed on both sides of all highways, roads, road ROWs, railroads, and waterbody crossings and in areas where the pipeline is buried less than 48 inches;
- Pipeline markers would be made from industrial strength materials to withstand abrasion from wind and damage from cattle;
- Pipeline markers would be installed at all fences;

- Pipeline markers would be installed along the ROW to provide line-of-sight marking of the pipeline, providing it is practical to do so and consistent with the type of land use, such that it does not hinder the use of the property by the landowner. Pipeline markers would be installed at all angle points, and at intermediate points, where practical, so that from any marker, the adjacent marker in either direction would be visible;
- Consideration would be given to installing additional markers, except where they would interfere with land use (e.g., farming);
- Aerial markers showing identifying numbers would be installed at approximately 5-mile intervals; and,
- At each MLV site and pump station, signs would be installed and maintained on the perimeter fence where the pipeline enters and exits the fenced area.

Markers would identify the owner of the pipeline and convey emergency contact information. Special markers providing information and guidance to aerial patrol pilots also would be installed. The markers would be maintained during operating life of the proposed Project.

7.12.1 Industrial Waste and Toxic Substances

Keystone and its contractors will dispose of all waste hazardous materials at licensed waste disposal facilities. Hazardous wastes will not be disposed of in any other fashion, such as unpermitted burying. If toxic or hazardous wastes are encountered during construction, the contractor will be required to stop work immediately and notify Keystone. Keystone will then determine, with input from appropriate state and federal personnel, how to safely and effectively mitigate for the contamination.

8.0 Stabilization and Reclamation

The objectives of reclamation and revegetation are to return the disturbed areas to approximately pre-construction use and capability. This involves the treatment of soil as necessary to preserve approximate pre-construction capability and the stabilization of the work surface in a manner consistent with the pre-construction land use. Stabilization and reclamation will be completed as detailed in the Construction/Reclamation Unit Specifications and BLM-Specific CMRP (Appendix P).

8.1 Soil Stripping, Replacement, and Stabilization

The objective of topsoil handling is to maintain topsoil capability by conserving topsoil for future replacement and reclamation and to minimize the degradation of topsoil from compaction, rutting, loss of organic matter, or soil mixing so that successful reclamation of the ROW can occur. At a minimum, Keystone plans to implement the topsoil removal and storage measures identified in the BLM-Specific CMRP (**Appendix B**). Stabilization and reclamation will be completed as detailed in the Construction/Reclamation Unit Specifications and BLM-Specific CMRP. All work shall be conducted in accordance with applicable permits and the BLM Grant of ROW conditions. Topsoil will be separated from the subsoil to a maximum depth of 12 inches (stockpiled subsoil). Based on site-specific circumstances, topsoil will be separated from subsoil over the trench, over the trench and spoil side, or full width of the ROW.

Temporary erosion and sediment control measures shall be installed immediately after initial disturbance of the soil, maintained throughout construction (on a daily basis), and reinstalled as necessary until replaced by permanent erosion control structures or reclamation of the construction ROW is complete. Specifications and configurations for erosion and sediment control measures may be modified by Keystone as necessary to suit actual site conditions. However, all work shall be conducted in accordance with applicable permits. Erosion and sediment control measures could include, but are limited to, the following; sediment barriers, trench plugs, temporary slope breakers (water bars), drainage channels or ditches, temporary mulching, or approved tackifier.

Once the pipe has been placed in the trench, the trench will be backfilled using the stockpiled subsoil whenever possible. Topsoil will not be used for backfill, and concentration and size of rocks will not be greater than what existed prior to construction. All work shall be conducted in accordance with applicable permits.

Soil that is backfilled in the trench will be compacted using the tracked construction equipment utilized during backfilling and rough clean-up. After backfilling, areas of the construction ROW that were stripped for topsoil salvage will be de-compacted prior to topsoil replacement, using methods outlined in Section 4.11 of the BLM-Specific CMRP. The subsoil surface will be graded

smooth and any subsoil clumps broken up (disc and harrow) in an effort to avoid topsoil mixing. Topsoil will then be replaced. Plowing under of organic matter including wood chips and manure, or planting of a green crop such as alfalfa to decrease soil bulk density and improve soil structure or any other measures in consultation with the BLM will be considered if mechanical relief of compaction is unsatisfactory.

In the first year after construction, Keystone will inspect the ROW to identify areas of erosion or settling. Subsequently, Keystone will monitor erosion and settling through aerial patrols, which are part of Keystone's Integrity Management Plan, and through notification from federal land managers.

8.2 Seeding Specifications

8.2.1 Mixture, Rate, Mulch, Fertilizer, Pesticide/Herbicide Use

Seed mixtures and application are discussed in Section 4.11.4 of the BLM-Specific –CMRP. Seeding shall be completed as detailed in the Construction/Reclamation Unit Specifications (Appendix P). The final seed mix will be based on input from the BLM and the local NRCS, and on the availability of seed at the time of reclamation. Keystone will ensure seeds will be certified, and will be used within an appropriate time after certification. The BLM may request specific seeding requirements in the ROW grant. Identified seeding areas shall be seeded at a rate appropriate for the region and stability of the reclaimed surface. Seeding rates shall be based on pure live seed.

If site-specific conditions warrant and if agreed to by the land management agency, amendments (fertilizer and soil pH modifier materials and formulations) commonly used for agricultural soils in the area may be applied in accordance with written recommendations from the local soil conservation authority and land management agencies. Amendments shall be incorporated into the normal plow layer as soon as possible after application.

If mulch is applied prior to seeding for temporary erosion control, Keystone will ensure the excess mulch is removed and disposed of prior to seedbed preparation to ensure that seedbed preparation equipment and seed drills do not become plugged with excess mulch, to support an adequate seedbed, and to ensure that seed incorporation or soil packing equipment also can operate without becoming plugged with mulch. If appropriate, the removed temporary mulch may be evenly re-applied to the construction ROW following seeding.

Weather conditions, construction ROW constraints, site access, and soil type shall influence the seeding method to be used (i.e., drill seeding versus broadcast seeding). All areas seeded by the Contractor, except for temporary cover crops, shall be drill seeded unless the ROW is too steep to allow drill seeding. Temporary cover crop seed shall be broadcast. Broadcast or hydro seeding, used in lieu of drilling, shall utilize double the recommended seeding rates. Where

seed is broadcast, the Contractor shall use a harrow, cultipacker, or other equipment immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.

Keystone shall work with the BLM to discourage intense livestock grazing of the construction ROW during the first growing season by utilization of temporary fencing, deferred grazing, or increased grazing rotation frequency.

Keystone will implement BMPs for conducting vegetation control where necessary before and after construction. Information from BLM's Programmatic EIS for Vegetation Treatments (BLM 2007b) also will be considered for implementation. Typical agricultural herbicides, developed in consultation with county or state regulatory agencies, will be used. Prior to use of pesticides or herbicides on federal lands, Keystone will provide a Pesticide Use Proposal to BLM for concurrence or approval. Herbicide types will be determined based on the weed species requiring control. Herbicides or pesticides will be applied by applicators appropriately licensed or certified by the state in which the work is conducted, and as deemed necessary for optimum mortality success. All herbicides applied prior to construction shall be non-residual or shall have a significant residual effect no longer than 30 days. Herbicides applied during construction shall be non-residual. Keystone will implement BMPs in the use of pesticides and herbicides along the pipeline corridor to reduce potential impacts to avian and wildlife species.

On any construction ROW over which Keystone will retain control over the surface use of the land after construction (i.e., valve sites, metering stations, pump stations, etc.), Keystone shall provide for weed control to limit the potential for the spread of weeds onto adjacent lands used for agricultural purposes. Any weed control spraying performed by Keystone shall be done by a state-licensed pesticide applicator.

8.2.2 Criteria to Determine Revegetation Success

Keystone will monitor revegetation success along the pipeline ROW until revegetation is deemed successful as determined by BLM on federal lands. 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 or NRCS Ecological Site Description, whichever is appropriate. Monitoring shall be completed in accordance with the "Proposed Revegetation Success Monitoring Plan for the Montana Portion of the Keystone XL Pipeline Project" (Appendix Q) that was developed for the Keystone Sage Grouse Mitigation Plan.

8.3 Limitation of ROW Access

Keystone will offer to install and maintain measures to control unauthorized vehicle access to the construction ROW on federal lands where appropriate. These measures may include the following unless otherwise approved or directed by Keystone based on site-specific conditions or circumstances:

- Signs;
- Fences with locking gates;
- Slash and timber barriers, pipe barriers, or boulders lined across the construction ROW; and
- Conifers or other appropriate trees or shrubs across the construction ROW.

8.4 Reclamation of Access Roads

The objective of reclamation is to return the disturbed areas to approximately pre-construction use and capability. This involves the treatment of soil as necessary to preserve approximate pre-construction capability and the stabilization of the work surface in a manner consistent with the initial land use. All reclamation required of access roads will be in accordance with the BLM Gold Book (BLM, 2007a). Where applicable, methodologies and BMPs implemented on the pipeline construction ROW as listed in the BLM-Specific CMRP (**Appendix B**) will be utilized for construction and reclamation of access roads (e.g., post-construction monitoring and repair).

Access roads that cross portions of federally owned lands generally will be used during construction only, and will be reclaimed after construction to pre-construction conditions. One road on federal land will be a permanent road, and will be maintained throughout the life of the Project. This road does not cross any wetlands, perennial waterbodies, cultural resource sites or sensitive species habitat.

After construction, Keystone will reclaim temporary roads to pre-construction conditions unless the BLM requests that they be left un-reclaimed. Reclamation of permanent access roads would occur only after the abandonment of the Project, upon BLM's request.

The permanent road could be reduced in width after construction is finalized, if requested, by reclaiming portions of the road not needed for vehicle travel. To achieve this, geotechnical material installed for road pack will be removed, and cut slopes, fill slopes, and borrow ditches will be covered with topsoil and revegetated wherever possible. This will restore habitat, forage, and visual resources in the restored areas, and would reduce soil erosion and maintenance costs.

New temporary roads constructed for the project would be reclaimed in their entirety; pre-existing roads that are modified to accommodate construction will be restored to their pre-existing road footprint. Reclamation initially will include removal of any geotechnical material installed for road pack and re-contouring the road back to the original contour. To improve reclamation success, methods such as ripping, scarifying, topsoil, replacement constructing water-bars, pitting, mulching, redistributing woody debris, and barricading could also be employed on a site-specific basis. After the surface contour is restored and the soil prepared, seed mixtures would be applied as specified by the BLM. If water-bars are used, they will be removed and seeded following successful revegetation.

9.0 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 Keystone's contractors.

Guidelines

The term "Operation Phase" refers to the period beginning immediately following the construction phase whereby the facilities are commissioned and placed in service to support the needs of the executed contracts. Activities in this phase include the transportation of crude oil. This definition also includes normal operations, routine pipeline ground and aerial inspections, emergency response activities, routine internal and external integrity inspections, repairs along short segments of the entire pipeline, and future reclamation activities such as reseeding and repair of erosion control structures.

Definitions

Normal Operations and Routine Maintenance

The pipeline will be inspected periodically via aerial and ground surveillance as operating conditions permit, but no less frequently than as required by 49 CFR Part 195 (i.e., a minimum of 26 aerial inspections per year). Aboveground facilities such as IMLVs and MLVs will be inspected twice annually or more frequently, if needed. When conducting ground inspections, inspectors will stay within the ROW unless agreed upon by the appropriate land management agency. Any such agreements will be on an inspection-specific basis. This surveillance will be used to locate and monitor possible encroachments on the ROW as well as nearby construction of other projects; erosion on or near the ROW, including the need for repair of permanent erosion control devices; exposed pipe; repair or replacement of pipeline markers; or other potential concerns that could affect the safety and operation of the pipeline. Any disturbances to the ROW as a result of such maintenance will be promptly rehabilitated in accordance with the BLM-Specific CMRP (**Appendix B**).

Aerial inspections will not require additional federal lands for aircraft facilities (i.e., landing strips or heliports). 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. Trees will be removed from the permanent easement. Keystone will use mechanical mowing or cutting along its permanent easement for normal vegetation maintenance. Trees along the paths of areas where the pipe was installed via HDD will not be cleared.

Keystone will monitor the ROW to identify any areas where soil productivity has been degraded as a result of pipeline construction and reclamation measures will be implemented to rectify any such concerns. Applicable reclamation measures are outlined in the BLM-Specific CMR Plan (**Appendix B**).

The Project will have a Supervisory Control and Data Acquisition (SCADA) –system and an Operational Control Center (OCC) manned by an experienced and highly trained crew 24 hours per day every day of the year. A fully redundant backup control center has been constructed and is available as needed.

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

Abnormal Operations

The USDOT prescribes pipeline design and operational requirements that limit the risk of accidental crude oil release (leaks or spills) from pipelines. Keystone will employ multiple safeguards to prevent a pipeline spill, and will prepare an Emergency Response Plan (ERP) based upon the plan currently in review by PHMSA for the Keystone Pipeline Project. The ERP will outline the measures designed to meet federal and state standards and that will be implemented in the event of an accidental release to ensure protection of human health and environmental quality.

Due to safeguards outlined here, the chance of spill occurring is very low, and if a spill occurred, the volume is likely to be very small. Keystone has developed a spill risk assessment to quantify the likelihood of an accidental release, and to better identify potential impacts to surface water and groundwater. In the unlikely event of a release, Keystone will initiate its ERP and emergency response teams will contain and clean up the spill. Based on the measures in the ERP, and on the safeguards in place on the pipeline, no potential impacts to human health and environmental resources discussed in this section are anticipated due to an accidental release.

Keystone will comply with the CFR 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 operating design limits 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 any safety device; and
- Any 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.

SCADA and Leak Detection

Keystone will utilize a SCADA system to remotely monitor and control the pipeline system. In summary, highlights of Keystone's SCADA system will include:

- Redundancy in the SCADA system and a 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

Additional automatic features installed at the local pump station level will also be utilized to provide pipeline pressure protection in the event communications with the SCADA host are interrupted.

Keystone will have complimentary leak detection methods and systems available within the OCC, which is manned on a 24 (hrs/day) x 7 (days/week) basis. 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 detect leaks down to approximately 25 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 model based leak detection systems that 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 to 2 percent of pipeline flow rate.
- Computer based, 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.
- 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.

Emergency Procedures

Keystone is required to prepare a site-specific ERP for the system, which will be submitted to PHMSA for approval prior to operation. Keystone has prepared a comprehensive ERP for the Keystone Pipeline Project which was submitted to PHMSA and approved. A summary of this ERP is provided in Appendix F. Keystone will use the ERP as the basis for preparation of an ERP specific to the Keystone XL Project, incorporating adjustments to reflect Project-specific factors. Prior to operations, Keystone will submit the Keystone XL ERP to PHMSA for approval.

Keystone is required to notify immediately the National Response Center (NRC) in the event of a release of crude oil that: 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 notifying the NRC, Keystone will make timely notifications to other agencies, including the appropriate local emergency planning committee, sheriff's department, the appropriate state agency, the USEPA, and affected landowners.

Under the National Contingency Plan, the 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 the responsible party or local authorities to handle the incident. The USEPA will monitor all activities to ensure that the spill is being contained and cleaned up appropriately. All spills meeting legally

defined criteria (see criteria above per 40 CFR Part 112) must be monitored by the USEPA, even though most spills are small and cleaned up by the responsible party. In the unlikely event of a large spill, Keystone and its contractors will be responsible for recovery and cleanup. 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.

A fire associated with a spill is unlikely. According to historical data (PHMSA 2008), only about 2 percent of reportable liquid 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 (Appendix O).

Remediation

Corrective remedial actions following a spill will be dictated by federal regulations and enforced by the USEPA and PHMSA and the appropriate state agencies. Required remedial actions may range from the excavation and removal of contaminated soil to allowing the contaminated soil to recover through natural environmental fate processes (e.g., evaporation, biodegradation). Decisions concerning remedial methods and extent of the cleanup will account for 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 caused by remedial activities.

In the event of a spill, 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 CWA, and the Oil Pollution Act. These interlocking programs mandate notification and initiation of response actions in a timeframe and on a scale commensurate with the threats posed. The appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

9.1 Air Resources

9.1.1 Air Quality Regulation Applicability to Project Facilities on Federal Lands

Operational emissions will be limited to the proposed pump stations to be located along the pipeline and backup generators at MLVs and IMLVs (where power is available). No pump stations are located on Federal lands. Project facilities will be subject to federal and state air quality regulations implementing the federal Clean Air Act (CAA) of 1970 and its amendments; however, no permanent facilities producing emissions will be located on federally owned or

managed lands. All pipeline pumps will be electrically driven, and will not include emergency generators, so the pump stations will not have combustion emissions. Operational emissions from each of the pump stations will consist exclusively of fugitive emissions. Since there will be a relatively small number of piping components at each of the pumping stations, only negligible amounts of fugitive emissions could occur from crude oil pipeline connections and pumping equipment at the pump stations. Although some pump stations will be within proximity of federal lands, no impacts to these lands are expected. For discussion of federal and state regulations applicable to, as well as potential impacts from the Project on private lands along the Project route, refer to the Environmental Report.

9.1.2 Climate

No change in local climate is anticipated as a direct result of the Project.

9.2 Noise

Because no noise-producing aboveground facilities will be located on federal lands, impacts during operation will be minimal.

9.3 Geology Resources

Maintenance activities associated with operation of the Project will only occur within previously disturbed areas; therefore, no additional impacts to geology or mineral resources are anticipated.

9.4 Paleontological Resources

Maintenance activities associated with operation of the Project will only occur within previously disturbed areas; therefore, no additional impacts to paleontological resources are anticipated. A paleontological mitigation plan was developed as a part of the MFSA certificate process and is attached as **Appendix F**.

9.5 Water Resources

9.5.1 Surface Water

There will be a period of time until riparian vegetation is re-established. Until then, the width of disturbance along stream banks will not have vegetative cover, if it existed prior to construction, could lead to increased temperature of that stretch of river/stream (50-75 feet wide).

Potential operational impacts could include water quality degradation in streams, lakes, impoundments, or surface water-based public water supplies from pipeline spills or leaks, or from spills or leaks of fuel, lubricants, or hazardous materials during operation.

Normal operations will not significantly adversely affect water resources. Minor surface disturbance activities from pipeline inspection and maintenance may occur in previously disturbed areas at isolated, small, and discrete locations.

The USDOT prescribes pipeline design and operational requirements that limit the risk of accidental crude oil releases (leaks or spills) 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 enter surface water resources and drinking water supplies. Keystone will prepare an ERP for the Project based upon the plan approved by PHMSA for the Keystone Pipeline Project. The Project ERP will outline the measures that will be implemented in the event of an accidental release. To minimize impacts to surface water resources, appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality. Keystone has submitted a risk assessment to DOS to better identify potential impacts to groundwater from a spill. Based on preliminary analysis, no impact to surface water associated with the pipeline on federal lands is anticipated.

To reduce the amount of product that could enter surface waters, federal regulation (49 CFR 195.260(3)) stipulates that new pipelines must have valves installed on both sides of any waterbody with 100-foot or greater width between ordinary high water marks. According to the PHMSA, intermittent and ephemeral streams are not considered waterbodies. In general, wetlands also are not considered by the PHMSA to be waterbodies. Keystone will comply with these PHMSA requirements. Valve locations, in addition to those required for major waterbody crossings, are discussed in Section 3.3. The location of valves, spill containment measures, and Keystone's ERP will minimize adverse effects to perennial, intermittent, and ephemeral waterbodies.

9.5.2 Groundwater

While routine operation of the Project will not affect groundwater resources, there is the possibility that a crude oil release could migrate through near-surface materials and enter a water-bearing zone or system. For reasons stated in Section 9.0, and based on preliminary analysis, no impact to groundwater associated with the pipeline on federal lands is anticipated.

9.6 Vegetation

Long-term impacts to vegetation include the permanent loss of woody species (i.e., evergreen and deciduous trees and shrub species) within a 30-foot corridor centered on the pipeline. Because wooded areas are limited on federal lands, this impact also will be limited. Encroachment of woody vegetation onto this strip will be periodically controlled by mechanical means such as chain saws or brush hogs. Use of herbicides to control woody vegetation is not anticipated. If it becomes necessary to use herbicides to control woody vegetation encroachment, herbicide selection, use, and permitting will be in accordance with all applicable

federal, state and local regulations, Keystone's Operating Procedures and/or other applicable BMPs.

The Project ROW will be managed in accordance with Keystone's Operating Procedures for ROW Management, USDOT regulations and other BMPs that are appropriate for conditions encountered on the ROW. The objective of ROW management will be to ensure safe operation of the pipeline while minimizing long-term alterations to pre-construction conditions and land use.

Pipeline operation and maintenance will have minimal impact on revegetated areas. Maintenance impacts will be limited to infrequent traffic along the pipeline ROW. Routine vegetation clearing of the ROW generally will not occur more frequently than every 1 to 3 years. Operation and maintenance of the Project may contribute to the presence of noxious weeds; however, efforts will be made to prevent their spread.

9.7 Wildlife

The effects of 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. Rangelands and native habitats will be reclaimed to primarily herbaceous communities using appropriate seed mixes prescribed by the BLM. 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.

Displacement or loss of non-game species from disturbance areas will be short-term due to repopulation of adjacent lands and high reproduction rates of the species involved.

Noise impacts on wildlife are difficult to assess because these impacts are affected by physical and biological characteristics such as the type, loudness and duration of noise as influenced by topography, weather/climate and vegetation; and the species, age and gender of affected wildlife (Janssen 1980; Pater et al. 2009). Janseen (1980) identified three potential effects of noise on wildlife:

- Primary effects are auditory damage, including deafness;
- Secondary effects include physiological responses, behavioral changes, altered reproduction, and reduced ability to obtain or utilize food, water and cover; and
- Tertiary effects occur at the population level, such as changes in age and sex ratios, population declines, habitat abandonment and potential species extinction.

For one pump station located adjacent to federal land, pump operations can result in high noise levels, up to 90 Dba (Air and Noise Compliance 2008). Such impacts would not be expected to affect wildlife in the vicinity of operation of the Project because any potentially affected animals would likely be displaced sufficiently to minimize this impact.

Some wildlife species may experience secondary effects, while others may not. For example, elk and mule deer have been shown to habituate to noise (e.g., Krausman et al. 1986) although response may vary by age class and time of year (e.g., Kuck et al. 1985). Secondary effects of noise would be expected to be most severe to wildlife species that rely heavily on auditory signals for survival (Air and Noise Compliance 2008), such as birds. Braun et al. (2002) reported lower rates of greater sage-grouse attendance at leks within one mile of CBM (coal bed methane) compressor stations. Reijnen et al. (1997) reported that breeding birds in grassland habitats were affected at a threshold noise level of 43-60 dBA while woodland birds were affected at a threshold level of 36-58 dBA. LaGory et al. (2001) found that some bird species were less common during the breeding season in pinyon-juniper habitat exposed to 40-50 dBA of gas well compressor noise while other species were more common, apparently in response to the habitat edge affect associated with the well development as well as an ability to display successfully despite the noise.

No tertiary effects would be expected from the Project because a comparatively small area would be affected by noise. In order for noise to cause population-level effects, the noise would have to be sufficiently widespread to affect a substantial portion of a wildlife population's critical range.

9.8 Soil Resources

During the operational phase of the Project, very small scale, isolated surface disturbance impacts, accelerated erosion, soil compaction, potential spills, and related reductions in the productivity of desirable vegetation or crops could result in localized areas from pipeline maintenance traffic and incidental repairs. Impacts related to excavation and topsoil handling are not likely to occur. These effects will be limited to small areas where certain pipeline maintenance activities take place. During operation, these types of impacts will be addressed with the affected land management agency and a mutually agreeable resolution reached.

9.9 Land Use

The 50-foot operational ROW will be maintained in an open condition for the life of the pipeline facilities. Permanent structures will not be built within this ROW during pipeline operation. No operational impacts are anticipated to agriculture and rangeland or special management areas. If there are to be surface disturbances due to future maintenance activities, these will be reclaimed after the disturbance, utilizing measures described in the BLM-Specific CMRP. Recreational use access will not be affected by pipeline operations within special management areas.

9.10 Cultural Resources

Maintenance activities associated with operation of the Project will only occur within previously disturbed areas; therefore, no additional impacts to cultural resources are anticipated.

9.11 Human Health and Safety

Keystone will operate and maintain the Project facilities in compliance with the Pipeline Safety Act regulations contained in 49 CFR Part 195 as administered by the USDOT. During all phases of this Project, the applicable requirements of the Occupational Safety and Health Act will be followed.

10.0 Termination and Rehabilitation

Properly maintained, the Project is expected to operate for 50 years or more. Keystone has no identified plans for abandonment of these facilities at this time. If abandonment of any facilities is proposed in the future, the abandonment will be subject to approvals by state and/or federal agencies having jurisdiction. Abandonment will be implemented in accordance with then-applicable permits, approvals, codes, and regulations.

Prior to abandonment, Keystone will coordinate with appropriate federal and state land management agencies to ensure that abandonment procedures follow agency-approved procedures at that time.

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Appendix A

Project Locations on Federal Lands (Pipeline and Access Roads)

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Appendix B

BLM-Specific Construction, Mitigation, and Reclamation (CMR) Plan

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Appendix C

Power Lines on Federal Lands

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Appendix D

Site-specific Waterbody Crossing Plan – Missouri River

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Appendix E

Spill Prevention, Control, and Countermeasure (SPCC) Plan and Public version Emergency Response Plan

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Appendix F

Paleontological Mitigation Plan

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Appendix G

Paleontological Survey Reports (Privileged and Confidential)

(***provided on CD under separate cover***)

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Appendix H

Soils Crossed by the Centerline on Federal Lands

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Appendix I

Species Potentially Occurring on Federal Lands Crossed by the Project

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Appendix J

Listed Species and Raptor Survey Reports

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Appendix K

Contact Summaries and Survey Protocols

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Appendix L

Cultural Survey Report – Montana (Privileged and Confidential)

(***provided on CD under separate***)

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Appendix M

BOR Canal and Waterline Crossings

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Appendix N

Keystone XL Sage Grouse Mitigation Plan

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Appendix O

Keystone XL Fire Prevention and Suppression Plan

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Appendix P

Con-Rec Unit Specifications

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Appendix Q

Keystone XL's Reclamation Plan for Federal Lands