4.0 Environmental Consequences

4.1 Analysis and Assumptions

4.1.1 Assumptions

For the purpose of analysis, the following assumptions were made:

1. The Project's construction, operation, reclamation methods, and environmental protection measures contained in the CMRP (**Appendix I**) would be implemented on all land regardless of ownership (federal, state, and private) unless specific exceptions are stated. Individual landowners may include specific construction and reclamation requirements in ROW agreements with Keystone. These site-specific requirements are likely to result in similar or less environmental impact than discussed here.
2. Keystone would acquire all necessary federal, state, and local permits and approvals to construct and operate the Project (not including power lines, which would be permitted, constructed, and operated by power providers), regardless of whether these permits and approvals are listed.

4.1.2 Guidelines

1. For the Proposed Action and all alternatives, the term "Construction Phase" includes surface-disturbing activities necessary to construct the pipeline, pump stations, lateral tie-ins, pigging stations, 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 was disturbed.
2. For the Proposed Action and all alternatives, the term "Operation Phase" is the period 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 in the Project. 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.
3. Prior to abandonment, Keystone would coordinate with appropriate federal and state land management agencies to ensure that abandonment procedures follow agency-approved procedures at that time.
4. For all resources, unless specific exceptions are stated, short-term impacts are those that would occur over a 5-year period or less, while long-term impacts are those that exceed 5 years.
5. Keystone's committed environmental protection measures included in the CMRP (**Appendix I**) were used to evaluate environmental impacts.

4.2 Proposed Action

4.2.1 Air Quality

4.2.1.1 Issues

The following air quality issues are likely to be encountered by the Project:

- Fugitive dust generation from pipeline construction equipment and roadway traffic;
- Combustion emissions from construction camps, construction equipment, and construction-worker commuter vehicles;

- Fugitive emissions from pump stations and associated piping and maintenance operations; and
- Emissions from the proposed Steele City tank farm.

4.2.1.2 Construction

Construction of the proposed Project would result in intermittent and short-term fugitive emissions. These emissions include fugitive dust from soil disruption and combustion emissions from construction equipment, construction-worker commuter vehicles, and generators at construction camps, if generators are installed.

The Project is in the process of identifying existing electric power infrastructure to supply power to each of the construction camps. However, if existing infrastructure is not available, diesel-fired internal combustion engines may be used to supply primary power to one or more of the construction camps. Additionally, even if power line infrastructure to each of the construction camps is available, the Project may install diesel-fired internal combustion engines as emergency back-up generators, to supply power to the camps if electrical power from the local utility is interrupted. To determine preliminary emissions estimates from the diesel-fired generator engines, a worst-case scenario of four, 400-kilowatt generator engines was assumed for installation per camp. This worst-case scenario would occur if electrical power to one of the construction camps was unavailable. Each of the diesel-fired engines would be "Tier 3" certified engines and are assumed to operate 8,760 hours per year. Preliminary estimates of emissions associated with four primary power generators are included in **Table 4.2-1** and preliminary estimates of emissions from one backup generator are included in **Table 4.2-2**.

Table 4.2-1 Four Power Generators

Compound	Emission Factor	Units	Hourly (lbs/hr)	Annual (tons/year)
NO_X + NMHC	3.0	g/bhp-hr	14.11	61.80
CO	2.6	g/bhp-hr	12.35	54.07
PM	0.15	g/bhp-hr	0.71	3.09
SO_x	0.054	lb/MMBtu	0.98	4.31
Pb	9.0	lb/10^{12} BTU	16e-04	7.2e-04

Table 4.2-2 One Back-up Generator

Compound	Emission Factor	Units	Hourly (lbs/hr)	Annual (tons/year)
NO_x + NMHC	3.0	g/bhp-hr	3.53	15.45
CO	2.6	g/bhp-hr	3.09	13.52
PM	0.15	g/bhp-hr	0.18	0.77
SO_x	0.054	lb/MMBtu	0.25	1.08
Pb	9.0	lb/10^{12} BTU	4.1E-05	1.8E-04

The quantity of fugitive dust emissions would depend on the moisture content and texture of the soils that are disturbed, along with the frequency and duration of precipitation events. A limited area would be exposed in each construction spread at any one time, and the majority of pipeline construction activities would generally pass by a specific location within a 30-day period before final grading, seeding, and mulching takes place. Fugitive dust emissions during construction would be restricted to the brief construction period along each

segment of the proposed Project route, with construction impacts diminishing once construction activities end and after disturbed areas are reclaimed. Weather conditions during construction also play a role in determining the dust emissions due to Project construction; drier weather and higher winds both increase the probability of airborne dust. Therefore, fugitive dust emissions are not quantifiable at this stage of Project development, although a preliminary estimate is included in this Supplemental Environmental Report. 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 would be limited to the immediate vicinity of the Project and the surrounding region would not be significantly impacted.

The Project would limit dust impacts in residential and commercial areas adjacent to pipeline construction by utilizing dust minimization techniques (primarily watering disturbed surfaces) in accordance with the CMRP (**Appendix I**). If further dust control plans are required by state agencies, the plans would be filed prior to land disturbance activities. Any wind-generated dust after construction would be controlled using land surface reclamation measures outlined in the CMRP.

Open burning could occur in areas where construction through areas with timber or heavy brush generates excessive brush or slash. Most of these locations are found on the Gulf Coast Segment of the Project. Disposal of these materials would be in accordance with landowner agreements, the CMRP, and applicable permits. The Contractor would determine whether to apply for burn permits, chip the material on the ROW, or haul it for disposal in a suitable landfill.

Construction equipment would 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 built to meet federal standards for mobile sources established by the USEPA mobile source emissions regulations. Preliminary construction emission calculations will be provided at a later date in **Table 4.2.3** and **Appendix V**. The preliminary calculations are based upon the tabulated construction equipment listed per spread in **Table 4.2-4**.

Table 4.2-3 Preliminary Construction Emissions – To be provided with the General Conformity Analysis.

Table 4.2-4 Preliminary Estimated Construction Equipment

Description On-/Off-road Equipment	Units per Spread	Horsepower of the On-road Equipment (hp)	Hours of Operation (hours/day)	Fuel type used in the engine (gasoline, diesel, natural gas etc.)
Automobile	50	500	2	Gasoline/ Diesel
Bus	7	190	3	Diesel
Pickup 4x4	100	500	5	Gasoline/Diesel
Welding Rig	30	400	10	Gasoline/Diesel
Winch Truck	3	650	8	Diesel
Dump Truck	1	650	8	Diesel
Flatbed Truck	8	650	9	Diesel
Fuel Truck	2	650	9	Diesel
Grease Truck	1	1	9	Diesel
Mechanic Rig	1	500	10	Diesel

Table 4.2-4 Preliminary Estimated Construction Equipment

Description On-/Off-road Equipment	Units per Spread	Horsepower of the On-road Equipment (hp)	Hours of Operation (hours/day)	Fuel type used in the engine (gasoline, diesel, natural gas etc.)
Skid Truck	1	650	10	Diesel
Stringing Tr. and Tr.	15	650	10	Diesel
Truck and Float	9	650	10	Diesel
Truck and Lowboy	5	650	10	Diesel
D-7 Dozer	12	240	8	Diesel
D-8 Dozer	22	310	8	Diesel
D-8 Ripper	0	310	0	Diesel
D-5 Tow	2	90/120	8	Diesel
D-7 Tow	1	200/240	8	Diesel
D-6 Tack	3	200	8	Diesel
CAT 225	7	150	8	Diesel
CAT 235	26	250	8	Diesel
CAT 235 w/Hammer	1	260	8	Diesel
Bending Machine 22-36	1	159	8	Diesel
Crane LS-98A (35 ton)	2	230	8	Diesel
Farm Tractor	2	60	8	Diesel
Frontend Loader 977	2	190	8	Diesel
Motor Grader 14G	2	200	8	Diesel
Sideboom 571	1	200	8	Diesel
Sideboom 572	1	200/230	8	Diesel
Sideboom 583	22	300/310	8	Diesel
Sideboom 594	4	410	8	Diesel
Air Compressor 1750 cfm	9	50	8	Gasoline
Generators	9	10	8	Gasoline
Pump - 3"	1	20	8	Gasoline
Pump - 6"	9	40	8	Gasoline

Note: In addition to the equipment listed above, ten 10-hp diesel or gasoline generators could be used per spread. Construction equipment listed in this table does not directly correlate to equipment listed in **Table 2.1-8**; however, total horsepower is similar for the purposes of the air emissions analysis.

As discussed in Section 3.1, Liberty, Hardin, Jefferson, Harris and Chambers counties in Texas are designated as being nonattainment for the 8-hour ozone NAAQS; therefore, construction emissions would need to comply with the SIP for Texas. A Federal action is subject to the General Conformity Rule if it is not listed as an exempt activity in 40 CFR Section 93, Subpart B, and if the total direct and indirect emissions of a pollutant (or its precursors), for which the area is classified as a nonattainment area, equal or exceed: 1) emission thresholds established in the General Conformity regulations, or 2) 10 percent of the total emissions budget for the entire nonattainment area. If emissions are less than these thresholds, then the Federal action is presumed to conform to the State Implementation Plan (SIP). An analysis of project emissions in relation to General Conformity rule requirements will be provided at a later date as **Appendix V**.

4.2.1.3 Operation

All pipeline pumps would be electrically driven. The pump stations do not include emergency generators, so the pump stations would not have combustion emissions. Operational emissions from each of the pump stations would consist exclusively of fugitive emissions. Because there would be a relatively small number of piping components at each of the pumping stations, only minor amounts of fugitive emissions can occur from crude oil pipeline connections and pumping equipment at the pump stations. Negligible CO_2 emissions are anticipated from the Steele City tank farm, as CO_2 production is primarily the result of combustion, and no combustion at the tank farm is planned. However, there will be some GHG emissions identified as CO_2 equivalent (CO_2e) emissions, due to fugitive emissions of methane at the pumping stations. Emissions from mobile sources during operation would be limited to vehicle traffic associated with periodic tank farm inspections. All vehicles would be required to meet applicable emission standards through the licensing process. Preliminary estimated emissions from mobile sources during operation are included in **Table 4.2-5**.

Table 4.2-5 Pipeline Operation Emissions

	HC	CO	NO_x	SO_2	TSP	PM_{10}	PM2.5	CO_2e
Steele City Tank Farm Vehicle Emissions	7.2E-05	1.5E-03	6.7E-05	8.0E-07	3.7E-02	5.8E-03	5.7E-04	4.3E-02
Pumping Stations Fugitive Emissions	6.81	--	--	--	--	--	--	84.08
Totals	**6.81**	**--**	**--**	**--**	**--**	**--**	**--**	**84.12**

Notes: CO_2e = CO_2 equivalent, which is conservatively estimated by assuming all total organic compounds are methane and multiplying by 21 for the global warming potential (GWP) for methane.

The operational emissions noted above from the Steele City Tank Farm are mobile source emissions only and do not include the preliminary estimated VOC emissions from the storage tanks. The preliminary estimated VOC emissions from the storage tanks are noted in the Supplemental Environment Report (**Table 4.2-6**).

Pumping station emissions include combined emissions from 29 pumping stations along the Steele City and Gulf Coast Segments that are located outside of non-attainment areas. There is one pump station in the nonattainment segment of the pipeline, which was included in the emissions analysis as part of the General Conformity Analysis.

The proposed tank farm to be located near Steele City, Nebraska, would emit regulated air pollutants as a result of the crude oil storage tanks. The proposed tank farm would be subject to federal and state air quality regulations, and would require an air construction and operating permit from Nebraska DEQ. Estimated emissions from the proposed Steele City tank farm, based on preliminary design data, are provided in **Table 4.2.6**. These construction permits would be submitted within the required timeframes as specified in the regulations.

Table 4.2-6 Estimated Emissions from Steele City Tank Farm

Emission Unit	VOC		Total HAPs		Maximum Individual HAP	
	Lb/hr	TPY	Lb/hr	TPY	Lb/hr	TPY
Crude Oil Tank #1	1.21	5.31	0.08	0.37	0.08	0.34 (Hexane)
Crude Oil Tank #2	1.21	5.31	0.08	0.37	0.08	0.34 (Hexane)
Crude Oil Tank #3	1.21	5.31	0.08	0.37	0.08	0.34 (Hexane)
Fugitives	1.16	5.10	0.11	0.46	0.08	0.36 (Hexane)
Totals	**4.79**	**21.03**	**0.35**	**1.57**	**0.32**	**1.38** (Hexane)

As discussed in Section 3.1, Liberty, Hardin, Jefferson, Harris, and Chambers counties are designated as being in nonattainment for 8-hour ozone NAAQS; therefore, construction emissions will need to conform to the SIP for Texas. Analysis of Project emissions in relation to the General Conformity Rule will be provided in **Appendix V**. Operational emission sources are limited to a rude sump and fugitive emission sources such as valves, flanges, and compressors at Pump Station 41. The analysis indicates that operational emissions are well below the 25 tpy General Conformity threshold and below 10 percent of the Regional Emissions budget. Therefore, the operation phase of the Project conforms to the SIP.

4.2.2 Geology, Minerals, and Paleontology

4.2.2.1 Issues

The following issues are likely to be encountered by the Project:

- Disturbance of unique geological features that are protected under state or federal programs;
- Disturbance to topography resulting in disruption of drainage;
- Loss of access to underlying mineral resources from installation of pipeline facilities; and
- Potential damage to the pipeline and the safety of the workers due to geological hazards encountered during construction.

4.2.2.2 Construction

No unique geological features protected by federal, state, or local governments would be disturbed by the Project. There is the potential for discovery of fossils during pipeline construction. Adherence to a Paleontological Mitigation Plan prepared prior to construction would minimize adverse impacts to scientifically important paleontological resources on federal lands. Important paleontological resources on non-federal lands would be recovered only with approval of the landowners, and therefore, may be unavailable for scientific study.

It is anticipated that the pipeline trench would 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 demands for sand and gravel would not substantially affect the long-term availability of construction materials in the area.

The effects of construction would include disturbances to the topography along the proposed ROW and at aboveground facilities due to grading and trenching activities. Upon completion of construction, Keystone would restore topographic contours and drainage patterns as closely as possible to the preconstruction condition.

Blasting is likely to be required where the bedrock type expected to be present within 84 inches of the surface is lithic or very strongly cemented rock. Ripping is likely to be required where the bedrock type expected to be present within 84 inches of the surface is dense material, paralithic bedrock, soils with abrupt textural change, nitric, or strongly contrasting textural stratification.

The Project crosses several oil and gas fields. In addition, the Project may cross aggregate resources in alluvial valleys and terraces. Construction would have very minor and short-term impact on current mineral extraction activities due to the temporary and localized nature of pipeline construction activities. Many oil and gas wells were identified within or close to the Project construction ROW. Construction activities potentially could damage wells, associated underground fluid lines and pipelines, and disrupt normal operations and routine maintenance. Damage to oil and gas facilities is unlikely to occur because of required notification and surveys to locate underground facilities. Abandoned wells also could be impacted since construction potentially could remove existing abandoned well markers and damage near-surface cement plugs. Because 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. Construction could only impact surface or near-surface components of the wells and gathering systems, which would temporarily disrupt production until repairs are made. Prior to construction, Keystone would identify the exact locations of active, shut-in, and abandoned wells and any associated underground pipelines in the construction ROW and take appropriate precautions to protect the integrity of such facilities. Keystone also would abide by utility locate rules in each state and conduct due diligence to identify and contact all oil and well operators and pipeline gathering system owners prior to construction activities.

Paleontological surveys were performed on federal lands in compliance with federal regulations. Results of these surveys are included in the Paleontological Survey Report, included in **Appendix G**. Preconstruction paleontological survey on private and state lands is not required by state or local regulations. There is the potential for discovery of fossils during pipeline construction regardless of pre-construction survey status, especially in areas with large historical fossilized finds in Montana and South Dakota. Adherence to the Paleontological Mitigation Plan would minimize adverse impacts to scientifically important paleontological resources on federal lands. Important paleontological resources on non-federal lands may be recovered only with approval of the landowners, and therefore, may be unavailable for scientific curation.

The main hazard of concern during construction of the pipeline is unintentional undercutting slopes or construction on steep slopes resulting in instability that could lead to landslides. Other hazards may result from construction on Cretaceous shales that contain bentonite beds. The high swelling hazard may cause slope instability during periods of precipitation. When selecting the proposed pipeline route, Keystone has attempted to minimize the amount of steep slopes crossed by the pipeline. Special pipeline construction practices described in the CMRP would minimize slope stability concerns during construction and reclamation.

4.2.2.3 Operation

Operation of the proposed Project would not have a significant added impact on current or future mineral recovery operations in the area, generally because of limited identified mineral resources other than oil and gas. Additionally, impacts on future mineral development would not constitute a significant loss of mineral resource or mineral availability because of the narrow, linear nature of the pipeline ROW relative to the expanse of areas with mineral resource potential. No additional disturbance or loss of unique geological features, or scientifically important fossils would occur because there would be no additional surface disturbance required for operation of the Project. Also, unfavorable geologic conditions that may affect the health and safety of maintenance staff are not expected to worsen as result of operation of the Project.

4.2.3 Soils

4.2.3.1 Issues

Anticipated soil issues associated with the Project include:

- Accelerated wind or water erosion on disturbed areas during construction and operation (including maintenance activities);
- Reduced soil quality and corresponding reductions in the productivity of desirable vegetation or crops as a result of accelerated erosion, soil mixing, compaction, spills, or disturbance of irrigation or drainage features;
- Contaminated soils encountered within the pipeline trench; and
- Reclamation potential of droughty soils and unstable trench walls associated with sandy soils.

4.2.3.2 Construction

Grading and excavating for the proposed pipeline and ancillary facilities would disturb a variety of agricultural, rangeland, wetland, and forestland soils. Certain inherent soil characteristics influence the agricultural productivity and revegetation potential after disturbance. The major soil characteristics of concern and the acreage encountered of each type in each state during construction and operation are indicated in **Table 4.2-7**. The quantification of acreage for each of the characteristics is based on data in the SSURGO Soil Survey Geographic database.

Approximately 24 percent of the overall Project surface disturbance would affect soils that are highly erodible by water. Overall, approximately 33 percent of the proposed route crosses soils designated by the NRCS as prime farmland. These soils typically possess the most favorable qualities for agricultural production (e.g., fertility, structure, depth and water holding capacity, microbial populations, infiltration and percolation rates, slope, and drainage). Short-term impacts such as soil compaction from equipment traffic, excavation and handling, and spills of fuels and lubricants may alter the capability of these soils temporarily following construction.

Approximately 66 percent of the proposed route is occupied by soils that are compaction prone. Soil compaction and rutting can result from the movement of heavy construction vehicles along the construction ROW and additional TWAs, and on temporary access roads. The degree of compaction would depend on the moisture content and texture of the soil at the time of construction. Compaction would 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.

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 also occur on dry sandy soils due to low soil strength. Sandy soils commonly occur along the proposed route in Nebraska and include soils such as the Valentine fine sand that occur on dunes, interdunes, and valley sides of sandhills.

Stony or rocky soils associated with glacial till would be crossed in Montana. Revegetation recovery rates may be slow in these areas. 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 could limit the success of restoration efforts. Shallow lithic (hard) bedrock occurs on approximately 5 percent of the proposed pipeline route. Where the proposed pipeline route crosses soils with lithic bedrock, blasting or rock saws may be required for trenching.

Approximately 2 percent of the proposed route could require ripping or blasting to remove hard bedrock soils during construction. Locations by milepost where ripping or blasting could be necessary are included in **Appendix K**, **Table K-9**.

Approximately 30 percent of the proposed route crosses droughty soils. The sandhills in northern Nebraska are a substantial area of droughty soils. Droughty soils can be prone to wind erosion during construction and would 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 restoration efforts in these areas may be limited unless additional treatments and practices are employed to offset the adverse physical and chemical characteristics of the soils.

Impacts to soils within the sandhills in South Dakota and Nebraska would be minimized to the extent practicable through construction and restoration practices developed specifically for the area. Keystone has consulted with several regional experts at universities and government agencies on sandhills ecology and restoration, and would continue consultations throughout Project development. In addition, Best Management Practices outlined on pages 40 and 41 of the CMRP (**Appendix I**) and in the Sandhills Reclamation Plan (**Appendix W**) would be implemented.

Cretaceous shales along the route in Montana weather to form soils high in smectitic clay minerals typically referred to as bentonite clays. 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 proposed route would cross numerous other smectitic soils such as Neldore, Scobey, Gerdrum, Creed and the Bascovy series. Badlands may also be associated with cretaceous shales and may be highly erodible and difficult to reclaim when disturbed. Please refer to Section 3.2 for further discussion on slope instability associated with cretaceous shales and swelling clays.

Keystone plans to minimize or mitigate potential impacts to soils by implementing the soil protection measures identified in the CMRP (**Appendix I**). 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 would work closely with landowners and soil conservation agencies to identify and implement recommended soil conservation practices in specific areas where they are needed. Damaged irrigation and tile drainage systems would be repaired in accordance with the CMRP.

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

Table 4.2-7 Summary of Soil Characteristics of Concern Potentially Affected by Project Construction and Operation (acres)

State/ County	Total Acres[1]	Highly Erodible Water[2]	Highly Erodible Wind	Prime Farmland[3]	Hydric[4]	Compaction Prone[5]	Stony – Rocky[6]	Shallow Bedrock[7]	Droughty[8]
Construction									
Steele City									
Montana	4,087	1,488	109	1,294	20	3,698	533	29	482
South Dakota	4,485	1,528	226	1,935	75	4,369	131	23	1,557
Nebraska	3,604	860	1,069	518	305	482	197	7	390
Kansas	12	5	4	10	0	14	0	2	14
Gulf Coast									
Oklahoma	2,206	163	385	434	1789	906	317	503	1,511
Texas	4,511	629	570	1,858	2,043	2,904	366	474	2,042
Houston Lateral	652	0	11	446	247	559	0	0	12
Total During Construction[9]	19,557	4,673	2,401	6,495	4,479	12,981	1,544	1,038	6,008
Operation									
Steele City									
Montana	1,754	637	46	549	9	1,660	224	12	207
South Dakota	1,946	660	98	863	32	2,083	57	10	966
Nebraska	1,570	286	216	307	59	313	75	3	127
Kansas	12	5	4	10	0.0	14	0.0	2	14

Table 4.2-7 Summary of Soil Characteristics of Concern Potentially Affected by Project Construction and Operation (acres)

State/ County	Total Acres[1]	Highly Erodible Water[2]	Highly Erodible Wind	Prime Farmland[3]	Hydric[4]	Compaction Prone[5]	Stony – Rocky[6]	Shallow Bedrock[7]	Droughty[8]
Gulf Coast									
Oklahoma	974	69	167	842	774	418	138	216	654
Texas	2,013	359	213	434	1,652	842	308	45	1,661
Houston Lateral	294	0	5	199	114	251	0	0	6
Total During Operation[9]	8,563	2,016	750	3,204	2,640	5,580	802	288	3,635

1 Based on a total of 110-foot-wide ROW for a 36-inch pipe, except in certain wetlands and as agreed with landowners, in shelterbelts and other forested areas, and commercial/industrial areas where an 85-foot-wide construction ROW would be used, or in areas requiring extra width for workspace necessitated by site conditions. Acreage does not account for disturbance associated with power lines, access roads, pipe stockpile sites, rail sidings, contractor yards, construction camps, or the tank farm in Steele City. Individual soils may occur in more than one characteristic class.

2 Includes soils listed as identified by a SSURGO database search.

3 Includes land listed by the NRCS (1995) as potential prime farmland if adequate protection from flooding and adequate drainage are provided.

4 As designated by the NRCS (1995).

5 Includes soils that have clay loam or finer textures in somewhat poor, poor, and very poor drainage classes.

6 Includes soils that have either: 1) a cobbly, stony, bouldery, gravelly, or shaly modifier to the textural class, or 2) have more than five percent (weight basis) of stones larger than three inches in the surface layer.

7 Includes soils that have bedrock within 60 inches of the soil surface.

8 Includes coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.

9 Discrepancies in acreage totals are due to rounding.

4.2.3.3 Operation

Very small scale, isolated surface disturbance impacts resulting in accelerated erosion, soil compaction, spills, and related reductions in the productivity of desirable vegetation or crops could result from pipeline maintenance traffic and incidental repairs. Impacts related to excavation and topsoil handling are not likely to occur. If they do occur, they would be limited to small areas where certain pipeline maintenance activities take place. During operation, these types of impacts would be addressed with the affected landowner and a mutually agreeable resolution reached.

Pipeline heat may influence spring growth and production. Positive effects of elevated soil temperature on plant emergence and production have been documented. Negative effects of elevated soil temperature on plant physiology have not been documented at the temperatures that would be generated by the pipeline. The limited number of studies that have been completed on the heat effects of pipelines on vegetation indicate neutral to positive effects. TransCanada assessed the heat effects of pipelines on soils and vegetation (see **Appendix X**).

As discussed in Section 2.1.12.2, Keystone would employ multiple safeguards to prevent a pipeline release. The chance of a spill occurring is very low and if a spill occurred, the volume would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its ERP and emergency response teams would contain and cleanup the spill. To minimize impacts to soils, appropriate remedial measures would be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.4 Water Resources

4.2.4.1 Surface Water

Issues

Surface water impacts from the Project include:

- Water quality degradation from temporary increases in suspended solids concentrations during in-stream construction activities or erosion from disturbed lands;
- Increased sedimentation in streams resulting from in-stream construction or nearby activities;
- Channel and bank modifications that affect channel morphology and stability;
- Reduced flows in streams where water is withdrawn for hydrostatic testing; and
- 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 construction or operation.

Construction

Waterbody Crossings

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

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

As described in Section 2.1.10.2, Keystone is proposing the following water crossing techniques:

- Open-cut wet crossings;
- Open-cut dry flumed crossings;
- Open-cut dry dam and pump crossings; and
- Horizontal directional drilling (HDD)

All waterbodies will be crossed in accordance with USACE Section 404 (Clean Water Act) Nationwide Permits and Section 10 (Rivers and Harbors Act) Permits or with State 401 permits. Updated communications and consultations associated with the nationwide permits, as well as delineation methodologies, are included in **Appendix R**.

Geotechnical explorations were initiated to define the subsurface conditions in areas to be crossed by HDD. Preliminary site-specific crossing plans are provided in **Appendix D**. Keystone is proposing to utilize HDD for 38 crossings of waterbodies listed in **Table 2.1-10**.

Since an HDD does not involve any intended direct contact with the waterbody, channel bed, or banks, no impact is expected at these crossings. It is possible that a frac-out (drilling lubricant release) or inadvertent return of drilling lubricant could inadvertently enter the waterbody. Keystone would prepare a contingency plan containing preventative and response measures to control frac-outs. At present, Keystone is proposing open-cut wet crossings at the remainder of the crossings (**Appendix E**). Open-cut wet crossings involve the direct excavation of the channel and banks in contact with any flow present. Additional HDD or dry crossing procedures may be considered at some of these proposed open-cut wet crossings based on a determination of crossing-specific resources (aquatic life), which may warrant mitigation. At open-cut wet crossings, the extent of increased suspended solids concentrations and downstream sedimentation impacts would depend on the flow conditions at the time of construction and the channel substrate. Measures related to managing spoil, timing, access, and equipment are included in the CMRP. These measures are designed to limit impacts of increased suspended solids concentrations and downstream sedimentation. Most open-cut wet crossings would be completed in 48 hours or less. Larger open-cut wet crossings may take 7 to 10 days.

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 CMRP 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 Clean Water Act (CWA), Keystone would comply with the National Pollutant Discharge Elimination System (NPDES) permit process with respect to pipeline construction and operation. Keystone is developing a Storm Water Pollution Prevention Plan (SWPPP), which will be filed as part of the NPDES permitting effort. This plan includes BMPs to minimize soil erosion and sedimentation.

Since open-cut wet crossings involve the disturbance of stream banks and channel bottoms, the CMRP includes procedures for limiting the extent of this disturbance and the restoration of disturbed areas. Restoration includes grading, stabilization, and revetment BMPs. These BMPs embrace bioengineering concepts, which encourage the restoration of natural stream banks. No stream channel impacts are anticipated; however If surveys indicate the presence of a special status aquatic species, Keystone would work with that agency with jurisdiction over that species to develop either construction methods to avoid impacts, timing restrictions to avoid impacts, or monitoring requirements during construction. There is no requirement to provide mitigation for stream channel impacts other than reclamation.

The pipeline would be constructed under flood management structures (levees and drainage ditches) as well as river channels with potential for lateral scour. The pipeline would be buried at an adequate depth under channels, adjacent floodplains, and flood protection levees to avoid pipe exposure caused by channel

degradation and lateral scour. Determination of the pipeline burial depth would be based on site-specific channel and hydrologic investigations where deemed necessary.

Hydrostatic Test Water Withdrawal and Discharge

Maximum volumes to be withdrawn for hydrostatic testing and approximate mileposts are identified by river in **Table 4.2.8.** If water is withdrawn from a sensitive surface water source during a low-flow period or at a time when particular flow ranges are needed for other uses, habitat reductions for water-dependent resources (e.g., fisheries, aquatic invertebrates) could occur. A similar effect on surface water resources could occur if large withdrawals are made from aquifer zones that provide late-season baseflows to streams.

In its updated hydrostatic test water management plan, Keystone identified 26 surface water sources which could provide hydrostatic test water, depending on the flows at the time of testing and the sensitivity of the individual waterbodies for other uses. In accordance with the CMRP, hydrostatic test water withdrawals from surface waterbodies would be made at controlled rates and with equipment that is designed to minimize impacts on stream beds, aquatic life, and downstream water users. Keystone would coordinate with federal and state agencies to further identify such seasonal concerns. Recycling water between test sections would reduce withdrawal volumes.

Hydrostatic test water would likely be withdrawn on the Steele City Segment in the fall season and would likely occur in the summer on the Gulf Coast Segment and Houston Lateral.

Table 4.2-8 Summary of Hydrostatic Testing Water Needs

River	Approximate Milepost of Uptake	Maximum Water (million gallons)
Steele City		
Montana		
Frenchman Creek	25.7	4.6
Missouri River	89.0	11.4
Redwater River	146.5	8.0
Yellowstone River	195.9	11.6
Box Elder Creek	281.4	7.4
South Dakota		
North Fork Moureau River	356.4	7.4
Cheyenne River	425.9	11.4
White Water River	536.9	6.5
Nebraska		
Niobrara River	615.3	12.4
Cedar River	696.9	12.0
West Fork Big Blue River	789.2	11.7
Gulf Coast Segment		
Oklahoma		
North Canadian River	39	31.5
Canadian River	74.5	

Table 4.2-8 Summary of Hydrostatic Testing Water Needs

River	Approximate Milepost of Uptake	Maximum Water (million gallons)
Red River	155	33.3
Bois d'Arc Creek	161	
North Sulphur River	190	
South Sulphur River	200	
Texas		
Sabine River	262	32.3
East Fork Angelina	312	
Angelina	332	19.7
Neches River	366	
Mendard Creek	393	3.0
Hillebrant Bayou	469	3.2
Houston Lateral		
Texas		
Trinity River	22	10.6
San Jacinto River	44	1.8

Discharge permits would be obtained for hydrostatic test waters, as identified in **Table 1.4-1**. Hydrostatic test water would be returned to the source water at an approved location or discharged to the land surface where it may evaporate or infiltrate into the source water. Discharges of hydrostatic testing waters would be made such that water quality requirements are met and permit requirements are followed. Discharge controls could include restrictions on pipeline dewatering rates, velocity control devices (such as splash pups or diffusers), and temporary synthetic channel linings.

Spill Prevention

Spill Prevention, Control, and Countermeasure (SPCC) procedures are described in the CMRP and would be implemented 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 would 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 would be moved to an upland area more than 100 feet away from perennial water bodies for refueling. In a few cases, such as for pumps or directional drill equipment located within or near a waterbody or wetland, refueling would be completed within or near a waterbody or wetland. In these situations, the specific measures identified in the SPCC portion of the CMRP would be followed.

Fuels and lubricants would 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, would be located in uplands or at least 100 feet from waterbodies and wetlands.

Operation

Normal operations will not adversely affect water resources. Minor surface disturbance activities from pipeline inspection and maintenance may occur 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 is 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 Emergency Response Plan (ERP) for the Project based upon the plan approved by PHMSA for the Keystone Pipeline Project. The Project ERP will outline the measures that would be implemented in the event of a release of crude oil.

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 Office of Pipeline Safety (OPS), intermittent and ephemeral streams are not considered waterbodies. In general, wetlands also are not considered by the OPS to be waterbodies. Keystone will comply with these OPS requirements. Valve locations, in addition to those required for major waterbody crossings, are described in Chapter 2.0. These additional valves would further aid in minimizing the amount of material released into other waterbodies in the unlikely event of a spill. The location of valves, spill containment measures, and Keystone's ERP would minimize adverse effects to perennial, intermittent, and ephemeral waterbodies, as well as to groundwater.

As discussed in Section 2.1.12.2, Keystone would employ multiple safeguards to prevent a pipeline release. The chance of a spill occurring is very low and if a spill occurred, the volume would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its Emergency Response Plan (ERP) and emergency response teams would contain and cleanup the spill. To minimize impacts to surface water resources, appropriate remedial measures would be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.4.2 Groundwater

Issues

Groundwater Impacts from the Project include:

- 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.

Construction

Reductions in groundwater quality from spills, leaks, or disposal practices are not anticipated during construction. Most of the aquifers along the route would be at least temporarily isolated from any spills on the land surface and attending personnel would be able to respond to an incident before contaminants migrate into groundwater. In areas with near-surface groundwater or in areas adjacent to surface waterbodies, additional procedures and measures would be implemented as presented in Chapter 2.0 and in the CMRP.

Operation

While routine operation of the Project would 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. All source water protection sites within ten miles of the Project were located and are listed in **Table 3.4-5**.

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 is a very low likelihood of a crude oil release from the pipeline that could enter water supply aquifers. Keystone would prepare an ERP

based upon the plan currently in review by PHMSA for the Keystone Pipeline Project. The Project ERP will outline the measures that would be implemented in the event of an accident.

As discussed in Section 2.1.12.2, 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 would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its ERP and emergency response teams would contain and cleanup the spill. To minimize impacts to groundwater resources, appropriate remedial measures would be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.4.3 Wetlands

Issues

The Project may face the following issues in wetlands:

- Potential modifications in wetland productivity due to the potential changes of modifications to surface and subsurface flow patterns from pipeline construction;
- Temporary and permanent modifications in wetland vegetation community composition and structure from clearing and operational maintenance;
- Temporary wetland soil disturbance;
- A temporary increase in turbidity and fluctuations in wetland hydrology; and
- Construction through prairie pothole areas possibly resulting in permanent alterations to their water holding capacity.

Construction

Based on 2008 and 2009 field survey results, NWI map review, and on aerial photo interpretation, approximately 5 percent of construction disturbance associated with the Project by mile would occur in wetlands. Of this total, approximately 33 percent is palustrine emergent wetlands (marshlands and meadows), 39 percent is palustrine forested wetlands (riparian woodlands), 3 percent is palustrine scrub shrub wetlands, and 24 percent is stream channels and open water. None of the proposed pump stations would be located in wetlands, based on the site survey, aerial interpretation using US Fish and Wildlife (USFWS) National Wetland Inventory (NWI) mapping and soils data, and 2008 and 2009 field surveys.

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

The construction ROW width would be reduced to 85 feet through certain wetlands to minimize potential effects. Keystone would 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 permit conditions. Section 404(b)(1) guidelines restrict the discharge of dredged or fill material into wetland areas where a less environmentally damaging practicable alternative exists.

For rivers that are crossed by the HDD method, streamside wetlands or floodplain forests would not be affected. Smaller streams and ephemeral or intermittent drainages would likely be open-cut and wetlands located in these areas would be crossed by trenching. No permanent loss of wetlands would occur as a result of this Project; however, approximately 82 acres of forested wetland would be permanently converted to herbaceous wetland. Herbaceous vegetation in palustrine emergent wetlands is expected to reestablish to preconstruction levels within three to five years following the completion of reclamation, resulting in a short-term loss of vegetation and available habitat for some wildlife species. Trees in forested wetlands would recover in 20 to 50 years. Keystone would work with each USACE district to examine what kind of compensation would be required for this permanent conversion of wetland.

As described in the CMRP, specific construction techniques would be used to retain the hydrological and vegetation characteristics of wetlands that would be disturbed by construction. These techniques could 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 would be reestablished to help ensure successful restoration and reestablishment of local drainage patterns to restore existing surface and subsurface water flow patterns.

Operation

Woody vegetation in forested wetlands would be removed periodically above the pipeline (approximately 15 feet on each side of the centerline) to maintain visibility of the area above the pipeline for aerial pipeline observation and to permit access to all areas along the pipeline in the event of an emergency except where the HDD construction methodology was used to cross a forested riparian area.

4.2.5 Vegetation

4.2.5.1 Issues

The Project may face the following vegetation issues:

- Temporary removal of vegetation from the ROW and ancillary facility areas during construction (with a consequent reduction in wildlife habitat, forage productivity, and an increased risk of soil erosion and weed invasion);
- Minimal alteration of existing vegetative communities as a result of ROW maintenance (e.g., removal of trees from wooded areas);
- Potential loss of sensitive plant individuals and habitat as a result of construction clearing and grading; and
- Potential expansion of invasive and noxious weed populations along the pipeline ROW as a result of construction.

4.2.5.2 Construction

Vegetation Communities

During construction of the Project, vegetation would be cleared from the construction ROW and reestablished following construction. Agricultural lands account for 24 percent of the disturbance associated with Project construction; these lands typically are disturbed every year during planting operations. There would be minimal change to agricultural lands since these areas would be allowed to revegetate in a cover similar to that found before construction. Other affected vegetation communities include rangeland (consisting of native prairie and seeded pastureland), forested woodlands, and wetlands (see **Table 3.5-2**). Potential impacts to wetlands are discussed under Section 4.2.4.3, Wetlands.

Pipeline construction would involve both the temporary and permanent alteration of vegetation through ROW preparation and excavation, high traffic activity, and the clearing of shrubs and trees. Vegetation recovery rates are estimated to be 1 to 5 years for herbaceous components, 5 to 15 years for shrubs, and 20 or more years for woodlands (depending on age and species). The reestablishment of pastures, rotated croplands, and open grassland range following construction is expected to take approximately 1 to 5 years.

Reclamation, native species revegetation, and revegetation success monitoring, as outlined in the CMRP would be completed for disturbed areas within the construction ROW after Project construction activities are complete. Under normal to above-normal precipitation conditions, vegetative cover in the reclaimed areas would consist primarily of herbaceous plants after one to three years. Three to 5 years after reclamation, vegetative cover in reclaimed areas would consist primarily of desirable species (i.e., species in the reclamation seed mixture), with a minor component of weedy species. Reclamation success is dependent

upon several variables, including soil preparation, season of seed application, and precipitation levels after seed application.

Long-term impacts to vegetation include the loss of woody species (i.e., evergreen and deciduous trees and shrub species) during clearing activities. The 50-foot permanent ROW would be maintained free of trees for the life of the Project. Within that permanent ROW, a 30-foot corridor centered on the pipeline would be maintained solely in an herbaceous condition except where the HDD construction methodology was used to cross a forested riparian area. Trees and shrubs would be removed during clearing activities and converted to early successional herbaceous and grassland communities. Trees and shrubs eventually would reinvade the temporary easement area after construction. However, shrubs would not become reestablished naturally in the temporary easement area for 5 years or more and trees would require a minimum of 20 years or more, depending on species and age of woodlands cleared. Locations of wooded areas, by milepost, are included in **Appendix T**. Approximately 2,523 acres of upland forest and 247 acres of forested wetlands would be cleared during construction. Trees would be allowed to regrow on all but 641 acres of upland and 82 acres of wetland after construction, which would be maintained in herbaceous communities, as required by pipeline safety standards.

Keystone would monitor revegetation success along the pipeline ROW according to permits and approvals. Revegetation would 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. Reseeding would be based upon reclamation success and natural rainfall amounts received in the years following revegetation efforts. In agricultural areas, revegetation would be considered successful if crop yields are similar to adjacent undisturbed portions of the same field. Vegetative monitoring plans would be provided for BLM, state lands, mitigation sites, wetland areas, and other conservation lands during the course of permitting and ROW acquisition. These plans would include success criteria approved by these land management agencies.

Keystone will use seed mixtures approved by the NRCS in each affected county, unless otherwise negotiated by landowners. On federal lands, Keystone would use seed mixtures approved by the appropriate agencies. Consequently, the various vegetation types altered by the proposed pipeline, other than forested communities, are expected to return rapidly to near pre-construction conditions. Impacts that may occur if desirable plant species are not established in the ROW within a short period of time include higher soil erosion rates, increases in weedy species, and reduced forage production.

Sensitive Plant Species

Based on preliminary response from state and federal agencies and on field observations, a total of 21 plant species (special status species and species of special concern) were identified as potentially occurring within the Project area. Of these, seven are federally listed threatened or endangered plant species. The federally listed species generally are associated with native prairie or wetland/riparian habitats. Protected plant species are further discussed in Section 4.2.6.

Clearance surveys will be conducted during the flowering period of sensitive plant species to ensure their absence prior to construction. If a population were located within the construction ROW, suitable mitigation measures would be developed in consultation with the USFWS.

A number of occurrences of state-listed threatened or endangered species or species of special concern were identified by state NHPs as occurring near or within the proposed Project. State listed species have varying distributions and, while rare in one state, a species can have relatively secure populations in other states. Surveys for state listed species will occur on federal and state land where suitable habitat exists.

Noxious and Invasive Plant Species

Surface disturbance from construction could contribute to the introduction of noxious and invasive weed species and other undesirable plant species. These species are 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 wetland areas and other sensitive plant communities. Typical locations for noxious weed infestations are riparian zones, livestock concentration areas, roads, and disturbed soils.

The CMRP provides weed control measures that Keystone would implement throughout the Project areas to minimize and control the spread and establishment of noxious and invasive species.

4.2.5.3 Operation

Pipeline operation and maintenance would have minimal impact on revegetated areas. Maintenance impacts would be limited to infrequent traffic along the pipeline ROW. Routine clearing of vegetation from the ROW generally would not occur more frequently than every one to three years. Sites for ancillary facilities (e.g., pump stations) would remain cleared for the life of the Project. Operation and maintenance of the Project may contribute to the prevalence of noxious weeds; however, efforts would be made to prevent their spread should new populations be identified.

Pipeline heat may influence spring growth and production. Positive effects of elevated soil temperature on plant emergence and production have been documented. Negative effects of elevated soil temperature on plant physiology have not been documented at the temperatures that would be generated by the pipeline. The limited number of studies that have been completed on the heat effects of pipelines on vegetation indicate neutral to positive effects. TransCanada assessed the heat effects of pipelines on soils and vegetation (see **Appendix X**).

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 is be a very low likelihood of a crude oil release from the pipeline which could injure terrestrial vegetation. Keystone will prepare an ERP based upon the plan currently in review by PHMSA for the Keystone Pipeline Project. The Project ERP would outline the measures that will be implemented in the event of an accident.

As discussed in Chapter 2.0, Keystone would employ multiple safeguards to prevent a pipeline release. The chance of a spill occurring is very low and if a spill occurred, the volume would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its Emergency Response Plan and emergency response teams would contain and clean up the spill. To minimize impacts to vegetation, appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.6 Wildlife, Aquatic Resources, and Sensitive Species

4.2.6.1 Terrestrial Wildlife

Issues

Impacts on terrestrial wildlife from the Project include:

- Potential habitat loss or alteration and incremental habitat fragmentation;
- Potential loss of breeding success from exposure to construction and operational noise and from higher levels of human activity;
- Limited direct mortalities from Project construction and operation; and
- The potential loss of individuals from exposures to accidental crude oil releases.

Construction

Wildlife Habitat

Approximately 57 percent of construction disturbance would disturb wildlife habitat. Of this, approximately 64 percent consists of grasslands/pasture, 33 percent consists of agricultural land, <1 percent consists of woodlands, 2 percent would be within wetlands and open water, and 3 percent consists of low density development. Due to the linear nature of the project over a large geographic area (approximately 1,380 linear miles of new pipe) these acreages represent a small amount of the available wildlife habitat in the vicinity of the Project ROW on a regional basis. In addition, the effects of long-term habitat loss on native wildlife populations would be relatively small since the majority of habitat disturbance is located in pasture/grassland or agriculture/cropland and these areas would quickly revert to their pre-existing conditions following construction. Potential impacts to terrestrial wildlife species from the Project can be classified as short-term, long-term, and permanent. Short-term impacts consist of activities associated with Project construction and changes in wildlife habitats lasting less than five years. This would include impacts to species dependent on herbaceous habitats. Long-term impacts would consist of changes to wildlife habitats lasting five years or more and would include species dependent on habitats with woody species components. Permanent impacts would result from construction of aboveground facilities that convert natural habitat to an industrial site. The severity of both short- and long-term impacts would depend on factors such as the sensitivity of the species impacted, seasonal use patterns, type and timing of construction activities, and physical parameters (e.g., topography, cover, forage, and climate).

Individuals of less mobile or burrowing species may be lost during construction by vehicles and equipment. Other potential impacts include habitat loss or alteration, habitat fragmentation, and animal displacement. Individuals may be permanently displaced and perish due to increased competition or other effects from being forced into sub-optimal habitat. Indirect impacts from increased noise and additional human presence also could lead to displacement and lowered fitness. Although the habitat adjacent to the construction zone may support some displaced animals, any species that is at or near its carrying capacity could exhibit localized increased mortality.

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 would be relatively small since the majority of the Project would 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 the 50-foot ROW, except in forested wetland areas where only 30 feet of the permanent easement would be maintained in an herbaceous state. Habitat losses also would be long-term at permanent aboveground pipeline facility locations such as pump stations and access roads.

Long-term conversion of wooded habitats to herbaceous communities would result in an incremental increase in habitat fragmentation in these state wildlife management areas but habitat conversion could increase habitat diversity, depending on the extent of habitats affected and the extent and distribution of undisturbed habitats

remaining in the state wildlife areas. Construction during the fall hunting seasons may create conflicts with hunter use of these areas.

Steele City Segment

For big game, greater sage-grouse, sharp-tailed grouse, greater prairie chicken, migratory birds, and raptors, agency-recommended seasonal buffers and timing restrictions are provided in **Table 4.2-9**. 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, SDGFD, and 2008 and 2009 aerial surveys.

Table 4.2-9 Seasonal Timing Restrictions and Buffers for Big Game, Game Birds, and Raptors[1]

Species/Habitat Type	State	Buffer	Seasonal Timing Restrictions
White-tailed Deer Winter Range	Montana	NA[2]	December 1 – March 31 (MFWP); December 1 – May 15 (BLM)
Mule Deer Winter Range	Montana	NA[2]	December 1 – March 31 (MFWP); December 1 – May 15 (BLM)
Antelope Winter Range	Montana	NA[2]	December 1 – March 31 (MFWP); December 1 – May 15 (BLM)
Sage Grouse (Lek and Nesting Habitat)	Montana/South Dakota	Within 4 miles of an active lek (MFWP); within 2 miles of an active lek (BLM)	March 1 – June 15
Sharp-tailed Grouse (Lek and Nesting Habitat)	Montana/South Dakota	Within 2 miles of an active lek (MFWP/BLM)	March 1 – June 15
Greater Prairie Chicken (Lek and Nesting Habitat)	South Dakota	Within 4 miles of an active lek	March 1 – June 15
Raptors	Entire ROW	0.5 miles (MFWP) 0.25 NSO[2]; 0.5 TLS[3] (BLM)	March 1 – August 1 (MFWP) March 1 – July 31 (BLM)

[1] Sources: 1994 Montana Bald Eagle Management Plan; Big Dry RMP; BLM 1994, 2008a, and MFWP 2008; MFWP – Correspondence from W. Davis 8/14/08; BLM – Correspondence from J. Carlson 8/14/08; and correspondence from K. Undlin 8/22/08.

[2] No surface occupancy or disturbance. For pipelines, this includes no permanent aboveground facilities year-round and no surface disturbing activities within the timing restrictions on lands administered by the MFWP and BLM.

[3] TLS = Timing Limitations. For pipelines, this includes no disturbance within 0.5 miles of an active nest between March 1 and July 31 on lands administered by the BLM.

Gulf Coast Segment and Houston Lateral

There are no big game or small game seasonal buffers or timing restrictions for the Gulf Coast Segment or Houston Lateral. There are seasonal buffers and timing restrictions for two groups of non-game species, raptors and rookeries. Agency-recommended buffers and seasonal timing restrictions are provided above in **Table 4.2-9**. Timing restrictions and buffer distances for these species were obtained from the USFWS and

the 2008 and 2009 aerial surveys. The results of the 2008 and 2009 aerial surveys are discussed in Section 4.2.6.3. The MPs of active raptor nests and rookeries would be determined by aerial surveys prior to construction if construction would occur during the nesting season of the species included in these groups.

Big Game Species

Steele City Segment

As presented in **Table 4.2-10**, construction impacts to primary big game species (white-tailed deer, mule deer, and antelope) would include the potential temporary loss of forage area and would result 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 would be long term (greater than 5 years and, in some cases, more than 20 years). In the interim, herbaceous 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 would be available for wildlife species until grasses and woody vegetation are reestablished within the disturbance areas. Locations for big game winter ranges were determined using data received from Montana Fish Wildlife and Parks (MFWP) and the BLM.

Indirect impacts would result from increased noise levels and human presence during surface disturbance activities. Big game animals (especially antelope and mule deer) would 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 construction activities.

Table 4.2-10 Winter Big Game Ranges Potentially Affected by the Project

State / Habitat Type	MP Locations		Total Length Crossed (miles)	Acreage Affected During Construction[1]
	Beginning MP	Ending MP		
Montana				
White-tailed Deer Winter Range	54.4	57.4	3.0	40.5
	65.8	68.2	2.4	32.0
	79.8	84.9	5.1	68.4
	87.4	91.0	3.6	48.0
	121.4	124.4	3.0	40.0
	137.8	142.9	5.1	68.4
	153.0	171.0	18.1	241.3
	193.7	197.0	3.3	44.0
	244.7	247.5	2.8	37.3
	248.7	248.8	0.1	1.2
	279.4	282.5	3.1	41.3

Table 4.2-10 Winter Big Game Ranges Potentially Affected by the Project

State / Habitat Type	MP Locations		Total Length Crossed (miles)	Acreage Affected During Construction[1]
	Beginning MP	Ending MP		
Mule Deer Winter Range	9.1	28.1	19.0	253.3
	28.4	29.7	1.3	17.3
	32.8	33.8	1.0	13.6
	34.3	35.2	0.9	11.9
	35.8	36.5	0.7	9.3
	37.2	65.8	28.6	381.3
	67.0	67.1	0.1	1.0
	88.6	89.4	0.8	11.0
	89.8	130.3	40.5	540.0
	131.5	131.8	0.3	4.0
	153.1	162.0	8.9	118.8
	203.0	204.2	1.2	16.4
	212.1	225.4	13.3	177.3
	244.7	247.5	2.8	37.3
	248.7	248.8	0.1	1.3
	256.9	260.2	3.3	44.0
	261.2	265.0	3.8	50.9
	269.3	280.4	11.1	148.8
	280.9	281.8	0.9	12.0
Antelope Winter Range	11.4	12.3	0.9	13.2
	12.6	13.8	1.2	16.0
	14.0	20.2	6.2	82.7
	21.5	26.8	5.3	70.6
	38.7	65.8	27.1	361.3
	74.7	82.7	8.0	107.2
	83.8	83.8	<0.1	0.1
	111.9	129.1	17.2	229.3
	162.3	163.2	0.9	12.6
	164.0	164.4	0.4	5.6
	219.4	219.7	0.3	4.0
	255.2	255.9	0.7	9.6
	258.5	259.1	0.6	8.5
	268.2	280.4	12.2	162.8

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

Gulf Coast Segment and Houston Lateral

Project construction would affect only a single big game species, white-tail deer. There are no timing restrictions for this species for the Gulf Coast Segment or Houston Lateral. Ranges of other potential big game species are peripheral to the Project area; therefore, impacts to these wide-ranging species would be negligible or non-existent. Impacts to white-tail deer would include the temporary loss of potential forage (native vegetation and croplands). The temporary loss of vegetation would represent a small percentage (less than 1 percent) of the overall available habitat in the Project region. No sensitive habitats for white-tail deer were identified along the proposed route. In a forested area that is predominately pine forest mixed with hardwood trees, clearing of the corridor for construction would remove all non-mast and mast producing trees and also create an edge habitat. After construction, the 50 feet permanent ROW would primarily consist of a herbaceous layer of vegetation and edge habitat, on which white-tail deer can forage.

Small Game Species

Potential impacts to small game from the Project would 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 the fact that animals would return to the disturbance areas following completion of construction and reclamation activities.

Steele City Segment

Potential direct impacts to small game species would 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 loss of lekking mating grounds and other greater sage-grouse, sharp-tailed grouse, and greater prairie chicken habitat (e.g., nesting habitat). The MFWP have implemented the following seasonal timing restrictions and buffers for surface use or disturbance (listed in **Table 4.2-9**):

- There should be no surface use or disturbance within a 4-mile radius of an active greater sage-grouse lek; and
- There should be no surface use or disturbance within a 2-mile radius of an active sharp-tailed grouse lek.

The SDGFD defers to these timing restrictions and buffer distances as well.

Although the Project would not result in a permanent loss of habitat along the pipeline ROW, the regeneration of sagebrush would likely be slow. A 30-year interval represents the approximate recovery period for a stand of Wyoming big sagebrush. A 20-year interval represents the approximate recovery time for a stand of mountain sagebrush (Connelly et al. 2000). The potential impacts on sage-grouse habitat would be minimized by locating the proposed ROW within previously disturbed areas (i.e., adjacent to existing pipelines and/or roads) to the extent possible. Given the abundant suitable habitat in the general area, it is not likely that the minor loss of habitat along the pipeline ROW would affect sage-grouse populations in the vicinity of the Project.

To avoid impacts of construction on nearby leks, the Project would work with regulatory agencies on activities allowed in lek buffer zones to minimize impacts (**Table 4.2-9**). This would avoid impacts during any breeding periods to the known Sage Grouse leks.

Based on the BLM, MFWP, and SDGFD historic data, sage grouse lek sites that have been identified as occurring within 4 miles of the Project in Montana and South Dakota are listed in **Table 4.2-11**. State agencies

are currently processing data to provide active sharp-tail grouse lek sites occurring within 2 miles of the Project in Montana and South Dakota (MNHP 2008). Survey reports are included in **Appendix F**, **Reports**. Aerial surveys to identify greater sage grouse and sharp-tailed grouse lek sites were conducted along the route in Montana and Harding and Butte counties in South Dakota. Two lek sites, one greater sage grouse and one sharp-tailed grouse were located in Harding County, South Dakota.

Table 4.2-11 Sage-Grouse Lek Sites

State/Habitat Type	MP Locations		Buffer Zone Length Crossed (miles)	Buffer Zone Acreage Affected During Construction[1]
	Beginning MP	Ending MP		
Montana				
	16.8	25.2	8.4	118
	25.6	35.3	9.7	136
	42.2	50.0	7.8	111
	56.3	61.9	5.6	81
	67.2	72.2	5.0	7
	87.8	122.0	34.2	501
	207.9	220.2	12.3	177
	229.4	243.7	14.3	203
	247.2	264.7	17.4	249
	278.6	282.5	3.9	55
South Dakota				
	282.5	290.9	8.4	118
	294.2	316.4	22.3	320
	323.9	347.2	23.3	3

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

Source: MNHP 2008 – Data Request.

Gulf Coast Segment and Houston Lateral

There are no timing restrictions for small game species along the Gulf Coast Segment or Houston Lateral. Overall, losses of small game species and their habitats would be relatively minor and short term, as vegetation would be allowed to quickly re-establish and potential habitat for foraging would be created around ROW edges. Edges would promote greater diversity, as many species favor edge habitats. Additionally, habitats adjacent to the proposed route may support displaced animals during construction.

Non-game Species

Direct impacts to non-game species from surface disturbance activities would result from the 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 would 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.

Steele City Segment

The 2008 raptor surveys documented 49 active raptor nests (see **Appendix F** for methodologies). The 2009 aerial raptor surveys document 91 active nests. Over 60 percent of the nests were occupied by red-tailed hawks and great-horned owls (**Appendix F**, **Survey Reports**), 38 (78 percent) were occupied by red-tailed hawks and great-horned owls. These species are known to be relatively tolerant of human activity and development (Call 1978; Johnsgard 1988, 1990; Kingery 1998). As a result, direct impacts to nesting raptors would be limited primarily to the incremental loss of potential nest structures within the construction ROW. Since the Project will have no nest trees cut during the nesting season and very few trees will be cut along the Steele City Segment, this potential impact is minor. Impacts resulting from increased noise and human presence are expected to be minor and short term.

Gulf Coast Segment and Houston Lateral

The aerial surveys for raptors included a visual observation distance of 1.0 mile on either side of the Project centerline. Sixty-eight raptor nest sites and seven rookeries were documented during the 2008 and 2009 aerial surveys. Of these, only 16 were active nests and nine (56 percent) of these were occupied by red-tailed hawks. Additionally, eight of the inactive nests were identified to be red-tailed hawk nests. This species is one of the most common raptors that may be found in the Project area and, as mentioned above, this species is relatively tolerant of human activity and development (Call 1978; Johnsgard 1988, 1990; Kingery 1998). The northern portion of the Gulf Coast Segment in Oklahoma is at the edge of the breeding range of the Swainson's hawk, which typically begin laying eggs in the central plains states from May to June (NatureServe 2008). However, construction in this area is anticipated to be complete by the end of March 2011; therefore, construction in Oklahoma would occur outside of the nesting season for the Swainson's hawk. The Swainson's hawk does not nest in the Project area in Texas and the ferruginous hawk does not nest in the Project area in Oklahoma or Texas. Wintering bald eagles may be present in the Project area in Oklahoma and Texas from December through March (Campbell 2003) and raptor species nest in the Project area generally from January to August. Therefore, the timing and duration of surveys (January to April), as well as the survey methods, were adequate to identify these key species.

An occurrence from 1992 of a rookery near MP 10 of the Houston Lateral is documented in the natural heritage database from Texas (Texas Natural Diversity Database [TXNDD]) and a rookery in this location was confirmed during the aerial surveys. Since no trees containing nests would be cut during the nesting season the potential impact to raptors and rookeries is minor. Due to the linear nature of the Project, suitable nest sites would be available in habitat adjacent to the permanent ROW during subsequent nesting seasons. However, if construction would occur during the nesting season, pre-construction survey documentation would occur to locate active nest sites.

Operation

Pipeline operations and maintenance would have minimal effects on terrestrial wildlife resources. Direct impacts to wildlife species populations and habitats from maintenance activities such as physical pipe inspections or ROW repair would be the same as those discussed above for construction but at a smaller scale and dispersed along the entire system. In order to reduce potential impacts to important wildlife resources as a result of maintenance activities, Keystone would consult with the appropriate state wildlife agencies prior to the initiation of maintenance activities beyond standard inspection measures or outside the permanent ROW.

As discussed in Section 2.1.12.2, 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 would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its Emergency Response Plan and emergency response teams would contain and cleanup the spill. To minimize impacts to wildlife, appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.6.2 Aquatic Resources

Issues

The impacts to aquatic resources from the Project 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.

Construction

Crossings

General waterbody crossing methods are discussed in Chapter 7.0 of the CMRP (**Appendix I**). Since Keystone plans to use the horizontal directional drill (HDD) technique to cross 38 named waterbodies (see **Table 2.1-10**) and construction-related impacts on aquatic biota and their habitat would be minor at these waterbodies. HDD at these waterbodies would minimize impacts to important game and commercial fish species and special status species. Directional drilling would not alter or remove streambank 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 route. However, if mud seepage (frac-out) is detected Keystone would implement their HDD contingency plan. 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 1 day). All preventive and response measures to frac-outs would be enumerated in a frac-out contingency plan. Open-cut trenching would be used on the remaining perennial streams, all of which contain at least one or more game fish species. Open-cut crossing can have the following impacts:

- Loss of in-stream habitat through direct disturbance;
- Loss of bank cover;
- Disruption of fish movement;
- Direct disturbance to spawning;
- Water quality effects; and
- Sedimentation effects.

Open-cut trenching methods are determined by the width of the waterbody at the time of crossing. Width categories for waterbodies include minor (less than or equal to 10 feet), intermediate (greater than 10 feet and less than or equal to 100 feet) and major (greater than 100 feet). For minor waterbody crossings, except where the flume method is used, construction would be completed in the waterbody within 24 hours if practicable. For intermediate waterbodies, the Contractor would attempt to complete trenching and backfill work within the waterbody within 48 hours if practicable. Major waterbody crossings would be constructed with a site-specific plan to be determined prior to construction. In-stream construction activities would be completed as expediently as practicable.

Open-cut trenching may occur during the spawning periods of certain game and commercial fish species. Best management practices (BMPs) would be in place to minimize the effects of the trenching on spawning organisms. BMPs that may be utilized include refueling restrictions, extra work spaces setback, and the use of sediment barriers to prevent the flow of spoil or heavily silt-laden water into any waterbody. Game and commercial fishes are typically of high fecundity with successful reproductive rates, and tolerant of spring runoff with high turbidity, so construction effects from open-cut trenching are expected to be negligible.

After agency discussion and a desktop review of aquatic species of concern, it was concluded that aquatic surveys are not needed for those waterbodies that are to be open-cut due to the lack of support for these specific organisms. The perennial waterbodies that do contain aquatic species of concern would not require aquatic surveys because they would be crossed using the HDD construction method.

In-stream Habitat

In the vicinity of the trenchline, trenching and backfilling can result in alteration of in-stream habitat and the mortality of benthic invertebrates inhabiting that reach of the watercourse.

Studies 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, due to the limited extent of the disturbed area and the active bottom substrate sorting by a river any such habitat modification would be small and of short duration in most stream environments.

Bank Cover

Vegetative 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 vegetative 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 CMRP provides stream bank restoration 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 dam and pump (a dry crossing procedure), may 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). Since most streams less than 50 feet in width can be crossed in less than 2 days, this potential impact should not be a concern.

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 would 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 3.6-4**, 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. Prolonged increase in TSS can adversely affect aquatic systems in the following ways:

- Triggering the drift of benthic organisms;
- Reducing the abundance of insect larvae;
- Damaging benthos through abrasion;
- Clogging fish gills;
- Damaging gill membranes;
- Altering fish behaviors;
- Reducing the ability of fish to feed by sight; and
- Making the fish susceptible to disease by the added stress of a turbid environment.

The impact to aquatic organisms by increases 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 short-term with construction across most streams being complete 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 for periods of time and over a greater spatial extent than that caused by a one time crossing event.

The extent of the increase in TSS would be mitigated by Keystone through the use of BMPs described in the CMRP. These BMPs include: measures to reduce the period of in-stream activity, spoil handling techniques,

equipment access installation procedures, and dry crossing techniques where required. The BMPs also address upland erosion and sediment control procedures to limit the potential for runoff from disturbed areas to contribute to increased in-stream TSS.

Sedimentation Effects

Solids introduced into suspension in a waterbody ultimately would settle on the streambed downstream of the crossing. The distance from the crossing is dependent upon the depth of flow, flow velocity, particle diameter and flow characteristics. Coarser materials (sands and gravels) tend to settle relatively close to the crossing location and tend to be distributed uniformly across the stream section. Fine silts and clays can stay in suspension for considerable periods of time and would tend to settle in natural depositional areas downstream of the crossing.

Sedimentation can have the following impacts:

- Cover or alters fish habitat;
- Cover fish eggs; and
- Cover benthic organisms.

The channel substrates of the streams crossed by the Project consist primarily of fine-grained materials (clay, silt, and sand). Fine-grained excavated material deposited downstream is expected to be similar to the existing substrate. Stream flows would suspend and redeposit 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 show benthic invertebrate populations generally recovered to normal within one to two months of construction. Tsui and McCart (1981) reported benthic invertebrate populations downstream of a water crossing recovered to near pre-construction levels shortly after construction.

Suspended sediment can prevent the successful incubation and hatching of fish eggs and the emergence of fry. This is an issue only when construction occurs during a spawning period.

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

Hydrostatic Testing

The updated hydrostatic test plan preliminarily lists 26 streams or rivers as potential water sources for hydrostatic testing for the Project. The water sources are located throughout the length of the proposed route. 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.

Maximum volumes to be withdrawn for hydrostatic testing are identified by river in **Table 4.2-8.** Water would likely be withdrawn on the Steele City Segment in the fall and would likely occur between mid-March and the end of September on the Gulf Coast Segment and Houston Lateral. Withdrawal periods, rates and volumes would be designed to avoid impacts to aquatic life and downstream water users. Water withdrawal could entrain small fish and drifting macroinvertebrates. The expected numbers of organisms removed during entrainment is considered to be relatively small in relation to the overall numbers in the stream or river. In summary, hydrostatic testing would result in minor impacts to aquatic biota. Fishery classes of these rivers are listed in **Table 3.6-2**; special status aquatic species that could potentially occur within the hydrostatic test sources are discussed in Section 3.6.6.3. Water will be withdrawn in accordance with applicable permits and with BMP's in the CMRP to mitigate any potential effects to these species.

Hydrostatic test water would be discharged to the land surface at an approved location or returned to the source with an approved energy dissipation device. No chemicals would be used in the test water, nor would any test water be discharged if it believed to contain oil or other substances that are in sufficient amounts as to create a visible color film or sheen on the surface of the receiving water. Hydrostatic test water would be returned to the source water at an approved location or discharged to the land surface where it may evaporate or infiltrate into the soil where it may evaporate or infiltrate into the soil or drainage where the water is released. The discharge of hydrostatic test water would follow state permit requirements, which would reduce potential effects on water quality or aquatic organisms. Energy dissipaters also would be used to prevent erosion at discharge locations.

Water sources for hydrostatic testing and dust control include some streams that have the potential to contain federally-listed and state listed or species of aquatic species of concern aquatic species include those listed in **Table 4.2-12**. Specific water volumes to be withdrawn from these streams are not known at this time but would be quantified as details of the hydrostatic test plan are finalized. Nevertheless, water use from any of these streams would result in a relatively small, one-time flow reduction. Water withdrawal is expected to represent a relatively small percentage of base flow. Therefore, impacts on fish habitat would be considered minor in the mid-size to large streams. The discharge of hydrostatic test water would follow state permit requirements, eliminating potential water quality effects on sensitive species. As part of the consultation with the USFWS for threatened and endangered species in the Platte River, water use (in acre-feet) must be identified. The depletion is determined by dividing the consumptive use by the duration of the Project in years. Depletions are considered minor if the volume is less than 25 acre-feet.

Table 4.2-12 Potentially Occurring Special Status Aquatic Species Potentially Occurring Special Status Aquatic Species

Location	Species
Montana	
Missouri River	Sauger, Paddlefish, Shortnose Gar, Blue Sucker, Pallid Sturgeon, Sturgeon Chub, Sicklefin Chub, Pearl Dace
Yellowstone	Sauger, Paddlefish, Blue Sucker, Pallid Sturgeon, Sturgeon Chub, Sicklefin Chub
Frenchman Creek	Sauger
Boxelder Creek	Sauger
Redwater River	Northern Redbelly x Finescale Dace
South Dakota	
Cheyenne River	Sturgeon Chub
White River	Sturgeon Chub
Nebraska	
Niobrara River	Finescale Dace, Redbelly Dace, Blacknose Shiner
Oklahoma	
North Canadian River	Arkansas Shiner
Canadian River	Arkansas Shiner
Texas	
Red River	Shovelnose sturgeon

Hydrostatic test water would be untreated, would be released after testing of the pipeline is completed, and 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. The discharge of hydrostatic test water would follow state permit requirements, which would reduce potential effects on water quality or aquatic organisms. Energy dissipaters also would be used to prevent erosion at discharge locations.

The potential for allowing the spread of invasive aquatic species would be limited by ensuring hydrostatic test water is released upland of, and in the same reach as, the uptake location. **Table 4.2-13** includes a list of invasive aquatic species with the potential to be within the Project area.

Table 4.2-13 Invasive Aquatic Species in Waterbodies

Species	County	River
Steele City Segment		
Montana		
Common Carp (*Cyprinus carpio*)	McCone	Missouri River
Common Carp (*Cyprinus carpio*)	Prairie	Yellowstone River
Common Carp (*Cyprinus carpio*)	Valley	Milk River
South Dakota		
Common Carp (*Cyprinus carpio*)	Haakon	Bad River
Common Carp (*Cyprinus carpio*)	Haakon	Cheyenne River
Common Carp (*Cyprinus carpio*)	Harding	Little Missouri River
Goldfish (*Carassius auratus*)	Harding	Little Missouri River
Rudd (*Scardinius erythrophthalmus*)	Meade	Cheyenne River
Nebraska		
Asian Clam (*Corbicula fluminea*)	Merrick	Platte River
Chinese Mystery Snail (*Viviparus malleatus*)	Nance	Loup River
Freshwater Jellyfish (*Craspedacusta sowerbyi*)	Merrick	Platte River
Silver Carp (*Hypophthalmichthys molitrix*)	Merrick	Platte River
Bighead Carp (*Hypophthalmichthys nobilis*)	Merrick	Platte River
Grass Carp (*Ctenopharyngodon idella*)	Merrick	Platte River
Common Carp (*Cyprinus carpio*)	Merrick	Platte River
Goldfish (*Carassius auratus*)	Merrick	Platte River
Common Carp (*Cyprinus carpio*)	Nance	Loup River
Rudd (*Scardinius erythrophthalmus*)	Merrick	Platte River
Gulf Coast Segment and Houston Lateral		
Grass Carp (*Ctenopharyngodon idella*)	Oklahoma and Texas Counties	Large River Systems
Bighead Carp (*Hypophthalmichthys nobilis*)	Oklahoma and Texas Counties	Large River Systems
Nutria (*Myocastar coypus*)	Oklahoma and Texas Counties	Aquatic Habitats

Operation

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 would be a very low likelihood of a crude oil release from the pipeline that could injure aquatic biota and habitats. Keystone will prepare an ERP based upon the plan currently in review by PHMSA for the Keystone Pipeline Project. The ERP will outline the measures that will be implemented in the event of an accident.

As discussed in Chapter 2.0, 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 would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its ERP and emergency response teams would contain and cleanup the spill. To minimize impacts to aquatic resources, appropriate remedial measures would be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.6.3 Sensitive Species

Issues

The issues would be the same identified for general wildlife species in Section 4.2.6.1 and aquatic resources in Section 4.2.6.2.

Construction

Terrestrial Species

As discussed in Section 3.6.3, Sensitive Terrestrial and Aquatic Wildlife Species, a total of 129 special status terrestrial wildlife species could potentially occur within the Project area (see **Appendix F, Tables**). Fourteen of these species are federally listed as threatened and endangered (black-footed ferret, black bear, Louisiana black bear, brown pelican, Eskimo curlew, whooping crane, interior least tern, piping plover, red-cockaded woodpecker, American burying beetle, Texas prairie dawn-flower, Texas trailing phlox, Western prairie fringed orchid, Houston toad, and the pallid sturgeon). Surveys conducted this year have eliminated species not found in the Project area (suitable habitat does not exist) or identified specific locations where follow-up surveys are required (see **Appendix F**, **Contacts, Meetings**, **Survey Reports**, and **Tables**). **Table 4.2-14** summarizes planned and completed surveys associated with the Project.

Table 4.2-14 Survey Schedule for Sensitive Species along the Project

Species	Locations	Time of Survey	Comments
2008			
Raptors (including bald eagle)	Aerial survey entire ROW for the Steele City Segment	April 7–10, 2008	49 active raptor nest sites were identified.
	Aerial survey entire ROW for Gulf Coast Segment and Houston Lateral	March 24–26, 2008	19 raptor nests were identified.
Rookeries (species such as herons and egrets)	Aerial survey entire ROW	April 7–10, 2008	1 rookery was identified.
	Aerial survey entire ROW for Gulf Coast Segment and Houston Lateral	March 24–26, 2008	4 rookeries were identified.
Interior least tern/piping plover	Steele City Segment: Platte Rive, Loup River, Niobrara River, Cheyenne River	July 21–23, 2008	No nest sites were identified. One individual piping plover was identified at the Niobrara River Crossing.

Table 4.2-14 Survey Schedule for Sensitive Species along the Project

Species	Locations	Time of Survey	Comments
American burying beetle	Steele City Segment: The entire ROW in Nebraska and Tripp County, South Dakota	August 15–23, 2008	A habitat assessment was conducted along the entire ROW in Nebraska and Tripp County, South Dakota. Trapping for presence/absence will be conducted in 2009.
2009			
Rookeries (species such as herons and egrets)	Aerial survey entire ROW for Gulf Coast Segment and Houston Lateral	January 26–28, March 4–6, April 7–9, 2009	3 rookeries were identified.
Raptors (including bald eagle)	Aerial survey entire ROW		
	Aerial survey entire ROW for the Steele City Segment	February 9–11, 2009	12 bald eagle winter roost sites were identified. These included 6 river crossings in Nebraska (Platte River, Loup River, Cedar River, Dry Creek, Niobrara River, Keya Paha River); 3 river crossings in South Dakota (White River, Cheyenne River, South Fork Moreau River); and 3 river crossings in Montana (Yellowstone River, Missouri River, and Frenchman Reservoir).
	Aerial survey entire ROW for Gulf Coast Segment and Houston Lateral	January 26–28, March 4–6, April 7–9, 2009	49 raptor nests were identified.
American burying beetle	Jefferson, Saline, Filmore, Hamilton, Merrick, Nance, Boone, and Greeley counties in Nebraska	June 2009	All areas with suitable habitat would be surveyed.
	Lamar County, Texas	June to August 2009	
Interior least tern	Okfuskee, Seminole, Hughes, and Bryan counties, Oklahoma; and Fannin County, Texas	June 2009	All areas with suitable habitat within the North Canadian, South Canadian, and Red River channels will be surveyed.

Table 4.2-14 Survey Schedule for Sensitive Species along the Project

Species	Locations	Time of Survey	Comments
Western prairie fringed orchid/small white lady's slipper	Suitable habitat within all counties in Nebraska and the southern portion of Tripp County.	June 2009	All areas with suitable habitat will be surveyed.
Texas prairie dawn-flower	Harris County, Texas	April 2009	All areas with suitable habitat and soil types will be surveyed prior to construction.
Preconstruction Surveys			
Raptors (including bald eagle)	Aerial survey entire ROW	During appropriate season	Only if construction occurs during the nesting/roosting period.
Rookeries (species such as herons and egrets)	Aerial survey entire ROW	During appropriate season	Only if construction occurs during the nesting/roosting period.
American burying beetle	Pending 2009 survey results for the Steele City Segment	During appropriate season	
	Lamar County, Texas	During appropriate season	
Interior least tern	Okfuskee, Seminole, Hughes, and Bryan counties, Oklahoma; and Fannin County, Texas	During appropriate season	All areas with suitable habitat within the North Canadian, South Canadian, and Red River channels would be surveyed.
Western prairie fringed orchid / small white lady's slipper	Pending 2009 survey results for the Steele City Segment	During appropriate season	All areas with suitable habitat would be surveyed.
Texas prairie dawn-flower	Harris County, Texas	During appropriate season	All areas with suitable habitat and soil types would be surveyed prior to construction.
Blacknose shiner, northern redbelly dace, finescale dace	Suitable habitat within tributaries to the Niobrara and South Fork Elkhorn rivers in Nebraska	2010 – Pending agency recommendations	Specific survey locations have not been determined by the NGPC to date.
Blacknose shiner, northern redbelly dace, pearl dace	Suitable habitat within all tributaries to the Keya Paha River in South Dakota	2010 – Pending agency recommendations	Specific survey locations have not been determined by the SDGFP to date.
Swift Fox	Steele City Segment: Phillips and Valley counties in Montana and South Dakota	During appropriate season	Only if construction occurs during the denning period.

Table 4.2-14 Survey Schedule for Sensitive Species along the Project

Species	Locations	Time of Survey	Comments
River otter	Steele City Segment: Platte River, Loup River, Niobrara River, Cedar River, North Branch Elkhorn River, Elkhorn River, South Fork Elkhorn River, Cheyenne River, White River, Bad River	During appropriate season	Only if construction occurs during the denning period.
Burrowing owl	Within prairie dog towns in Montana	During appropriate season	Only if construction occurs during the nesting period.

Steele City Segment

Potential impacts to sensitive wildlife resources would parallel those discussed in Section 4.2.6.3, Terrestrial Wildlife. 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 (e.g., piping plover, interior least tern). 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. 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 would 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.

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 to locate areas where suitable habitat may exist for follow-up species presence/absence surveys. The results of this effort are provided in **Appendix F**, **Tables**.

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 would 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 surveys. Detailed further in this section are current recommended mitigation measures for specific sensitive terrestrial and aquatic species potentially occurring along the Steele City Segment of the Project.

Mammals

Meadow Jumping Mouse, Preble's Shrew, Merriam's Shrew. Potential impacts to the meadow jumping mouse, Preble's Shrew, and Merriam's Shrew from construction of the Project would be minimal due to the small amount of potentially suitable habitat that could occur along the proposed route. The highest possibility for direct impact would occur during clearing if heavy equipment collapses dens and tunnels while navigating the ROW, or during the trenching process. Once operational, the pipeline corridor would provide loose soil for dens and rodent burrows, plus forbs, grasses and seeds for rodent forage. During reclamation, the proposed pipeline ROW would be reseeded with BLM- and NRCS-approved seed mixes appropriate to soil and range conditions for the area. Agency consultation with MFWP is ongoing for these species and impacts to this species are not likely to adversely affect the species.

Townsend's Big-eared Bat, Long-legged Myotis, Spotted Bat. 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 also would 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 acoustic surveys for the bats if suitable habitat exists along the project (**Appendix F**, **Contacts and Meetings**). Impacts to this species are not likely to adversely affect the species.

Black-footed Ferret. According to surveys conducted in the spring and summer of 2008, black-tailed prairie dog colonies have been identified along the route. Burrow density requirements set forth in the 1989 Black-footed Ferret Survey Guidelines (USFWS 1989) have not been evaluated for these towns to date. If ferrets were 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.

In Nebraska and South Dakota, black-footed ferret surveys are no longer recommended in black-tailed prairie dog towns. It is assumed that areas not requiring surveys do not have the potential to support black-footed ferrets. Montana prairie dog towns have not been cleared and would require black-footed ferret surveys. Prairie dog towns identified along the route are listed in **Table 4.2-15**. 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.

Table 4.2-15 Active Black-tailed Prairie Dog Colonies Recorded within the Construction ROW[1]

Milepost	County	State
46.8	Valley	Montana
115.6	McCone	Montana
285.9	Harding	South Dakota
288.3	Harding	South Dakota
366.1	Perkins	South Dakota
369.1	Perkins	South Dakota
374.1 – 374.7	Meade	South Dakota

Table 4.2-15 Active Black-tailed Prairie Dog Colonies Recorded within the Construction ROW[1]

Milepost	County	State
380.5	Meade	South Dakota
394.9	Meade	South Dakota
398.8 – 399.1	Meade	South Dakota
409.5 – 409.7	Meade	South Dakota
411.0	Meade	South Dakota
417.6	Meade	South Dakota
521.9	Jones	South Dakota
584.3	Tripp	South Dakota
600.3	Keya Paha	Nebraska

[1] Based on 021509 Centerline.

Black-tailed Prairie Dog. As discussed in **Appendix F** (**Contacts**, **Meetings**) and shown by milepost in **Table 4.2-15** the black-tailed prairie dogs occur along the Project route. 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 restoration, 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 to cause a trend to federal listing or loss of viability to black-tailed prairie dogs.

Swift Fox. 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.

As a result of discussions with the MFWP, SDGFD, and BLM and as detailed in **Appendix F** (**Contacts**, **Meetings**), the Project traverses current swift fox distribution in Phillips, Valley, Dawson, and Prairie counties in Montana (Kahn et al. 1997) and in Haakon and Jones counties in South Dakota between the reintroduction sites of the Bad River Ranches (Turner Endangered Species Fund), Badlands National Park, and the Lower Brule Sioux Tribe Reservation (SDGFD 2008). Additionally, the Project crosses suitable habitat in Fallon and McCone counties in Montana and in Harding, Butte, Perkins, Meade, Pennington counties in South Dakota (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. SDNHP data indicates three known occurrence records in Haakon County between MP 452.3 and MP 468.0.

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 would occur in suitable habitat in the counties mentioned above during the breeding season (spring/summer), where dens are present, restrictions on construction activities would be required. According to Natural Heritage Data, the occurrence potential for this species along the Project route is low. With the completion of pre-construction surveys for natal den sites and because of the mobility of this species, swift fox would most likely be temporarily displaced and would return after construction. As a result the, potential impact to this species is not likely to adversely affect the species.

River Otter. Surveys for river otter dens would occur prior to construction if construction is scheduled during the denning period. However, since most major rivers where suitable habitat exists would be crossed by the HDD construction method, impacts are not likely to adversely affect this species.

Birds

Sensitive raptor species identified as potentially occurring along the route include the ferruginous hawk, Swainson's hawk, bald eagle, peregrine falcon, and the burrowing owl. As discussed in Chapter 3, aerial raptor nesting surveys were conducted in April 2008 and 2009. No active Swainson hawk or peregrine falcon nests were observed during the survey. In addition, no documented historic breeding records for the peregrine falcon exist along the proposed route. Foraging habitat (i.e., wetland and open water) would be impacted by the pipeline in Montana and South Dakota, however this impact would be short-term and the construction ROW would be allowed to revegetate to previous conditions.

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 (BLM 2008) if construction is to occur during the nesting season (April 15 – October 1). Initial biological surveys (ENSR 2008) identified 16 prairie dog towns along the route (**Table 4.2-15**). 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 Species of Concern by Montana that may be impacted by the proposed Project. They include:

- Long-billed Curlew
- Loggerhead Shrike
- Chestnut-collared Longspur
- Red-headed Woodpecker
- Bobolink
- Lark Bunting
- Sprague's Pipit
- Dickcissel
- Franklin's Gull
- Yellow Rail
- White-faced Ibis
- American White Pelican
- Eastern Bluebird
- Sage Thrasher
- Black-crowned Night Heron
- Brewer's Sparrow
- Grasshopper Sparrow
- Harlequin Duck
- Marbled Godwit
- Black and White Warbler
- Common Tern
- Forster's Tern
- Caspian Tern
- Black Tern
- McCown's Longspur
- Baird's Sparrow
- Common Loon
- Wouldet
- Wilson's Phalarope

Potential impacts to these migratory species would be the same as discussed in Section 4.2.6.1 for non-game species. No further species specific surveys are proposed for these migratory bird species. Instead, if

construction were to occur during the nesting period for migratory birds (April 15 – July 15), discussions with the FWS would be undertaken to determine what measures are required.

Mountain Plover. Mountain plover surveys are recommended in Montana within prairie dog towns only. According to 2002 USFWS mountain plover survey guidelines, surveys would be required between mid-April and early July prior to construction (USFWS 2002). However, since the only suitable habitat is associated with the larger rivers to be crossed using the HDD construction method, any impacts are not likely to adversely affect this species.

Piping Plover and Interior Least Tern. Initial piping plover and interior least tern nesting surveys were conducted in July 2008 at the Platte, Loup, Niobrara, and Cheyenne rivers. One foraging piping plover was identified at the Niobrara River. The results of the 2008 surveys can be found in **Appendix F**, **Reports**. In addition to the rivers listed above, the Yellowstone River also contains suitable habitat but access to the crossing was impossible at the time of surveys due to high water levels. All of these rivers would be crossed using the HDD construction method, therefore, impacts are not likely to adversely impact these species.

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 historic lek sites were identified by the MNHP and BLM, and specific timing restrictions and buffer zones are listed in **Appendix F** (**Contacts**, **Meetings**, **and Tables**). In addition, aerial lek surveys were conducted in April 2009. One greater sage grouse lek site was identified in Harding County, South Dakota.

Reptiles/Amphibians

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.

As a result of agency consultation, additional surveys for the Massasauga are required in Jefferson County, Nebraska.

All other reptile and amphibian species (Western hog-nosed snake, milksnake, snapping turtle, spiny softshell, common sagebrush lizard, Greater short-horned lizard, Great Plains toad, Plains spadefoot, Northern leopard frog) species included on the BLM Sensitive Species List for Montana would be the subject of off-site mitigation measures currently being discussed with the BLM.

Invertebrates

American Burying Beetle. To avoid impacts to the American burying beetle, the Project conducted a habitat assessment in August 2008 on the Steele City Segment. Suitable habitat was located along the proposed route between Tripp County, South Dakota and Wheeler County, Nebraska. Only small pockets of suitable habitat were identified along the proposed route south of Wheeler County, Nebraska. In June 2009, the Project plans to conduct presence/absence surveys in areas of suitable habitat in Nebraska only. The USFWS in South Dakota does not recommend further trapping procedures (**Appendix F**, **Contacts**). Once presence/absence of the American burying beetle along the proposed route in Nebraska has been determined, the Project would conduct trap and relocate procedures in areas of suitable habitat in August prior to construction. Project impacts are not likely to adversely affect the species.

Gulf Coast Segment and Houston Lateral

As discussed in Section 3.7.3, Sensitive Terrestrial and Aquatic Wildlife Species, a total of 37 special status terrestrial wildlife species could potentially occur within the Gulf Coast Segment and Houston Lateral Project area. Twelve of these species are federally listed as threatened or endangered (Louisiana black bear, black bear, brown pelican, Eskimo curlew, interior least tern, piping plover, red-cockaded woodpecker, whooping crane, Houston toad, American burying beetle, Texas prairie dawn-flower, and Texas trailing phlox).

Preconstruction surveys would occur for a subset of these species as determined based on habitat surveys conducted and consultations with the USFWS and state wildlife agencies (see Section 3.7.3). Species that were not likely to occur within the Project footprint, based on agency knowledge of habitat and current distribution, or which the USFWS preferred other forms of mitigation, were eliminated from species-specific surveys (see **Appendix F**, **Contacts**, **Meetings**).

Mammals

Black Bear/Louisiana Black Bear. The Louisiana black bear sub-species is federally threatened in Texas and the black bear is given the same protection within the Louisiana black bear's historic range in eastern Texas due to its similarity in appearance. Habitat of the Louisiana black bear typically includes large tracts of bottomland hardwoods that are not altered by human use, along with vegetated corridors for dispersal and large trees for den sites. Currently, there is not a resident breeding population of the Louisiana black bear in Texas, although dispersing juvenile males have been sited in Texas (Campbell 2003; NatureServe 2008).

Species-specific surveys are not planned for the Louisiana black bear. This species is not expected to be impacted by the Project as it is infrequently found and there are no known den sites in the Project area in Texas (Campbell 2003) and due to the mobility of individuals that may migrate through the Project area.

Birds

Bald Eagle. As discussed in Chapter 3.0, aerial raptor nesting surveys were conducted in 2008 and 2009. Nesting habitat of the bald eagle usually occurs along river systems, reservoirs, or lake shores with large, tall trees. This species may occur within the Project area in Oklahoma and Texas as a spring and fall migrant, breeders, or winter residents (Campbell 2003).

Aerial surveys for bald eagles nests and winter roosts occurred within 1 mile of the construction ROW in March 2008 and January, March, and April of 2009. Additional surveys are planned , if construction would occur during the nesting or roosting season. No active bald eagle nests have been found along the Gulf Coast Segment or Houston Lateral. See **Table 4.2-16** for results of the 2008 and 2009 aerial surveys.

The USFWS stated that bald eagles are known to nest in the vicinity of MP 330 and MP 340 of the Gulf Coast Segment (USFWS 2008e) and an occurrence from 2001 of bald eagle nests from MP 404 to MP 412 is documented in the natural heritage database from Texas (TXNDD). However, although the presence of bald eagles was confirmed from MP 330 to MP 340 during the aerial surveys, no inactive or active bald eagle nests were found in either of these areas within 1 mile of the construction ROW. If active nests are present during construction. Keystone will adhere to the 660-foot protection zone around the nest.

Table 4.2-16 Results of March 2008 and January, March, and April 2009 Aerial Surveys for the Gulf Coast Segment and Houston Lateral

Species	MP	Distance (feet), Direction from Centerline
Gulf Coast Segment - Oklahoma		
Bald eagle sightings	22.3	104, W
Raptor (*Buteo* sp.) sighting	22.4	982, E
Inactive red-tailed hawk nest	23.8	129, W
Unidentified nest	27.9	232, W
Inactive red-tailed hawk nest	28.0	1,357, W
Active red-tailed hawk nest	28.1	856, W
Active red-tailed hawk nest	28.2	322, E
Inactive, unidentified hawk nests	28.4	32, E
Unidentified nest	28.4	108, W
Active red-tailed hawk nest	28.9	134, E
Raptor (*Buteo* sp.) sighting and nest	28.9	79, E
Unidentified nest	28.9	240, E
Unidentified nest	36.4	3,290, E
Inactive red-tailed hawk nest	37.9	3,518, W
Inactive red-tailed hawk nest	38.1	2,181, W
Inactive red-tailed hawk nest	38.3	3,825, E
Active red-tailed hawk nest	38.3	2,762, E
Bald eagle and inactive nest	38.8	1,228, W
Active red-tailed hawk nest	39.2	3,887, E
Active red-tailed hawk nest	39.2	3,238, E
Unidentified nest	44.1	15, W
Inactive red-tailed hawk nest	49.2	3,280, W
Unidentified nest	49.4	90, E
Unidentified hawk with active nest	52.7	164, W
Inactive red-tailed hawk nest	57.5	1,701, W
Unidentified nest	58.1	18, W
Inactive, unidentified hawk nest	58.2	265, W
Two unidentified hawks with active nests	65.9	214, E
Inactive, unidentified hawk nest	69.1	3,226, W

Table 4.2-16 Results of March 2008 and January, March, and April 2009 Aerial Surveys for the Gulf Coast Segment and Houston Lateral

Species	MP	Distance (feet), Direction from Centerline
Unidentified nest	75.0	4,249, W
Unidentified nest	75.1	1,142, W
Unidentified nest	105.0	85, W
Unidentified hawk with active nest	110.9	732, W
Inactive, unidentified hawk nest	114.8	1,271, W
Unidentified nest	118.9	197, E
Inactive, unidentified hawk nest	122.0	2,044, E
Active red-tailed hawk nest	125.2	2,065, W
Inactive, unidentified hawk nest	130.0	1,867, W
Inactive red-tailed hawk nest	133.9	53, W
Two inactive, unidentified hawk nests	139.3	283, W
Unidentified nest	142.4	12, W
Gulf Coast Segment - Texas		
Active red-tailed hawk nest	155.1	1,071, W
Active red-tailed hawk nest	155.2	1,787, E
Unidentified nest	155.7	1,031, E
Inactive, unidentified hawk nest	155.8	1,476, E
Unidentified nest	156.0	2,571, E
Unidentified nest	156.9	4,740, E
Unidentified nest	160.1	5,168, SW
Unidentified nest	165.2	247, W
Inactive, unidentified hawk nest	203.2	118, W
Unidentified nest	203.6	69, W
Raptor (*Buteo* sp.) sighting and nest	206.6	21, W
Unidentified hawk sighting and nest	212.4	150, E
Unidentified hawk sighting and nest	212.6	240, W
Inactive, unidentified hawk nest	212.6	250, W
Raptor (*Buteo* sp.) sighting and nest	214.1	327, W

Table 4.2-16 Results of March 2008 and January, March, and April 2009 Aerial Surveys for the Gulf Coast Segment and Houston Lateral

Species	MP	Distance (feet), Direction from Centerline
Owl and nest with eggs	214.1	196, W
Unidentified hawk with active nest	214.2	346, W
Unidentified hawk with active nest	217.1	200, E
Unidentified nest	248.8	35, W
Unidentified nest	255.3	420, W
Bald eagle sightings	262 - 361	Various locations
Unidentified nest	262.7	818, W
Unidentified nest	265.1	310, E
Unidentified nest	271.3	353, W
Unidentified nest	278.6	354, W
Great blue heron rookery	301.0	849, W
Great blue heron rookery	310.2	3,197, E
Great blue heron rookery	310.5	2,873, W
Rookery and unidentified raptor	310.6	17, E
Inactive great blue heron rookery	310.6	258, W
Hawk sighting with empty nest	327.9	35, W
Bald eagle sighting	362.5	2,389, W
Great blue heron rookery	369.6	727, E
Inactive, unidentified hawk nest	438.8	129, NE
Houston Lateral - Texas		
Great blue heron and roseate spoonbill rookery	10.2	570, E
Unidentified nest	18.8	334, NW
4 bald eagle sightings, no nests	43.9	401, S

Brown Pelican. The brown pelican is federally endangered in Texas and nests on small, coastal islands in Texas. Part of the Texas population spends nonbreeding season along Texas coast (Campbell 2003).

Although this species occurs in counties crossed by the Project, this species nests and winters along the coast, which is outside of the Project area. This species is not expected to be impacted by the Project due to the lack of preferred habitat and mobility of individuals that may occur within the Project area during construction.

Eskimo Curlew. The Eskimo curlew is federally endangered in Texas. Historically, this species could be found in the Project area as a migratory species during the spring. This species is thought to be close to extinction and the last recorded sighting in Texas was in 1987 (Campbell 2003).

Species-specific surveys are not planned for the Eskimo curlew. This species is not expected to be impacted by the Project as it has not recently been recorded in the Project area and was not historically known to nest in the Project area.

Interior Least Tern. The interior least tern is federally endangered in Oklahoma and Texas. This species nest along inland river systems and reservoirs, especially in areas with little human disturbance and bare beaches. In the Project area in Oklahoma and Texas, it is known to nest along the Red River, South Canadian River, and North Canadian River (Campbell 2003; NatureServe 2008). A review of data from the Oklahoma Natural Heritage Inventory (ONHI) found that the only occurrences of the least tern within 10 miles of the Project area in Oklahoma occurred along the South Canadian River. The closest recorded occurrence was 0.5 mile to the east of the Project area.

No direct impacts to least tern breeding habitat would be anticipated at these locations, since pipeline placement across the rivers would be completed by the HDD method. Therefore, the Project is not likely to adversely impact this species. As recommended by the USFWS, a buffer of 300 feet from bank full width would be maintained on each side of these rivers. Only limited clearing of vegetation and limited human access would be required within this zone in order to use the True Tracker Wire that is associated with the drilling equipment and in order to access these rivers to withdraw water for the Project's hydrostatic tests.

Currently, construction activities in the vicinity of the North Canadian River, South Canadian River, and Red River are anticipated to be completed prior to the end of April. Although least terns may begin arriving at breeding sites in late April, egg laying begins in late May (USFWS 1990); therefore, construction activities are anticipated to be complete prior to the period of time when active nests have the potential to be present in the Project area. In order to avoid indirect impacts to this species, prior to any construction-related activities occurring at the North Canadian River, South Canadian River, and Red River after April 15, Keystone would conduct presence/absence surveys to identify active nest sites, in coordination with the USFWS. If active nest sites are identified, the USFWS would be notified and appropriate protection measures, such as establishment of a 0.25-mile buffer area, would be implemented on a site-specific basis in coordination with the USFWS. These measures should limit any indirect impacts to this species resulting from increased noise and human presence at work site locations.

Piping Plover. The piping plover is federally threatened in Oklahoma and Texas. This species is a migratory North American shorebird that winters along the Texas Gulf Coast in bare or very sparsely vegetated tidal mudflats, sand flats, algal flats, or beaches. Plovers may be present throughout the remainder of Texas and Oklahoma when migrating to and from northern breeding grounds (Campbell 2003; NatureServe 2008).

This species is not expected to be directly impacted by the Project in Oklahoma and Texas as it does not nest within the Project area and due to the mobility of individuals that may occur within the Project area during construction. Suitable habitat for migration stopovers by this species includes sandy shorelines of lakes and rivers. Construction personnel, such as Environmental Inspectors, would attend environmental training sessions, where they would be informed of the possibility of presence of these species within or in close proximity to the construction ROW during the migration periods. If this species happens to land in close proximity to the construction ROW during construction, its presence would be documented and the USFWS notified

Red-cockaded Woodpecker. The red-cockaded woodpecker (RCW) is listed as federally endangered in the state of Texas. This species is found in mature pine forests of east Texas. RCWs nest and roost in clusters of trees containing excavated cavity trees with a grassy or herbaceous understory with little mid-story (Campbell 2003).

The USFWS is not requiring surveys for this species, as no known RCWs or potential habitat are located within the survey corridor for the Project (**Appendix F**, **Contacts**).

Whooping Crane. The whooping crane is a federally listed endangered species that winters in marshes and salt flats of the Aransas National Wildlife Refuge and adjacent wetlands in southeast Texas. It has the possibility of occurring throughout the Project area in Texas and Oklahoma as a migratory species from Canadian nesting grounds (Campbell 2003).

This species is not expected to be impacted by the Project as it does not nest within the Project area. Suitable habitat for migration stopovers by this species includes shallow emergent wetlands or riverine habitats that are within one kilometer of a suitable feeding site. Croplands are often utilized as feeding sites (CWS and USFWS 2007). Construction personnel, such as Environmental Inspectors, would attend environmental training sessions, where they would be informed of the possibility of presence of these species within or in close proximity to the construction ROW during the migration periods. If this species happens to land in close proximity to the construction ROW during construction, its presence would be documented and USFWS notified.

Amphibians

Houston Toad. The Houston toad is a federally endangered terrestrial amphibian associated with soft sandy soils within pine or mixed deciduous forests and coastal prairie areas of East Texas. It is often found in shallow ephemeral pools, flooded fields, or wet areas associated with springs or seeps when inactive (Campbell 2003; NatureServe 2008).

Species-specific surveys are not planned for the Houston Toad as the known distribution in Texas is outside of the Project survey corridor.

Invertebrates

American Burying Beetle (ABB). This federally listed endangered species prefers areas that are undisturbed by human activity, and is known to inhabit grassland prairies, scrubland, and forest edges (NatureServe 2008).

Keystone currently is discussing appropriate mitigation for the Gulf Coast Segment and Houston Lateral with the USFWS-Tulsa District for the project area in Oklahoma. Trap and relocate measures are not recommended and, instead, a compensatory mitigation plan will be set-up as a conservation measure.

In Lamar County, Texas, presence/absence surveys for the American burying beetle are planned in the summer of 2009. If the beetle is found to be present along the proposed route in Lamar County, the Project would conduct “bait away” or “trap and relocate” procedures in areas of suitable habitat prior to construction. The Project is not likely to adversely affect the species.

Plants

Texas Prairie Dawn-Flower. This federally listed endangered species occurs in small sparsely vegetated areas of fine-sandy compacted soil in seasonally wet depressions or saline swales. The bare spots are often associated with pimple (mima) mounds, but the species also can occur in areas where mima mounds have been leveled in the past (USFWS 1989).

Species-specific surveys for the Texas prairie dawn-flower occurred in suitable habitat in Harris County, Texas, in April 2009. No individual of this species was identified in the environmental survey corridor; however, landowner access was not obtained for all areas requiring survey. Areas pending survey would be surveyed prior to construction in April 2010. If this species is found in the Project area during future surveys of

areas denied access, consultations with the USFWS would occur to determine the appropriate measures that would be implemented to avoid and/or minimize the potential for adversely affecting this species.

Texas Trailing Phlox. This federally listed endangered species occurs in sandy soils of fire-maintained openings in pine savannahs or oak woodlands (NatureServe 2008).

During pedestrian surveys, no documented individuals of Texas trailing phlox were observed. Therefore, the Project is not likely to adversely impact these species.

Aquatic Species

Steele City Segment

The Project would cross 16 streams or rivers that contain known or potential habitat for special status fish species. These include Frenchmen Creek, Milk River, Missouri River, Yellowstone River, Redwater River, Boxelder Creek, White River, Cheyenne River, Cottonwood Creek, Keya Paha River, Niobrara River, Holt Creek, South Fork Elkhorn River, Loup River, and Platte River. However, impacts to special status species at the Milk, Missouri, Yellowstone, White, Cheyenne, Keya Paha, Niobrara, Loup, and Platte Rivers would be avoided using HDD crossing methods (see the HDD construction discussion in this section).

Pallid Sturgeon, **Sturgeon Chub**, **Sauger**, **Paddlefish, Shortnose Gar**, **Blue Sucker**, **Sicklefin Chub**. Rivers identified as suitable habitat or that contain historic occurrences for these fish species would be crossed using the HDD construction method, therefore, construction of the Project is not likely to adversely impact these species and species-specific surveys are not recommended. The USFWS has expressed concern for the potential downstream effects on the Pallid Sturgeon in Nebraska. Water depletion impacts on the pallid sturgeon from hydrostatic testing could include a temporary incremental reduction of potential habitat in the lower Platte River Basin due to changes in downstream water flow. The USFWS defines “depletion” as consumptive loss plus evaporative loss of surface or groundwater within the affected basin. However, because Keystone plans on returning water back to its source within a 30-day period, the USFWS would consider the temporary water reduction as insignificant. As a result, indirect impacts from hydrostatic testing on the pallid sturgeon would be negligible.

Blacknose Shiner, **Northern Redbelly Dace**, **Pearl Dace**, **Northern Redbelly Dace x Finescale Dace**, **Finescale Dace**. These species inhabit a variety of prairie streams crossed by the Steele City Segment of the Project. However, potential impacts to these fish species would be minor due to the small amount of potentially suitable habitat that could occur along the proposed route. The highest possibility for direct impact would occur if construction activities within suitable stream crossings occurred during spawning periods. Consultation with state wildlife agencies regarding spawning periods and construction schedules is ongoing. Surveys for the blacknose shiner, northern redbelly dace, and pearl dace are planned for 2010 within tributaries to the Keya Paha River containing suitable habitat crossed by the Project in South Dakota. Surveys for the blacknose shiner, northern redbelly dace, and finescale dace in Nebraska are planned prior to construction in 2010. Specific locations are still being discussed with NGPC.

Gulf Cost Segment and Houston Lateral

As discussed in Section 3.6.3, Sensitive Terrestrial and Aquatic Wildlife Species, a total of 22 special status terrestrial aquatic species could potentially occur within the Project area (see **Appendix F**). Three of these species are federally listed as threatened and endangered (Ouachita rock pocketbook, Arkansas river shiner, and pallid sturgeon). Surveys conducted in 2009 have eliminated species where suitable habitat does not exist, or identified specific locations where follow-up surveys are required (see **Appendix F**).

Arkansas River Shiner. Species-specific surveys are not planned for the Arkansas river shiner because the Canadian River, North Canadian River, and Red River would be crossed using the HDD construction method.

Additionally, as recommended by the USFWS, a buffer of 300 feet from bank full width would be maintained on each side of these rivers. Limited clearing of vegetation would be required within this buffer zone in order to use the True Tracker Wire that is associated with the drilling equipment and to withdraw water for the hydrostatic test. Therefore, the Project is not likely to adversely impact this species.

Shovelnose Sturgeon. The shovelnose sturgeon is a state species of concern in Oklahoma, and threatened in Texas. It has known distributions in the Red River and tributaries in east, north, and northeast Texas (NatureServe 2008). The Red River would be crossed using the HDD construction method. Therefore, the Project is not likely to adversely impact this species.

Ouachita Rock Pocketbook. This federally listed endangered species has the potential to exist in the Red River system where it may be found in backwater areas of rivers with sluggish current and stable substrates containing gravel or sand. It generally occurs within large mussel beds containing a diversity of species (NatureServe 2008). The Red River would be crossed using the HDD construction method. Therefore, the Project is not likely to adversely impact this species.

HDD Construction

The Project route would cross 28 streams or rivers that contain known or potential habitat for state- or federally listed special status fish species. These include the Frenchmen Creek, Milk River, Missouri River, Yellowstone River, Redwater River, Boxelder Creek, Cherry Creek, Cheyenne River, White River, Cottonwood Creek, Keya Paha River, Niobrara River, Holt Creek, South Fork Elkhorn River, Loup River, Platte River, North Canadian River, South Canadian River, Little River, Deep Fork, Red River, North & South Sulphur Rivers, Sabine River, Angelina River, Neches River, Trinity River, and San Jacinto River. Of these rivers, the Milk, Missouri, Yellowstone, White, Cheyenne, Keya Paha, Niobrara, Loup, Platte, North Canadian, South Canadian, Little, Deep Fork, Red, North & South Sulphur, Sabine, Angelina, Neches, Trinity, and San Jacinto rivers would be crossed with the HDD construction method. Therefore, impacts to special status species would be avoided.Impacts that could affect sensitive fish and mussel species are similar to those discussed for game fish species. Construction-related impacts on sensitive species living in streams crossed by the Project using HDD (**Table 2.1-6**) would be minor, since directional drilling would eliminate disturbance within the channel. In contrast, open-cut trenching at other streams listed above would result in alteration of bottom substrates, temporary increased sedimentation, and possible removal of riparian vegetation. The degree of impact would depend upon whether important fish spawning or rearing habitat is altered. Adult fish are likely to move away from the construction area. Generally, impacts could range from several weeks to several years, depending on the life stages affected and whether future spawning is affected.

Potential water sources for hydrostatic testing and dust control include the following streams that have the potential to contain federally listed sensitive fish and mussel species: South Canadian and North Canadian Rivers. Specific water volumes to be withdrawn from these streams are not known at this time but would be quantified as details of the hydrostatic test plan are finalized. Nevertheless, water use from any of these streams would result in a relatively small, one-time flow reduction. Water withdrawal is expected to represent a relatively small percentage of base flow. Therefore, impacts on fish or mussel habitat would be considered minor in the mid-size to large streams. The discharge of hydrostatic test water would follow state permit requirements, eliminating potential water quality effects on sensitive species. As part of the consultation with the USFWS for threatened and endangered species in the Platte River, water use (in acre-feet) must be identified. The depletion is determined by dividing the consumptive use by the duration of the Project in years. Depletions are considered minor if the volume is less than 25 acre-feet.

Operation

To reduce potential impacts to sensitive wildlife species as a result of maintenance activities, Keystone would consult with the appropriate state wildlife or land management agency prior to the initiation of maintenance activities beyond standard inspection measures.

As discussed in Section 2.1.12.2, 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 would likely be relatively small. In the unlikely event of a pipeline release, Keystone would initiate its ERP and emergency response teams would contain and cleanup the spill. To minimize impacts to special status species, appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.2.7 Land Use and Aesthetics

4.2.7.1 Issues

Issues associated with land use and aesthetics include:

The following land use issues are likely to be encountered by the Project:

- Establishment of a new pipeline ROW;
- Potential damage to agricultural equipment or features (e.g., drainage tiles and irrigation systems) during construction;
- Temporary loss of agricultural productivity during the construction period;
- Potential visual impacts associated with the construction ROW which include removal of existing vegetation, exposure of bare soils, and earthwork and grading scars;
- Increased noise and dust to nearby residential and commercial areas from pipeline construction activities; and
- Increased noise to nearby residential and commercial areas as a result of pump station operations.

4.2.7.2 Construction

Private lands make up 95 percent of the land affected by construction of the Project. **Table 4.2-17** summarizes the acreage of federal, state, and private land that would be temporarily disturbed by construction of the Project.

Table 4.2-17 Construction Acreage on Federal, State, and Private Lands

	Federal	State	Private	Total
Montana	578	276	3,794	4,608
South Dakota	1	306	4,758	5,064
Nebraska	<1	0	4,179	4,179
Kansas	0	0	12	12
Oklahoma	0	<1	2,671	2,671
Texas	0	<1	5,307	5,307
Houston Lateral	0	0	652	652
Project Total	**579**	**582**	**21,371**	**22,493**

Note: Acreage does not include disturbance associated with power lines, access roads, or construction camps.

The principal land use affected by the Project would be rangeland and agriculture. The Project crosses land composed of 53 percent and 25 percent grassland/rangeland and agriculture, respectively. Other land use categories that would be affected by construction of the Project include forest, water, wetland/riparian, and developed land.

Surface disturbance to various types of land use caused by construction of the Project are summarized in **Table 4.2-18**. A relatively small, temporary loss of crops and forage land would occur in many agricultural and rangelands during construction. In areas where drain tiles are present, the tiles may be damaged by the installation of the pipeline. Keystone would repair or restore drain tiles, fences, and lands that are temporarily disturbed during pipeline construction, as described in the CMRP. The CMRP also describes topsoil handling and reclamation practices designed to restore land productivity to its prior use.

Keystone would compensate owners of commercial and industrial land for construction related impacts based on the land value as determined by local professional appraisers. Should any infrastructure be damaged, it would be repaired or replaced or the owner would be compensated for the damage.

Table 4.2-18 Land Uses Affected by the Project (Acres)

	Developed	Agriculture/ Cropland	Rangeland/ Grassland	Forest	Water	Wetland/ Riparian	Total
Construction							
Steele City Segment							
Montana	47	1,253	3,232	12	48	16	4,608
South Dakota	48	1,434	3,504	10	50	18	5,064
Nebraska	80	1,944	1,983	67	23	82	4,179
Kansas	0	12	0	0	0	0	12
Gulf Coast Segment							
Oklahoma	230	160	1,178	598	22	18	2,671
Texas	518	638	1,369	1,600	46	340	5,307
Houston Lateral							
Houston Lateral	23	43	267	236	3	80	652
Project Total	945	5,404	11,533	2,523	192	555	22,493
Operation							
Steele City Segment							
Montana	18	451	1,253	50	20	7	1,754
South Dakota	19	512	1,380	6	21	8	1,946
Nebraska	29	675	845	25	10	36	1,620
Kansas	0	12	0	0	0	0	12

Table 4.2-18 Land Uses Affected by the Project (Acres)

	Developed	Agriculture/ Cropland	Rangeland/ Grassland	Forest	Water	Wetland/ Riparian	Total
Gulf Coast Segment							
Oklahoma	120	70	508	256	11	10	974
Texas	268	272	596	674	23	179	2,013
Houston Lateral							
Houston Lateral	12	19	116	105	2	40	294
Project Total	465	2,011	4,698	1,071	88	280	8,613

[1] Total acres affected by construction in Oklahoma and Texas include 465 acres and 196 acres, respectively, of pipe stockpile sites, rail sidings, and contractors yards that are not included in land use categories. These will be included after survey completion.

Note: Acreage does not include disturbance associated with power lines, access roads, or construction camps.

Discrepancies in totals are due to rounding.

For the purposes of this analysis, Keystone anticipates that production on all areas disturbed during construction would be lost during construction. Agricultural lands would be productive during the next planting season, while rangelands would be productive after reclamation is successful. Acreage impacts would be spread over two construction years. For the year of construction, landowners are compensated for 100 percent of the calculated value of any crop loss in the construction ROW for that year. Landowners are compensated for 75 percent for the second year, and 50 percent in the third year. If demonstrated crop losses persist for three years, additional compensation would be provided.

Residences within 500 feet of the construction ROW (**Table 2.1-11**) would experience short-term inconvenience from construction equipment noise and dust for a period of 7 to 30 days. During construction, Keystone would be required to comply with any local construction noise requirements. Noise and dust impacts from construction activities would be mitigated according to the CMRP.

Structures located within 25 feet of the construction ROW are summarized in **Table 2.1-11**. The majority of the structures located within 25 feet of the construction ROW are found on the Gulf Cost Segment of the Project. Keystonehas conducted surveys of these structures during the spring of 2009 to determine if they are inhabited or abandoned and develop site-specific crossing plans and procedures for crossing in close proximity to residences.

There is one USFWS wetland easement crossed by the Project in Montana. One potential easement for Montana Fish, Wildlife and Parks is currently under negotiation, and will be located in Montana. Conservation Reserve Program (CRP) lands are crossed in Montana, South Dakota, and Nebraska (**Table 3.7-7**). The Project would cross multiple parcels under the jurisdiction of Montana State Lands, South Dakota State School Lands, and one canal managed by USBR in Nebraska (**Table 3.7-6**). Mitigation measures outlined in the CMRP would minimize impacts to these areas. No special interest areas such as USFWS wetland easements, NRCS conservation easements, or federal or state owned parks crossed by the Project in Oklahoma. However, there is a NRCS Wetland Reserve Program (WRP) easement in Texas. This area would be crossed using the HDD construction method.

If CRP land participants are required to exit the CRP as a result of the construction of the Project, Keystone would compensate the landowner for any loss of CRP payments, including retroactive forfeit payments.

The Project does not cross any rivers within segments declared as wild or scenic. Construction of the Project would have temporary impacts on recreational traffic and use patterns during construction activities in special management areas and recreational areas. Sightseers, hikers, wildlife viewers, hunters, etc., would be displaced from the immediate area during construction. Keystone would continue to coordinate with agency managers to minimize conflicts between construction activities and recreational uses for which these special areas were established. These impacts would be of short duration with no long-term impacts.

Visual impacts associated with construction of the Project include removal of existing vegetation, exposure of bare soils, earthwork and grading scars, and landform changes that introduce contrasts. Keystone aligned the pipeline route to avoid aesthetic features to the maximum extent possible. Visual impacts from construction activities would be of short duration with no significant long-term impacts due to implementation of Keystone's mitigation measures outlined in the CMRP.

As discussed in Section 2.1.11.1, the majority of construction activities would occur during daylight hours. Potential exceptions include HDD and critical tie-in activities, which would be conducted in compliance with local noise ordinances.

4.2.7.3 Operation

Certain existing land uses would be converted to long-term utility use for the duration of the pipeline's operation. This conversion represents a long-term future constraint on development of private land because dwellings cannot be placed on the permanent pipeline ROW for the entirety of the ROW lease period. The 50-foot operational ROW would be maintained in an open condition for the life of the pipeline facilities. No other operational impacts are anticipated to agriculture and rangeland or special management areas. If surface disturbances occur due to future maintenance activities, disturbed areas would be reclaimed after the disturbance, utilizing measures described in the CMRP. Recreational use access would not be affected by pipeline operations within special management areas**.**

The visual impact of aboveground facilities would depend on the location of each facility and its visibility from the surrounding area. Keystone located the pump stations based on hydraulic and engineering design considerations, but also considered impacts on aesthetics and sensitive environmental resources in determining the facility locations. Pump stations are located on private range or agricultural lands.

During operation of the pipeline, the noise impact associated with the electrically driven pump stations would be limited to the vicinity of the facilities. Keystone will identify noise sensitive receptors within one mile of proposed pump station locations.

Noise impacts from the electrically powered pump stations are anticipated to be minor. No system blowdowns would occur, as the Project is a crude oil pipeline. The pump stations would be constructed in a manner to minimize potential impacts from noise. Should noise monitoring be requested by residents near pump stations during operation, noise surveys would be conducted to indicate the operational levels at that residence and would be used to determine any necessary noise abatement measures necessary to reduce the noise levels at that residence. No statewide noise regulations have been identified through the permitting process. Butler County in Kansas requires fenceline boundary noise limitations of <55 dBA for the agricultural, residential, and recreational land use category during daytime hours for 60-minute time periods and <50 dBA during nighttime hours for 60 minutes. No other county level noise regulations have been identified where pump stations are proposed.

4.2.8 Cultural Resources

4.2.8.1 Issue

The following cultural issues are likely to be encountered by the Project:

- Construction and operation of the Project could affect National Register of Historic Places (NRHP)-eligible historic properties such as prehistoric or historic archaeological sites, districts, buildings, structures, and objects.

4.2.8.2 Construction

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 would be subject to impacts that could affect their eligibility for the NRHP based on NRHP criteria for evaluation. For the Steele City Segment, 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 to include an additional 500 feet architectural location analysis, access roads to be used or upgraded during construction, pipe yards, contractor yards, and any other temporary use or staging areas, plus a 50-foot buffer. For the Gulf Coast Segment of the Project, the APE consists of a 300-foot survey corridor that is centered on the pipeline centerline in greenfield areas. In co-located areas the APE consists of a 200-foot survey corridor on the co-located side of the proposed pipeline centerline and a 100-foot survey corridor on the co-located side of the Project centerline.

Cultural resource field surveys along selected segments of the pipeline corridor have been ongoing since June 2008. As a result of the field surveys, Keystone is recommending 61 potentially eligible and 40 sites as eligible for listing on the NRHP, and 236 sites as ineligible for listing. At 304 sites, NRHP-eligibility status is undetermined at present. One site, the former Route 66 in Oklahoma, was already listed on the NRHP. These sites were determined to be located within or adjacent to the Project APE. Avoidance or evaluation to definitively determine NRHP eligibility is recommended for these sites. Re-routes, boring, or construction ROW with reduction is currently being evaluated for all of the eligible and potentially eligible sites. See **Appendix G** for proposed avoidance plans for each of these resources. The remaining sites are ineligible, and would not require additional work.

Construction and operation of the Project could potentially affect NRHP-eligible sites. These could include prehistoric or historic archaeological sites, districts, buildings, structures, objects, and locations with traditional cultural value to Native Americans or other groups. Project impacts could include: the physical disturbance during construction of archaeological sites located within the Project APE; the demolition, removal, or alteration of historic or architecturally significant structures or features; and the introduction of visual or audible elements (e.g., pump stations) that could alter the site's setting. Impacts to NRHP-eligible sites would be mitigated through avoidance or SHPO- and lead federal agency-approved data recovery techniques. Mitigation may include one or more of the following measures: 1) avoidance through the use of realignment of the pipeline centerline, relocation of pump stations, or changes in the construction or operational design; 2) data recovery, which may include the systematic professional excavation of an archaeological site or the preparation of photographic or measured drawings documenting standing structures; and 3) the use of landscaping or other techniques that would minimize or eliminate effects on the historic setting or ambience of standing structures.

Whenever feasible, Keystone would avoid NRHP-eligible sites identified within the Project APE. Keystone would consult with the appropriate SHPOs to identify measures to avoid adversely affecting these sites. If adverse effects to any NRHP-eligible sites cannot be avoided, Keystone would develop treatment plans for mitigating those effects. Keystone would file avoidance or treatment plans, as appropriate, with the appropriate SHPOs and the lead federal agency.

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 would cease until Keystone, in consultation with the appropriate

parties, can evaluate the site's eligibility and the probable effects. If the previously unidentified site is recommended as NRHP eligible, impacts would be mitigated through the steps outlined in an approved Unanticipated Discovery Plan. State-specific plans for Nebraska, Oklahoma, and Texas are included with each relevant field survey report in the November 2009 Environmental Report confidential **Appendix G**. Unanticipated Discovery Plans for Montana, South Dakota, and Kansas are included in the confidential **Appendix G** of this Supplemental Environmental Report.

Keystone recognizes that minor route changes will occur up through construction. As such, Keystone anticipates the development of a Programmatic Agreement by DOS to accommodate Section 106 clearance for these cases.

If construction or other Project personnel discover what they believe to be human remains, funerary objects, or items of cultural patrimony on federal land, construction would cease within the vicinity of the discovery and the appropriate agency and tribal representatives would be notified of the find in accordance with NAGPRA. Construction would not resume in the area of the discovery until the authorized agency issues a notice to proceed.

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

4.2.8.3 Operation

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

4.2.9 Socioeconomics

4.2.9.1 Issues

The following socioeconomic issues are likely to be encountered by the Project:

- Compensation to landowners for conveyance of easements and restrictions and damage to land and property;
- Construction work force demands on local infrastructure;
- Fiscal benefits from goods and services purchased locally and associated tax revenue; and
- Ongoing tax revenues generated by the Project.

4.2.9.2 Construction

Compensation for Damages to Land Use and Property

The Project would be constructed in predominantly rural, agricultural areas. Keystone would acquire pipeline ROW easements from landowners and would provide landowners with monetary compensation for the conveyance of those easements. Construction activities would create the potential for damage to land and property, including drainage tiles, irrigation systems, fences, and crop productivity. Keystone would restore damaged or disturbed lands, repair or restore damaged property, or compensate owners for damages as agreed to in advance in the easement agreements or negotiated on a case-by-case basis. In addition, the easement area is returned to its preconstruction use with the exception of timber and aboveground facility sites.

Demands on Local Infrastructure

Construction of the Project is proposed to be completed in 17 spreads (see **Table 2.1-13**). Keystone anticipates that it would require 6 to 9 months to complete each spread. Work on the Project is proposed to commence in 2010 and to be complete in 2012. The spreads of the Gulf Coast Segment would be constructed in 2010 and 2011, and the Houston Lateral would be constructed in 2012. The Steele City Segment spreads would be constructed in 2011 and 2012. Approximately 500 to 600 construction personnel (Keystone employees, contractor employees, construction inspection staff, and environmental inspection staff) are expected to be associated with each spread for a total work force of 3,500 to 4,200 construction personnel. Additionally, construction of pump stations and delivery facilities would require an additional 20 to 30 workers per station. Construction of pump stations and delivery stations is to commence in 2010 and be completed by 2012.

Keystone would attempt to hire temporary construction staff from the local population where possible. Keystone estimates that long-term operation of the pipeline could require 20 permanent employees in the US.

The Project construction period would be relatively short in any given area and most non-local workers would not be accompanied by their families during their work tenure. Consequently, it is expected that most Project workers would use temporary housing, such as hotels, motels, recreational vehicle parks, and campgrounds. Some workers are likely to rent furnished apartments and homes, due to the constrained availability of other accommodations, though this is generally less preferable because landlords and property management companies prefer extended term commitments. Most of the temporary workers would seek housing in the more populated, service-oriented towns located within a reasonable commuting distance to the work site. As the more convenient options fill, workers would seek alternatives, driving farther, looking at smaller communities, even using campgrounds in nearby state parks, which typically have limits on the length of occupancy. Furthermore, some individuals may desire to relocate during the term of the Project as the active construction area in each spread moves along the pipeline route. The net effect of these factors is that the temporary housing demand would be dynamic.

In the more rural portions of the Project, it would be more difficult for local housing markets to fill these temporary housing needs due to the limited availability of temporary housing in close proximity to construction work sites. Construction workers in these areas are likely to drive farther to find housing in nearby small towns or rely more heavily on recreational vehicle parks and campgrounds. Due to a possible lack of housing, Keystone will install temporary construction camps in these areas. These temporary camps would supplement local housing in remote areas of Montana and South Dakota for the duration of construction in the area. Currently, Keystone is planning to install four camps, two in Montana, and two in South Dakota, each capable of housing up to approximately 600 workers. Busing of workers from work camps to the construction locations also is being considered. Conversely, in the portions of the route through more populated areas, the local housing markets would be much more likely to absorb the temporary housing needs of construction workers as they would be more likely to find hotels and motels in towns and cities close to construction work sites.

Other construction-related impacts on local services may include increased demand for permits for vehicle load and width limits and local police assistance during construction at road crossings to facilitate traffic flow. In more rural sections of the proposed route, response times to highway or construction-related accidents may be lengthy, given communication, dispatch, and travel time considerations. In these areas, it may be necessary to provide on-site first responder services; however, Keystone would work with local law enforcement, fire departments, and emergency medical services to determine the best course of action and coordinate for effective emergency response. Plans associated with these issues are addressed in the ERP. The degree of impact would vary from community to community, depending on the number of non-local workers and accompanying family members that temporarily reside in each community, the duration of their stay, and the size of the community. Although these factors are too indeterminate and variable to accurately predict the magnitude of impact, the effects would be short-term and, therefore, not expected to be significant.

Short-term Fiscal Benefits

In addition to property taxes, state, county, and local taxing jurisdictions would receive taxes on gross receipts from the sales of goods and services. These taxes and fees vary by region and locality and would be received only during the construction period.

4.2.9.3 Operation

Demands on Local Infrastructure

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

Long-term Fiscal Benefits

In the operation phase, the pipeline would increase the tax base in the states, counties, and communities crossed. Keystone has estimated that a total of approximately $140 million would be paid in property taxes during the first year of pipeline operation for the Project. Based on 2006 property assessment and tax rate information for each state/county, the distribution by state for the first year of property taxes would be $61 to Montana, $15 million to South Dakota, $22 million to Nebraska, $4 million to Kansas, $14 million to Oklahoma, and $25 million to Texas.

Environmental Justice

The demographic analysis contained in Section 3.10.7, Environmental Justice, revealed minority and low income populations residing at various locations along the Project route. Public participation is a goal of the NEPA process; this participation is especially important when low-income populations, minority populations or Native American populations have the potential to be affected by a Project. Therefore, Keystone has been engaged in public consultation since the Project was first announced in July 2008. Keystone is committed to ongoing and regular correspondence, communication, and consultation with all stakeholders. Twenty-six open houses have been undertaken to date and 19 tribal reservations were visited by the Project team. Keystone shares information about the Project and provides opportunities for identification and resolution of questions, issues, and concerns through a number of channels, including press releases, the Project web site, e-mail, toll free telephone numbers, one-on-one discussions between landowners and land agents, and direct mailings. To date, Keystone's public participation program included meetings with community leaders, tribal government leaders, and open houses. Public participation and consultation activities would continue throughout the life of the Project.

While the Project does not traverse any Native American lands; there are seven reservations that are located in proximity to the proposed route, and 73 tribes have a potential interest in the Project from a traditional or historical perspective. Section 3.9 further describes the interactions Keystone has had with Native American populations in the Project area.

As explained in greater detail in Chapter 2.0, the purpose of the Project is to transport incremental crude oil production from the WCSB to meet growing demand by refineries and markets in the US. The Project responds to several needs, including the increasing crude oil demand in the US and decreasing domestic crude supply and the opportunity to reduce US dependence on foreign offshore oil through increased access to stable, secure Canadian crude oil supplies. These Project benefits would be realized for the population as a whole, regardless of race and income.

Both short-term and long-term benefits would stem from increases in employment and business opportunities for the areas surrounding the Project route. Increased spending in the affected areas also would benefit community businesses that would provide materials and services for the construction and operation of the pipeline/pumping stations. In addition, increases in state and local property tax revenues would provide additional monies to local governments, some of which may be used to support local social programs for minority and/or low income groups.

The pipeline route was selected based on criteria outlined in Section 2.4, which are unrelated to the demographics of the surrounding area. While portions of the new pipeline and new and upgraded pumping stations are located in areas of significant minority populations and with families living below the poverty level, the Project also is located in areas of majority white populations and with relatively few families living below the poverty level. Project impacts would be the same regardless of the demographics of the surrounding population. The evaluations contained throughout this document consider the potential Project impacts on environmental indicators including but not limited to air quality, water quality, noise, land use, socioeconomics, ecology, natural resources, and cultural resources. The environmental impacts have been considered for all communities, including those with high minority populations and low income populations. The analyses demonstrate that the Project would result in neither adverse nor disproportionate impacts to minority or low income populations. Potential impacts on Native American communities are continuing to be assessed through on-going tribal engagement and consultation efforts.

4.2.10 Public Health and Safety

4.2.10.1 Issues

- Risk of hazardous material releases (leaks and spills) during construction of the Project; and
- Risk of crude oil releases (leaks and spills) during pipeline operations, including the contribution of natural hazards (seismicity and faults, landslides, and subsidence) to this risk and the subsequent potential effects on humans and other sensitive resources such as populated areas, drinking water sources, and ecologically sensitive areas.

4.2.10.2 Construction

The following is a list of hazardous materials that may be present and possibly released during construction:

- Diesel fuel;
- Gasoline;
- Lubricating oil;
- Transformer oil;
- Antifreeze;
- Battery acid;
- Field joint coating material;
- Radiography source (radioactive);
- Paint; and
- Cleaning solvents.

During construction, fuel or oil could be released from storage tanks at contractor yards within secondary containment facilities. In the event of a failure of a storage tank, the material would be held within the secondary containment facility, and therefore, there would be no release. Diesel and gasoline would be transported to the construction site for equipment fueling in tank trucks with up to 6,000 gallons capacity, which would be the estimated maximum volume of diesel and/or gasoline that could be released. Lubricating and engine oil would be stored in 55-gallon barrels and would be dispensed at the construction sites by a lube truck. Lube trucks typically carry up to six 55-gallon barrels of lubricating and engine oils. In a catastrophic event in which all six barrels failed such that all contents are released, the estimated maximum volume of lubricating and engine oil that could be released is 330 gallons.

Keystone would require all contractors to employ preventative measures to avoid spills of hazardous materials as discussed in Chapter 3.0 of the CMRP (**Appendix I**). Should an accidental release occur, clean up measures as noted in the CMRP would be implemented. Additionally, the Keystone Contractor for each construction spread would be required to finalize and adhere to a project-specific SPCC Plan prior to construction. These plans would meet the requirements of 40 CFR Part 112, and would be based on the SPCC template, included in **Appendix Y**.

4.2.10.3 Operation

Keystone would employ multiple safeguards to prevent a pipeline release, as discussed in Section 2.1.12. As discussed in the Risk Assessment (**Appendix H**), the chance of a spill occurring during pipeline operation 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 would initiate its ERP and emergency response teams would contain and clean up the spill. The ERP will be prepared and filed prior to commencement of operation. A preliminary table of contents for the ERP is included in **Appendix W**. This plan would be approved by PHMSA prior to commencement of operation. To minimize impacts to the public, appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

Should a spill occur, the ERP outlines methodologies, procedures and techniques for oil spill containment and recovery on land and in water, as well as in extreme situations such as subzero weather. Keystone is committed to a comprehensive emergency response program with integrated and complimentary components that include responding to any pipeline emergency event. Because the potential for spills on or in water are of special concern, Keystone also will develop Tactical Control Plans on watercourses, and would require a rigorous training program for staff and contractors specifically for spills on water, as well as on ice covered water such as lakes, ponds, rivers and streams. Keystone and its subcontractors would be responsible for the response to and clean up of any pipeline release.

No hazardous materials subject to the Chemical Accident Prevention Provision / Risk Management Plan set out by 40 CFR 68 would be stored on any site associated with the Project.

The materials transported by the Keystone XL Project would primarily be crude oils similar to Western Canadian Select (WCS) and Suncor Synthetic A (Suncor). The chemical characteristics of these oils are summarized in **Table 4.2-19.** Shippers may add diluents (cutter stock), as necessary to ensure that crude oil to be shipped would meet specifications in Keystone's tariff. Although Keystone has no information on the use or source of any diluent that may be added, condensate or synthetic crude are typically used as diluent to achieve a heavy crude blend. Condensate consists of lightweight petroleum hydrocarbons, and is already found in WCS and Suncor crude oils, but additional condensate may be added to the oils to make it flow better within the pipeline. Other additives that may be included are drag reducing agents and corrosion inhibitors. Drag Reducing Agents such as ConocoPhillips Liquid Power 100 Flow Improver comprised of 55 percent to 65 percent water and 35 percent to 45 percent proprietary additives. Corrosion Inhibitors such as Baker Perolite CRW9110 Corrosion Inhibitor, which is water soluble and amine based product.

Table 4.2-19 Selected Chemical Constituents of Crude Oil

Chemical	WCS	Suncor
BTEX		
Benzene (%)	0.10	0.05
Toluene (%)	0.17	0.23
Ethyl Benzene (%)	0.06	0.15
Xylenes (%)	0.26	0.52
Total BTEX (%)	0.59	0.95
Non-petroleum Hydrocarbon Components (metals)		
Nickel (ppm)	53.2	0.6
Vanadium (ppm)	129	1.5