

5.2 ROUTE ALTERNATIVES

The U.S. Department of State (the Department) considered eight route alternatives in addition to TransCanada Keystone Pipeline, LP's (Keystone's) proposed Project route. Based on screening and evaluation of these alternatives described in Section 2.2.4.1, Screening of Reasonable Major Route Alternatives, the Department identified two route alternatives as reasonable alternatives for evaluation in comparison to Keystone's proposed Project route:

- Keystone XL 2011 Steele City Segment Alternative (2011 Steele City Alternative), as proposed in the 2011 Final Environmental Impact Statement (Final EIS); and
- I-90 Corridor Alternative.

A detailed description of these two route alternatives is presented in Section 2.2.4, Major Pipeline Route Alternatives. The proposed Project and the alternatives are shown on Figure 5.1.2-1. The 2011 Steele City Alternative represents the project as previously proposed by Keystone and evaluated in the 2011 Final EIS. The previous application was denied on February 3, 2012, because as noted with greater specificity in Section 1.0, Introduction, there was insufficient time to complete the review. This alternative was carried forward for purposes of comparison with the proposed Project and the I-90 Corridor Alternative. To facilitate comparison with the proposed Project, each of the alternative routes would begin at the same border crossing as the proposed Project (near Morgan, Montana) and end at the same location as the proposed Project (near Steele City, Nebraska). Also to facilitate comparison between the various alternatives, impact areas for the proposed Project, the 2011 Steele City Alternative, and the I-90 Corridor Alternative were compared using the temporary and permanent right-of-way (ROW) area only. It was assumed that impact areas from ancillary facilities were similar among the three alternatives since exact number and locations of these facilities are not known for the I-90 Corridor Alternative, and these impact areas were not included in the comparison.

The analysis in this section provides a comparison between the potential environmental impacts associated with each route alternative and the proposed Project route. The environmental setting and potential impacts of both alternatives are discussed below. Since the alternatives follow portions of the same alignment as the proposed Project, the discussion of the environmental setting in this section focuses on those portions of the routes where the alternatives differ from the proposed Project. Please see Chapter 3, Affected Environment, for a description of the Environmental Setting where the alternative routes follow the same route as the proposed Project.

The potential impacts sections for each of the alternatives includes a description of the impacts of the entire route alternative, but then focuses primarily on the differences between the route alternatives and the proposed Project. Both of these major route alternatives would require essentially the same aboveground facilities, including the same two pumping stations for the Keystone Cushing Extension in Kansas. As part of the proposed Project, three connected actions were identified as integral to the Project:

- The Bakken Marketlink Project;
- The Big Bend to Witten 230-kilovolt (kV) Transmission Line; and
- Electrical Distribution Lines and Substations.

The Bakken Marketlink Project would be identical for both the 2011 Steele City Alternative and the I-90 Corridor Alternative to that described in Section 2.1.12.1, Bakken Marketlink Project, for the proposed Project (see Figure 2.1.12-1). Since both alternatives follow the same route as the proposed Project near Baker, Montana, the environmental setting and expected impacts for the proposed piping, booster pumps, meter manifolds, and two tank terminals would be the same as the proposed Project; therefore this connected action is not considered further in this alternatives analysis. Please see Chapter 4, Environmental Consequences, for a description of the environmental effects of the Bakken Marketlink Project.

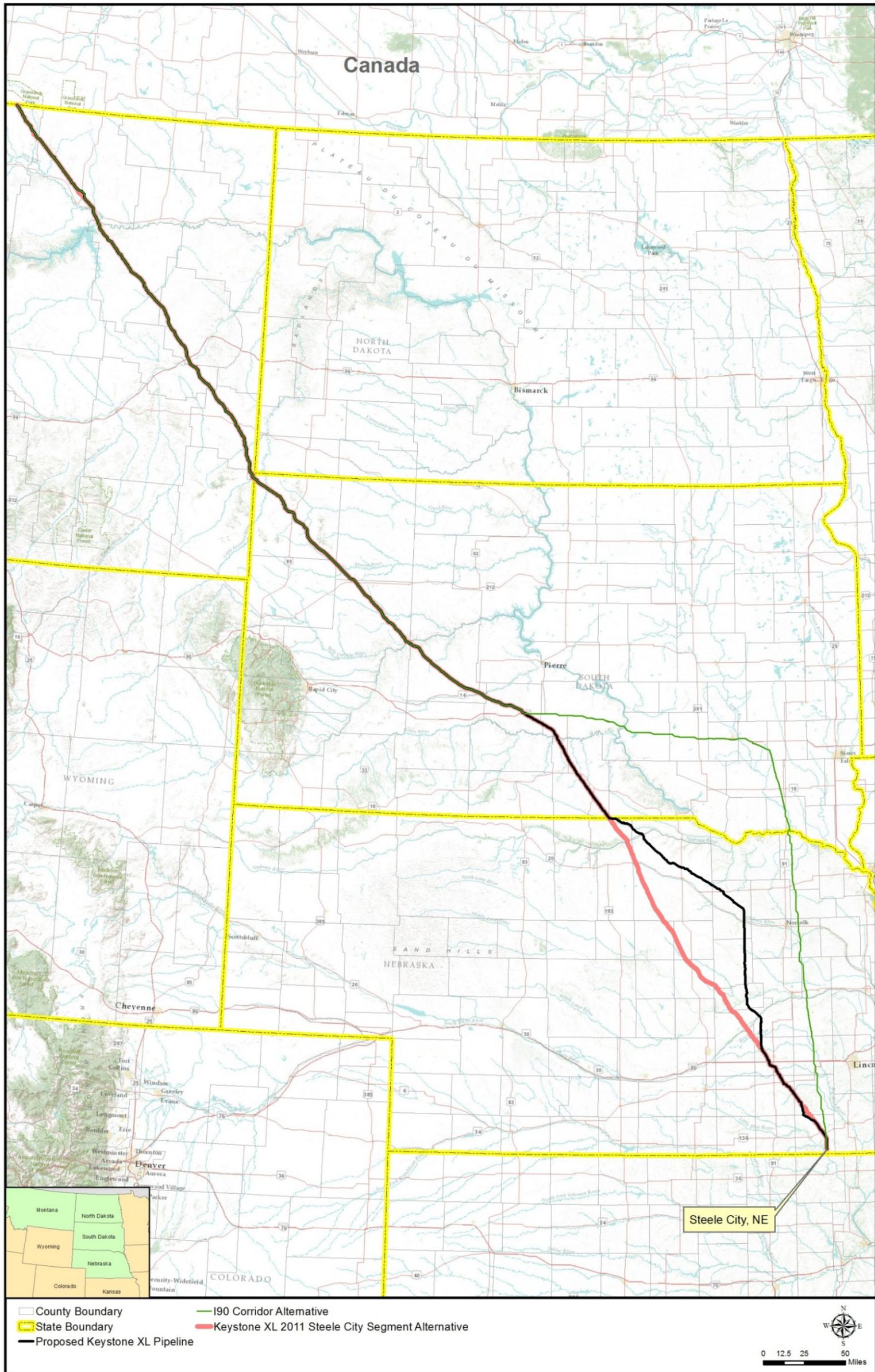
The Big Bend to Witten 230-kV Transmission Line connected action for the 2011 Steele City Alternative would be identical to the proposed Project. For the I-90 Corridor Alternative, however, pump stations 20 and 21 would be located between 40 and 80 miles further north than they would be for the proposed Project, but in the same Western Area Power Administration service area. For the purposes of this evaluation, it is assumed that the Western Area Power Administration system would need similar upgrades and that the impacts for this connected action would be similar to the proposed Project.

Similar to the proposed Project, new electrical transmission power lines with voltages of 69 kV or greater would be required to service each pump station for both of the major route alternatives. As with the proposed Project, electrical power for the alternatives would be obtained from local electric utilities. It is assumed that any routing, facilities siting, and approvals would be the responsibility of, or handled through, the local utilities. For these reasons, the impacts associated with these facilities would be essentially the same as the proposed Project (see Chapter 3, Affected Environment, and Chapter 4, Environmental Consequences) and they are not further evaluated in this section.

5.2.1 2011 Steele City Alternative

Overall, the 2011 Steele City Alternative is 854 miles long from milepost (MP) 0 at the Canadian border to the terminus of this alternative pipeline route at Steele City, Nebraska. The 2011 Steele City Alternative is approximately 20 miles shorter than the proposed Project. Other than minor route modifications, the 2011 Steele City Alternative and the proposed Project share a common alignment from MP 0 to approximately MP 602 in Nebraska. At MP 602 the 2011 Steele City Alternative diverges from the proposed Project route and takes a more direct southerly path. The 2011 Steele City alternative merges with the proposed Project route again at approximately MP 796 on the proposed Project route. The assessment of the 2011 Steele City Alternative below references the resource-specific impacts for the entire 854-mile alignment, but focuses on where this alternative differs from the proposed Project. This is limited to the pipeline segments in Nebraska between MP 602 and 796 of the proposed Project route. For the purposes of this analysis the effects of the 2011 Steele City Alternative and the proposed Project in Montana and South Dakota are considered identical.

The 2011 Steele City Alternative would cross the Nebraska Department of Environmental Quality (NDEQ)-identified Sand Hills Region and the northern High Plains region, which are subdivisions of the Great Plains province. The NDEQ-identified Sand Hills Region comprises one of the most distinct and homogeneous ecoregions in North America and includes one of the largest areas of grass-stabilized sand deposits in the world.



Source: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp, GEBSCO, USGS, FAO, NPS, NRCAN, GeoBase, Kadaster NL, Ordnance Survey, Esri Japan, METI, and the GIS User Community.

Figure 5.2.1-1 Proposed Project and Alternatives

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5.2.1.1 *Geology*

Environmental Setting

The majority of the state of Nebraska is covered by Quaternary deposits along with glacial till, loess, and the Sand Hills. Glacial till is present in southeast Nebraska, south of the Loup River to the Kansas state line. Loess is present from the town of Greeley to the Loup River. The geology of the 2011 Steel City Alternative is the same as the proposed Project except in the three locations where the alignments diverge (the NDEQ-identified Sand Hills Region, the Clarks Well Head Protection Area (WHPA), and the Western WHPA). In those areas, there are more areas of shallow bedrock for the 2011 Steele City Alternative route (4.62 miles in Nebraska) compared to the proposed Project (0.27 miles in Nebraska). The predominant terrain associated with the 2011 Steele City Alternative includes rolling to steep, irregular sand dunes, and gently sloping valleys. Tertiary sedimentary formations of sandstones and conglomerates (sedimentary rocks that consist of at least thirty percent of their total mass in gravel-sized particles) are deeply covered by Quaternary clay-rich sedimentary deposits (aeolian sand and loess). Although the 2011 Steele City Alternative is approximately 20 miles shorter than the proposed Project, there are approximately 42 more miles of fossil-containing formations, but an equal number of oil and gas wells within 0.25 mile of both Alternative routes. However, along the 2011 Steele City Alternative, there are approximately 15 fewer miles of high-risk landslide areas.

Potential Impacts

The types of potential impacts to geological resources for the 2011 Steele City Alternative would occur during construction and are essentially the same as for the proposed Project (see Section 4.1, Geology), which include rock ripping and disturbance and modification of the surficial geology. There would not be any geology related environmental impacts associated with operations. The 2011 Steele City Alternative route would not cross any know active faults with confirmed surface offsets. Based on the FEMA Landscape Hazard Ranking System mapping, as described in Section 3.1.2.5, Geologic Hazards, the 2011 Steele City Alternative would cross approximately 323.6 miles of areas where, as described below, if steep slopes were encountered there could be a high risk for landslides. This is slightly less than for the proposed Project, which would cross approximately 338.8 miles of areas where steep slopes could present a high risk for landslides. See Table 5.2-1 for a comparison of the 2011 Steele City Alternative and the proposed Project.

Table 5.2-1 Geology: Comparison of the 2011 Steele City Alternative and Proposed Project

Resource Potentially Impacted/Risk	Proposed Project (all units in miles)	2011 Steele City Alternative (all units in miles)
High Risk Landslide Areas	338.8	323.6
Fossil Fuel and Mineral Resources	24 oil and gas wells within 0.25 mile; 1 gravel pit within 0.5 mile; 5 aggregate mines within 1 mile	24 oil and gas wells within 0.25 mile; 1 gravel pit within 0.5 mile
Fossil Containing Formations (Paleontology)	~599 miles occurring sporadically between MP 3.0 and 875	~641 occurring sporadically between MP 1.1 and 387 and between MP 595 and 850

Landslides typically occur on steep terrain (slopes of 20 percent or greater) during conditions of partial or total soil saturation, or during seismic activity (Geologic Hazards sections 3.1.2.5 and 4.1.3.4). Given the low likelihood of a significant seismic event and relatively limited extent of steep slopes along the 2011 Steele City Alternative route, the potential for earthquake-induced landslides is low.

As described in Section 4.1.3.4, Geologic Hazards, four miles of the terrain crossed by the proposed Project route contain steep slopes. Most of these steep sections are less than 0.1 mile in length and correspond to stream crossing locations. Based on a review of USGS topographic mapping, the terrain crossed by the 2011 Steele City Alternative where it diverges from the proposed Project is similar and the occurrence of steep slopes is anticipated to also be similar. If the 2011 Steele City Alternative was recommended, planning and design surveys would identify specific areas of steep slopes. Where steep slopes could not be avoided, the construction and operation methods required by 49 CFR Parts 192 and 193 and additional soil erosion, sediment control, and slope stabilization measures identified in Section 4.1.3.4, Geologic Hazards, would be implemented to minimize the risk of landslide associated with construction and operation on steep slopes.

The number of oil and gas wells within 0.25 miles of the 2011 Steele City Alternative and the proposed Project route would be the same (24); impacts to fossil fuel and mineral resources would still be limited for the 2011 Steele City Alternative. In Nebraska, there are no active oil, gas, or mining operations along the proposed Project or the Alternative route.

Valuable fossil-containing formations are classified as Potential Fossil Yield Classification (PFYC) Class 4 (geologic units containing a high occurrence of significant fossils) or Class 5 (highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils, invertebrate fossils, or plant fossils, and that could be at risk of human-caused adverse impacts or natural degradation). As several formations along the 2011 Steele City Alternative route have fossil-containing sediments, it is likely that PFYC Class 4 or 5 paleontological specimens and fossil-bearing formations would be encountered along the Alternative route. Since PFYC Class 4 and 5 fossils occur sporadically throughout the formations, which may or may not contain surficial fossils, for the purpose of this assessment, the entire formation was noted and included in the total mileage of potential fossil occurrence. Based on a geologic and topographic desktop analysis, the 2011 Steele City Alternative route would cross a total of 641 miles of PFYC Class 4 or 5 formations.

The proposed Project and the 2011 Steele City Alternative would cross a similar number of total miles affecting surface geology and a similar number of miles ranked as high risk landslide areas, in addition to having comparably low impacts on fossil fuel and mineral resources in the vicinity of the two routes. The most prominent difference between the routes with respect to geology is that there are fewer miles of fossil containing formations that would be crossed by the proposed Project (599 miles) than by the Steele City Alternative (641 miles).

The mitigation measures described for the proposed Project would also apply to the proposed 2011 Steele City Alternative. No additional mitigation measures would be required.

5.2.1.2 Soils

Environmental Setting

In northern and central Nebraska, the 2011 Steele City Alternative route would cross portions of the NDEQ-identified Sand Hills Region in Keya Paha, Rock, Holt, Garfield, Wheeler, Greeley, and Merrick counties. This region consists of a prairie landscape that supports livestock grazing, wildlife habitat, and recreation. Soils in the NDEQ-identified Sand Hills Region consist of aeolian (wind deposited), well-sorted sands, sandy alluvium, and lesser amounts of loess and glacial outwash. The topsoil is typically sand mixed with organic matter, with the top six inches including vegetative root systems and the native vegetation seed bank. The soils are generally very deep, excessively drained to somewhat poorly drained, with intermittent wetland depressions. The rolling-to-hilly sand dunes that are common in this area have been stabilized by the existing vegetative cover. Where the vegetative cover has been disturbed or removed without restoration, severe wind erosion associated with the prevailing northwesterly winds typically creates steep-sided irregular or conical depressions referred to as “blowouts.”

Soils in central to southern Nebraska that would be crossed by the 2011 Steel City Alternative route generally consist of deep loess deposits that are susceptible to erosion. Soils in Hamilton County that would be crossed by the 2011 Steel City Alternative route, and extending to the state line, contain thick, dark, organically enriched layers of topsoil.

Potential Impacts

The types of potential impacts to soils for the 2011 Steele City Alternative are essentially the same as for the proposed Project (see Section 4.2, Soils) and include soil erosion, loss of topsoil, soil compaction, soil contamination, damage to existing tile drainage systems, and permanent increases in the proportion of large rocks in topsoil. Table 5.2-2 compares the impacts of the 2011 Steele City Alternative with the proposed Project for several key soil characteristics. These impacts would primarily occur during construction, with the potential for wind and water erosion in limited areas where restoration is not effective. Any areas subject to erosion would be identified during operational monitoring and stabilized.

Table 5.2-2 Soils: Comparison of the Steele City Alternative and Proposed Project

Resource Characteristics	Proposed Project (all units in miles)	2011 Steele City Alternative (all units in miles)
Total Miles	875.0	854.0
Highly Erodible (wind)	66.2	115.9
Highly Erodible (water)	375.5	298.8
Prime Farmland ^a	349.2	273.7
Hydric Soils ^b	53.6	28.5
Compaction Prone	626.1	603.9
Stony/Rocky	73.7	51.8
Shallow with Bedrock	5.3	5.5
Drought Prone	127.9	160.3

^a Prime Farmland as defined by the Natural Resources Conservation Service are those areas that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and are also available for these land uses.

^b Hydric Soils are soils that developed under sufficiently wet conditions to support the growth and regeneration of wetland vegetation.

The primary difference between the 2011 Steele City Alternative route and the proposed Project route is that although the 2011 Steele City Alternative route is 20 miles shorter than the proposed Project route, it would cross the NDEQ-identified Sand Hills Region of Nebraska, which is particularly vulnerable to wind erosion. The 2011 Steele City Alternative route would cross approximately 116 miles of soils highly susceptible to wind erosion (approximately 90 miles of which are located in the NDEQ-identified Sand Hills Region) compared with approximately 66 miles for the proposed Project route (which does not cross the NDEQ-identified Sand Hills Region). Concerns about crossing the NDEQ-identified Sand Hills Region was a primary factor cited by the Department for not granting a Presidential Permit pursuant to the 2011 Final EIS.

5.2.1.3 Water Resources

Groundwater

Environmental Setting

The 2011 Steele City Alternative route would cross the Northern High Plains Aquifer (NHPAQ) in Nebraska, passing through an area immediately upgradient of the town of Clarks, Nebraska's wellhead protection area, and through a portion of the wellhead protection area for the town of Western, Nebraska. The NHPAQ is at or near the surface through much of the portion of the NDEQ-defined Sand Hills Region that would be crossed by the Alternative route. The proposed Project route would pass downgradient of the Clarks wellhead protection area, and several miles upgradient of the Western wellhead protection area. The proposed Project route would traverse approximately 89 miles of the NHPAQ in Nebraska. See Section 3.3.2.1, Hydrogeologic Setting, for a detailed description of the region's hydrogeology.

Potential Impacts

In Nebraska, more wells are within 1 mile of the proposed Project route (2,124 total, with 919 potentially less than 50 feet deep) than for the 2011 Steele City Alternative route (1,194 total, with 565 potentially less than 50 feet deep).

The NDEQ-identified Sand Hills Region, through which the 2011 Steele City Alternative route passes, is characterized by highly permeable sandy soils at the surface and by very shallow groundwater, especially in interdunal areas. Petroleum product releases in these areas could be expected to be conveyed to groundwater relatively rapidly. By avoiding the NDEQ-identified Sand Hills Region, the proposed Project reduces potential impacts to groundwater quality compared to the 2011 Steele City Alternative. With respect to groundwater resources, the 2011 Steele City Alternative has the following primary differences from the proposed Project:

- The Alternative route would cross the NDEQ-identified Sand Hills Region and the proposed Project route would not.
- The Alternative route would pass immediately upgradient of the Clarks WHPA and the proposed Project route would pass downgradient of this area.
- The Alternative route would cross a portion of the town of Western WHPA and the proposed Project route would not.

Although the 2011 Steele City Alternative route is only 20 miles shorter than the proposed Project route, it would cross 129 fewer waterbodies, including eight fewer perennial waterbody

crossings. In addition, the 2011 Steele City Alternative route would cross 57 fewer mapped floodplains than the proposed Project route.

Surface Water

Environmental Setting

The 2011 Steele City Alternative route would enter north-central Nebraska near the edge of the northern NDEQ-identified Sand Hills Region and the northern High Plains Region, both of which are subdivisions of the Great Plains province. As described earlier, the NDEQ-identified Sand Hills Region in north and central Nebraska comprises one of the most distinct and homogeneous ecoregions in North America and includes one of the largest areas of grass-stabilized sand deposits in the world. The area is relatively treeless with the exception of areas adjacent to streams and rivers (riparian areas, which are areas where birds of prey nest and or hunt). The predominant terrain includes rolling to steep, irregular sand dunes, and gently sloping valleys. Tertiary sedimentary formations of sandstones and conglomerates (gravel and stones larger than sand) are deeply covered by Quaternary clay-rich sedimentary deposits (aeolian¹ sand and loess²) (Wiken et. al 2011).

Large portions of the NDEQ-identified Sand Hills Region contain many lakes and wetlands that lack definitive surface drainage or a stream network because of the surface and near surface groundwater. The NDEQ-identified Sand Hills Region is a major recharge zone for the Ogallala Aquifer. The highly porous Aeolian deposits allow for infiltration of precipitation and lateral movement in the deposits. Because water can move so quickly into and within these loose sediments, there is not much overland flow.

Potential Impacts

Impacts to surface water that would occur during construction and operation of the 2011 Steele City Alternative are generally consistent with those for the proposed Project, as presented in Sections 4.3.3.3, Operational Related Impacts and 4.3.3.4, Floodplains, which include:

- Temporary increases in total suspended solid concentrations and increased sedimentation during stream crossings or at upland locations with soil erosion and transport to streams;
- Temporary to long-term changes in channel morphology and stability caused by channel and bank modifications;
- Temporary to long-term decrease in bank stability and resultant increase in total suspended solids concentrations from bank erosion as vegetation removed from banks during construction is re-establishing; and
- Temporary reduced flow in streams and potential other adverse effects during hydrostatic testing activities and stream crossing construction.

Construction impacts to surface water resources associated with hazardous liquids spills and leaks are discussed in Section 4.13, Potential Releases. Temporary impacts to floodplains would also occur during construction of both the 2011 Steele City Alternative and the proposed Project;

¹ Aeolian is the process by which wind-blown sand is moved and deposited.

² Loess is the deposited windblown materials including both silt and sand.

however, in both cases floodplains would be restored to as close to previously existing contours as practical and the disturbed areas would be re-vegetated.

Potential operational impacts would involve spills or damage to the pipeline caused by erosion and subsequent exposure. Impacts associated with potential crude oil releases from pipeline operation are addressed in Section 4.13, Potential Releases. Channel migration and streambed degradation could expose the pipeline. Mitigation measures, including accounting for each stream channel’s vertical and lateral migration zone, as described in Section 4.3.3.4, Floodplains, and Section 4.3.4, Recommended Additional Mitigation, would be implemented to minimize the potential for exposing the pipeline.

Table 5.2-3 compares the surface water resources that would potentially be impacted for the 2011 Steele City Alternative and the proposed Project. As shown in the table, the 2011 Steele City Alternative route would cross 129 fewer waterbodies and eight fewer perennial stream crossings than the proposed Project. One key difference in potential impacts to surface water resources between the 2011 Steele City Alternative and the proposed Project is that the 2011 Steele City Alternative route would pass directly through the NDEQ-identified Sand Hills Region in Nebraska. Many riparian areas and banks of streams and rivers through this region are highly susceptible to erosion. The sensitive nature of the surface landscape and the relatively shallow groundwater tables would require additional mitigation measures to be implemented during and after construction of a buried pipeline. Additional mitigation measures would include preventing soil mixing and minimizing the loss and degradation of topsoil from erosion, implementing specific construction methods to ensure that disturbed areas are returned to pre-construction conditions, and conserving topsoil (through segregation and stockpiling) for post-construction replacement and reclamation. In areas with identified low-revegetation-potential soils, additional evaluation would be undertaken to identify recommended topsoil salvage depths sufficient to conserve the high-organic-content soils, which do not contain physical or chemical conditions that could inhibit soil capability. In addition, if trench dewatering is necessary, care would be taken to discharge water away from stored topsoil.

Table 5.2-3 Surface Water: Comparison of the Steele City Alternative and Proposed Project

Resources	Proposed Project	2011 Steele City Alternative
Waterbody Crossings	1,073	944
Perennial Waterbody Crossings	56	48
Other Waterbody Crossings	1,017	896
Waterbodies with Impairments Crossed	19	24
Mapped Floodplains Crossed	33	90
Nebraska Summary by Resource	Proposed Project	2011 Steel City Alternative
Nebraska Waterbody Crossings	281	157
Perennial Waterbody Crossings	31	28
Other Waterbody Crossings	250	129
Waterbodies with State Use Classifications	40	22
Waterbodies with Impairments	10	5
Mapped Floodplains	74	17

5.2.1.4 Wetlands

Environmental Setting

The U.S. Environmental Protection Agency (USEPA) has delineated Nebraska into several ecoregions, which are relatively large units of land and water delineated by biotic and abiotic factors (e.g., climate, topography, geology, vegetation) that regulate the structure and function of the ecosystems within them (Nebraska Game and Parks Commission [NGPC] 2005). The quantitative amount of distributed wetlands that would be crossed by the 2011 Steele City Alternative route and the proposed Project route differ, and are illustrated on Figure 5.2.1-2. Wetlands along the 2011 Steele City Alternative route in Nebraska are characterized by several regional complexes, including the NDEQ-identified Sand Hills Region, the Central Table Playas, and the Rainwater Basin (Nebraska Game and Parks Commission [NGPC] 2005). NDEQ-identified Sand Hills Region wetlands and wetlands adjacent to this region have similar characteristics and include saturated wet meadows, shallow marshes, and lakes supported by shallow aquifer conditions, as discussed in Section 3.3.2, Groundwater. Central Table Playa wetlands, located in the central portion of the state, are associated with loess (wind-deposited silt) deposits and are typically small, seasonally flooded wetlands. Wetlands in the Rainwater Basin of south-central Nebraska include wetlands associated with gently rolling loess-covered plains. In Nebraska, the 2011 Steele City Alternative route would cross the Prairie Pothole Region only for a few miles near the South Dakota border (USEPA 2010, USEPA 2011), based on the extent of the Northwestern Glaciated Plains Ecoregion (USEPA 2011).

There are many wetland areas located within the NDEQ-identified Sand Hills Region and the surrounding area which are considered sensitive wetland areas. These sensitive wetlands in Nebraska are regional wetlands that have been identified as being important natural resources and include the NDEQ-identified Sand Hills Region, the Rainwater Basin, and the Prairie Pothole Region; refer to Section 3.4.3.1, Sensitive Wetland Areas, for additional details. Protected wetlands (i.e., wetland easements) would occur along both routes; refer to Section 3.4.3.2, Protected Wetlands, for details regarding wetland easements that would occur along the proposed Project route.

Potential Impacts

Section 4.4.2, Impact Assessment Methodology, discusses the impact assessment methodologies used to determine the potential impacts related to the Steele City Alternative and the proposed Project. The types of potential impacts to wetlands for the 2011 Steele City Alternative are essentially the same as for the proposed Project (see Section 4.4.3.1, Potential Wetland Impacts) and include permanent loss of wetlands and vegetation as a result of permanent fill; temporary to permanent loss of surface and subsurface flow patterns; loss or alteration of wetland soil integrity; temporary increase in turbidity and water quality; and general wetland impacts associated with hazardous liquid spills and leaks during the construction and operational phases of the Project.

An estimate of wetland acreages that would be affected by the proposed 2011 Steele City Alternative and the proposed Project are summarized in Table 5.2-4. Estimated impacts are based on the impact analysis methods described in Section 4.4, Wetlands. Impacts are categorized by phase (construction versus operations).

Table 5.2-4 Wetlands: Comparison of the Steele City Alternative and Proposed Project

Wetland Type ^a	Proposed Project		2011 Steele City Alternative	
	Construction Impacts (acres)	Operations Impacts (acres)	Construction Impacts (acres)	Operations Impacts (acres)
PEM	127.6	55.2	410.5	186.4
PSS	53.3	22.5	56.9	24.1
PFO	7.1	5.0	4.4	1.9
Riv-OW	74.2	37.8	72.3	35.0
Total	262.2	120.5	544.1	247.4

Sources: exp Energy Services Inc. 2012a, and 2012 b; U.S. Fish and Wildlife Service (USFWS) 2012; Fry 2011; U.S. Geological Survey (USGS) 2010.

^a Cowardin et al. 1979; PEM = palustrine emergent; PSS = palustrine scrub-shrub; PFO = palustrine forested; Riv-OW = riverine-open water.

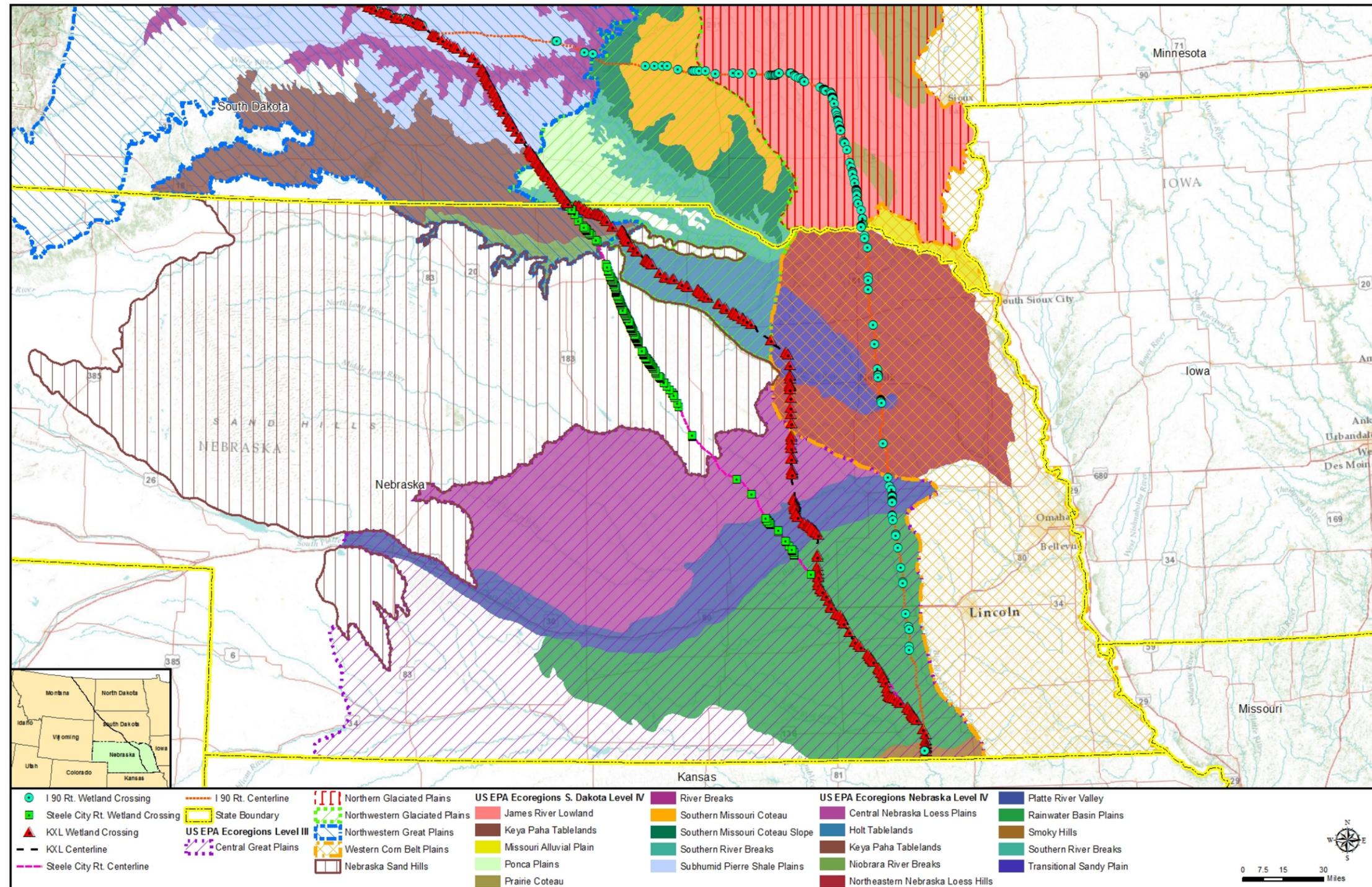
Approximately twice as many total wetlands would be affected within the operations ROW by the 2011 Steele City Alternative route (247.4 acres) than by the proposed Project route (120.5 acres). The comparison of total impacts within the construction ROW yields similar conclusions (i.e., approximately twice as much acreage impacted in the case of the 2011 Steele City Alternative route). Estimated impacts to PSS, PFO, and Riverine/Openwater wetlands are similar for both routes; however, over three times as many PEM (emergent wetlands), which primarily occur in the NDEQ-identified Sand Hills Region, would be impacted along the 2011 Steele City Alternative route.

The 2011 Steele City Corridor alternative would cross approximately 70 miles more of sensitive wetland regions than the proposed Project (see Table 5.2-5).

Table 5.2-5 Wetlands: Comparison of Sensitive Wetland Regions that would be Crossed by the 2011 Steele City Alternative and the Proposed Project

Wetland Region	Proposed Project (Miles Crossed)	2011 Steele City Alternative (Miles Crossed)
Prairie Pothole	127	113
Rainwater Basin	96	90
Sand Hills	0	90
TOTAL	223	293

The mitigation measures described for the proposed Project in Section 4.4.3, Potential Impacts, and Section 4.4.4, Recommended Additional Mitigation, would also apply to the 2011 Steele City Alternative. No additional mitigation measures would be required.



Source: exp Energy Services Inc. 2012b; USFWS 2012; Fry 2011; USGS 2011; USEPA 2011a, b.

Figure 5.2.1-2 Route Alternatives and Proposed Project Route, USEPA Ecoregions, and Wetland Distribution

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5.2.1.5 Terrestrial Vegetation

Environmental Setting

The generalized vegetation cover and ecosystems that would be crossed by the 2011 Steele City Alternative route are similar to those that would be crossed by the proposed Project, but differ in two main ways: 1) The 2011 Steele City Alternative route would cross the NDEQ-identified Sand Hills Region; and 2) The proposed Project route would cross through the Keya Paha Watershed, Lower Niobrara River, and Lower Loup River unique landscapes in Nebraska with priority cottonwood-willow riparian woodlands.

Land cover types crossed by the proposed Project were identified and delineated based on review of desktop analysis and general observations during field reconnaissance. Vegetative cover is an important component in the classification of ecoregions that reflects differences in ecosystem quality and integrity (USEPA 2007). At the northern end of the proposed Project route, the vegetation is predominately comprised of mixed-grass prairies and sagebrush (*Artemisia* spp.), which transitions southerly to tallgrass prairies. These general landscapes are further classified into 11 USEPA-rated Level III Ecoregions, and the landscapes specific to Nebraska include: Northwestern Glaciated Plains (9 percent); Northwestern Great Plains (36 percent); Nebraska Sand Hills (7 percent); and Central Great Plains (11 percent). The remaining ecoregions occur to the south.

Potential Impacts

The data for the 2011 Steele City Alternative and the proposed Project are derived from a centerline provided by Keystone. Data presented for the 2011 Steele City Segment are based on literature review and consultation with regional scientists. The proposed Project route has been evaluated in the Supplemental EIS using geographical information system data. In an effort to accurately assess and compare the impacts for the 2011 Steele City Alternative route and the proposed Project route, both routes were analyzed using the 2011 National Land Cover Database (NLCD) (Fry et al. 2011). This database provides a more precise rendering of spatial boundaries between the land cover classes.

Section 4.5, Terrestrial Vegetation, discusses the impact assessment methodologies used to determine the potential impacts related to the 2011 Steele City Alternative and the proposed Project. Table 5.2-6 below provides a summary of the potential construction and operation impacts to vegetation (in acres) for the 2011 Steele City Alternative and the proposed Project. Similar vegetation types would be impacted (native grasslands; sagebrush grasslands; riparian habitats and bottom-wood hardwoods; and native forest communities) by the 2011 Steele City Alternative and the proposed Project. As shown in Table 5.2-6, the 2011 Steele City Alternative construction would involve fewer impacts to cultivated crops, areas of upland forest, forested wetlands, and developed lands than the proposed Project. Conversely, the proposed Project would impact less grassland/prairies, emergent herbaceous wetlands, and shrub/scrub-lands.

Table 5.2-6 Vegetation: Summary of Estimated Impacts on Vegetation Communities Crossed (Acres)^a 2011 Steele City Alternative and Proposed Project

	Cultivated Crops	Grassland/Pasture	Upland Forest	Open Water	Forested Wetlands ^b	Emergent Herbaceous Wetlands ^b	Shrub/Scrub	Developed Land	Total ^d
Totals Construction									
2011 Steele City Alternative	2,786	7,801	32	15	63	57	461	173	11,387
Proposed Project	3,873	6,983	38	15	63	29	452	214	11,667
Totals Operation^c									
2011 Steele City Alternative	0	0	14.3	0	28.5	0	0	0	42.8
Proposed Project	0	0	17.1	0	28.4	0	0	0	45.5

Source: National Land Cover Database (Fry et al. 2011).

a Data for both alternatives is based on disturbance within a 110-foot construction and the 50-foot operation ROW. Acreage does not include disturbance associated with any ancillary activities outside of the ROWs.

b Wetland acreage is based on NLCD for comparison and does not reflect the specific data provided in the Wetlands Section 5.2.1.4.

c All non-forested areas would be restored to preconstruction conditions.

d Totals may not match due to rounding.

In addition to general vegetation impacts, vegetation communities of conservation concern would also be impacted, as shown in Table 5.2-7. The 2011 Steele City Alternative construction would impact an additional 135 acres of native grasslands (which are of conservation concern in Nebraska). This difference is because the 2011 Steele City Alternative would pass through the NDEQ-identified Sand Hills Region. In contrast, to avoid the NDEQ-identified Sand Hills Region, the proposed Project would extend outside of the NDEQ-identified Sand Hills Region as a means to avoid this environmentally sensitive landscape.

Table 5.2-7 Vegetation: Comparison of Estimated Impacts on Vegetation Communities of Conservation Concern^a 2011 Steele City Alternative and Proposed Project

	Forest Communities ^b Acres Impacted	Riparian Forest Acres Impacted	Native Grasslands ^c Acres Impacted	Sagebrush Grasslands ^d Acres Impacted
Total Construction				
2011 Steele City Alternative	141.4	88.7	4,814.9	740.6
Proposed Project	141.4	85.2	4,679.9	740.4
Total Operation^e				
2011 Steele City Alternative	63.0	40.6	0	0
Proposed Project	63.0	85.2	0	0

Source: USGS GAP Analysis (USGS 2011).

a Data for both alternatives is based on disturbance within a 110-foot construction and the 50-foot operation ROW. Acreage does not include disturbance associated with any ancillary activities outside of the ROWs.

b All non-forested areas would be restored to preconstruction conditions.

c Native Grasslands include mixed-grass and tallgrass prairie ecosystems as identified in the GAP Analysis (USGS 2011).

d Sagebrush Steppe length and communities crossed based on Inter Mountain Basins Big Sagebrush Steppe Ecosystem layer (USGS 2011).

e All non-forested areas would be restored to preconstruction conditions.

The removal of vegetation and associated soils would create long-term impacts in the cases of both the 2011 Steele City Alternative and the proposed Project, as discussed in Section 4.5.4, Potential Impacts to Biologically Unique Landscapes and Vegetation Communities of Conservation Concern. Removing the native soils and clearing the vegetation may create instability within the soils and prevent re-establishment of the various grass mixtures. It may take between 1 and 5 years for the seed mixtures to become established or longer, depending on the nature of the routine maintenance and/or the introduction of invasive species. Shrub-land species may take between 5 and 15 years to re-establish, while trees may take between 20 to 50 years to re-establish, also based on whether restored areas are located within or outside of maintained ROW.

The mitigation measures described for the proposed Project would also apply to the proposed 2011 Steele City Alternative. No additional mitigation measures would be required.

5.2.1.6 Wildlife

Environmental Setting

The 2011 Steele City Alternative route and the proposed Project route would cross areas with a diversity of wildlife including big game animals, small game animals and furbearers, waterfowl and game birds, and many other nongame animals³ (see Section 3.6, Wildlife) and their associated habitats (see Section 5.2.1.5). Some of these wildlife habitats discussed include threatened and endangered species' habitats, which are discussed below in Section 5.2.1.8. As shown in Table 5.2-6, approximately 24 percent of habitat (2,786 acres) that would be crossed by the 2011 Steele City Alternative has been converted to agricultural land with crops such as soybean, corn, and hay in various phases of production. Approximately 33 percent of habitat (3,873 acres) that would be crossed by the proposed Project has been converted to agricultural land.

In general, the same big game, small game, and furbearer species; waterfowl and game birds; non-game animals and mammals; raptors and other migratory birds (regulated under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act); and herpetiles (reptiles and amphibians) are found within the areas that would be crossed by the 2011 Steele City Alternative and the proposed Project. The only difference in the list of species that may be affected is the addition (for the 2011 Steele City Alternative route) of two more species, the American dipper (*Cinctus mexicanus*) and the olive-sided flycatcher (*Contopus cooperi*) (Nebraska Ornithologist Union 2012). A complete list of species found in areas that would be crossed by both the 2011 Steele City Alternative and the proposed Project is presented in Tables 3.6-2, 3.6-3, 3.6-4, 3.6-5, 3.6-6, and 3.6-7.

As with the proposed Project, the 2011 Steele City Alternative would also cross three bird conservation regions that are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues, as defined by the U.S. North American Bird Conservation Initiative (USNABCI 2012). These regions are Prairie Potholes (Region 11),

³ Common names of animals are used in this section. Scientific names following nomenclature in the NatureServe Explorer database (NatureServe 2012) for most animals discussed in this section are listed in Tables 3.6-2, 3.6-3, 3.6-4, 3.6-5, 3.6-6, and 3.6-7. Where animals discussed in this section are not included in these tables, common names are followed by the scientific name.

which provides breeding and migratory habitat to over 200 species of birds; Badlands and Prairies (Region 17), which is habitat for some of the healthiest populations of high-priority dry-grassland birds; and Central Mixed Grass Prairie (Region 19), which acts as an important spring migration area (USNABCI 2012).

Potential Impacts

Similar to the proposed Project, the construction of the 2011 Steele City Alternative would have direct, indirect, temporary (short-term and long-term), or permanent impacts on wildlife resources (see Section 4.6, Wildlife, for additional information). The impacts of the proposed Project and of the 2011 Steele City Alternative on wildlife resources have been evaluated using a combination of quantitative and qualitative assessments of the potential direct and indirect impacts to species and their habitat through literature review and consultation with regional biologists. Potential impacts associated with the 2011 Steele City Alternative are essentially the same as for the proposed Project (see Section 4.6.3, Potential Impacts) and principally include fragmentation of wildlife habitat. The following are wildlife habitat fragmentation issues relevant for pipeline construction and operation:

- Reduction in patch size of remaining available habitats;
- Creation of edge effects;
- Creation of barriers to movement;
- Intrusion of invasive plants, animals, and nest parasites;
- Facilitation of predator movements;
- Habitat disturbance; and
- Intrusion of humans (Hinkle et al. 2002).

Additional impacts to wildlife include direct mortality during construction and operation; indirect mortality due to stress from construction and operations; reduced breeding success from exposure from construction and operation activities; and reduced survival due to overall disruption of habitat and food sources. Table 5.2-8 summarizes potential wildlife impacts for the 2011 Steele City Alternative and the proposed Project. Operational impacts would be limited to the permanent easement where maintenance activities would prevent the establishment of trees.

Table 5.2-8 Wildlife: Comparison of Types of Wildlife Impacts for Steele City Alternative and Proposed Project

Resource	2011 Steele City Alternative	Proposed Project
Big Game	Construction disturbance, habitat fragmentation, noise, human disturbance	Construction disturbance, habitat fragmentation, noise, human disturbance
Small Game and Furbearers	Habitat loss, direct mortality, human disturbance	Habitat loss, direct mortality, human disturbance
Waterfowl and Game Birds	Nesting, feeding, roosting disturbance	Nesting, feeding, roosting disturbance
Non-game Mammals	Habitat fragmentation	Habitat fragmentation
Raptors and Other Migratory Birds	Nesting, feeding, roosting disturbance	Nesting, feeding, roosting disturbance
Herpetiles	Habitat loss, direct mortality, human disturbance	Habitat loss, direct mortality, human disturbance
Insects	Habitat loss, direct mortality, human disturbance	Habitat loss, direct mortality, human disturbance

The NDEQ-identified Sand Hills Region is comprised of rolling sand dunes covered with grassland that is home to approximately 314 species of wildlife (USFWS 2012). This area is also important to migrating birds, as it lies in the middle of the Central Flyway. Use by mammals, herpetiles, and invertebrates in the NDEQ-identified Sand Hills Region may be higher than other regions due to the large expanses of undisturbed and undeveloped habitat. The proposed Project would avoid the NDEQ-identified Sand Hills Region.

Construction of the 2011 Steele City Alternative would result in disturbance of about 11,387 acres of various habitat types, including approximately 7,801 acres of grasslands and rangelands, 32 acres of upland forested habitat, and 120 acres of wetland habitats, including 63 acres of forested wetlands and 57 acres of emergent herbaceous wetlands (see Table 5.2-6). Construction of the proposed Project would result in disturbance of about 11,667 acres of various habitat types, including approximately 6,983 acres of grasslands and rangelands, 38 acres of upland forested habitat, and 92 acres of wetland habitats, including 63 acres of forested wetlands and 29 acres of emergent herbaceous wetlands. This indicates that the 2011 Steele City Alternative would impact less (approximately 280 acres) vegetation than the proposed Project.

Both the 2011 Steele City Alternative route and the proposed Project route would cross areas considered important habitats used by wildlife (see Table 5.2-9). Encompassing both public and private lands, these areas include wetland and conservation easements, Important Bird Areas (IBAs), river valleys, and state wildlife areas. The linear impacts described in this section apply equally to both construction and operation.

Table 5.2-9 Wildlife: Comparison of Important Wildlife Habitats that would be Crossed by the 2011 Steele City Segment Alternative Route and the Proposed Project Route

Name	Ownership and Description	Miles Crossed by 2011 Steele City Alternative Route	Miles Crossed by Proposed Project Route
Nebraska			
Keya Paya River Valley	Various	~0.4	22.4
Niobrara River Valley	Various	~0.5	5.7
Sand Hills	Various	46.8	NA ^a
Cedar River Valley	Various	~0.1	NA
Verdigris/Bazile	Various	NA	11.4
Loup River Valley	Various	~0.4	5.2
Platte River Valley	Various	~0.5	NA
Rainwater Basin	Various	50.0	69.5
Conservation Reserve Program	Private	5.2	na ^b

Source: Schneider et al. 2012, National Audubon Society 2012, Keystone 2012.

^a NA = not applicable. Pipeline would not cross these areas, therefore, no acreage would be crossed.

^b na = not available. Additional relevant information is pending and will be included in this review as part of the Final Supplemental EIS.

Mitigation measures similar to those described for the proposed Project would be required to minimize the potential wildlife impacts of the 2011 Steele City Alternative. The proposed Project attempts to reduce these impacts by avoiding the NDEQ-identified Sand Hills Region.

5.2.1.7 Fisheries

Environmental Setting

Fisheries information was derived primarily from fishery distribution maps available on agency websites supplemented by information provided by regional biologists. The 2011 Steele City Alternative would involve 48 perennial stream crossings (some crossed multiple times) including the Keya Paha River, Spring Creek, Niobrara River, Holt Creek, South Fork Elkhorn River, Cedar River, South Branch Timber Creek, Fullerton Canal, Loup River, Prairie Creek, Warm Slough, Platte River, Big Blue River, Lincoln Creek, Beaver Creek, West Fork Big Blue River, Turkey Creek, and various unnamed tributaries including the unnamed tributary to South Branch Timber Creek, the unnamed tributary to Platte River, and the unnamed tributary to Turkey Creek (see Section 3.7, Fisheries, Table 3.7-3). These creeks and rivers contain known or potential habitat for fish of recreational or commercial value. The proposed Project would have 56 perennial stream crossings, including one cold water stream, Spring Creek, which is rated as Class B water. Cold water fish that may be maintained year-round by stocking in Spring Creek could include brook trout, brown trout, or rainbow trout.

The 2011 Steele City Alternative route would cross many of the same streams and rivers as the proposed Project but would typically cross them further upstream. Additionally, the 2011 Steele City Alternative route would traverse portions of the NDEQ-identified Sand Hills Region while the proposed Project route would avoid the NDEQ-identified Sand Hills Region.

As a result of the relatively close proximity of the routes, in combination with the broad distributions of these species, the recreational and commercial fish species that occur along the 2011 Steele City Alternative route are the same species that occur along the proposed Project

route. These species are listed in Table 3.7-1 and are discussed in more detail in Section 3.7.2, Environmental Setting. Correspondingly, spawning periods and habitats for the recreational and commercial fish species that occur along the 2011 Steele City Alternative route are the same as for the proposed Project. The spawning periods and habitat are presented in Table 3.7-2 and are discussed in more detail in Section 3.7.2.1, Fisheries Resources.

Potential Impacts

The impacts of the proposed Project on fisheries and aquatic resources were evaluated through literature review and consultation with regional biologists. Field studies continue to be conducted along the proposed Project route, the results of which will be reported in fall 2012 and spring 2013. The types of potential impacts to fisheries for the 2011 Steele City Alternative are essentially the same as for the proposed Project (see Section 4.7.3, Potential Impacts) and include increased sedimentation, increased total suspended solids, restriction or delay of fish movement, water temperature alteration, bank alteration, riparian habitat alteration, potential for invasion of invasive species, and reduction of aquatic habitat. Table 5.2-10 provides a comparison between the 2011 Steele City Alternative and the proposed Project of the number of perennial stream crossings that contain known or potential habitat for fishes of recreational or commercial value.

Table 5.2-10 Fisheries: Comparison of the 2011 Steele City Alternative and Proposed Project

Resource Characteristics	Proposed Project	2011 Steele City Alternative
Perennial Stream Crossings	56	48
Open-cut Crossing Method ^a	43	36
HDD Crossing Method ^b	13	12

^a Open cut = One of the four open cut methods (non-flowing, flowing, dry flume, or dry dam-and-pump) would be used for these crossings.

^b The HDD method would also be used to cross one intermittent waterbody, Bridger Creek (MP 433.6). Bridger Creek will be crossed by both the Proposed project route and the Steele City Alternative.

The 2011 Steele City Alternative would have 48 perennial stream crossings, while the proposed Project route would have 56 perennial stream crossings. Two perennial fisheries streams would be crossed twice by the proposed Project route: an unnamed tributary to the South Branch Timber Creek and an unnamed tributary to the Platte River. The horizontal directional drilling (HDD) method would be used at 12 of the 48 perennial crossings for the 2011 Steele City Alternative, and at 13 of the 56 perennial crossings for the proposed Project. In addition, the HDD method would be used to cross one intermittent waterbody, Bridger Creek (MP 433.6), which would be crossed by both the Proposed project route and the Steele City Alternative. The HDD method would reduce the removal of vegetation and avoid impacts of sedimentation or temperature within the waterbodies. All other perennial stream crossings in Nebraska would use either the open-cut wet crossing method or an open-cut dry crossing method. Also as previously discussed, the 2011 Steele City Alternative would extend through the NDEQ-identified Sand Hills Region, which is comprised of environmentally sensitive landscapes. The proposed Project's route would avoid this Region and there would be correspondingly fewer impacts to associated creeks, rivers, and overall fisheries.

The mitigation measures described for the proposed Project would also apply to the proposed 2011 Steele City Alternative. No additional mitigation measures would be required.

5.2.1.8 Threatened and Endangered Species

Environmental Setting

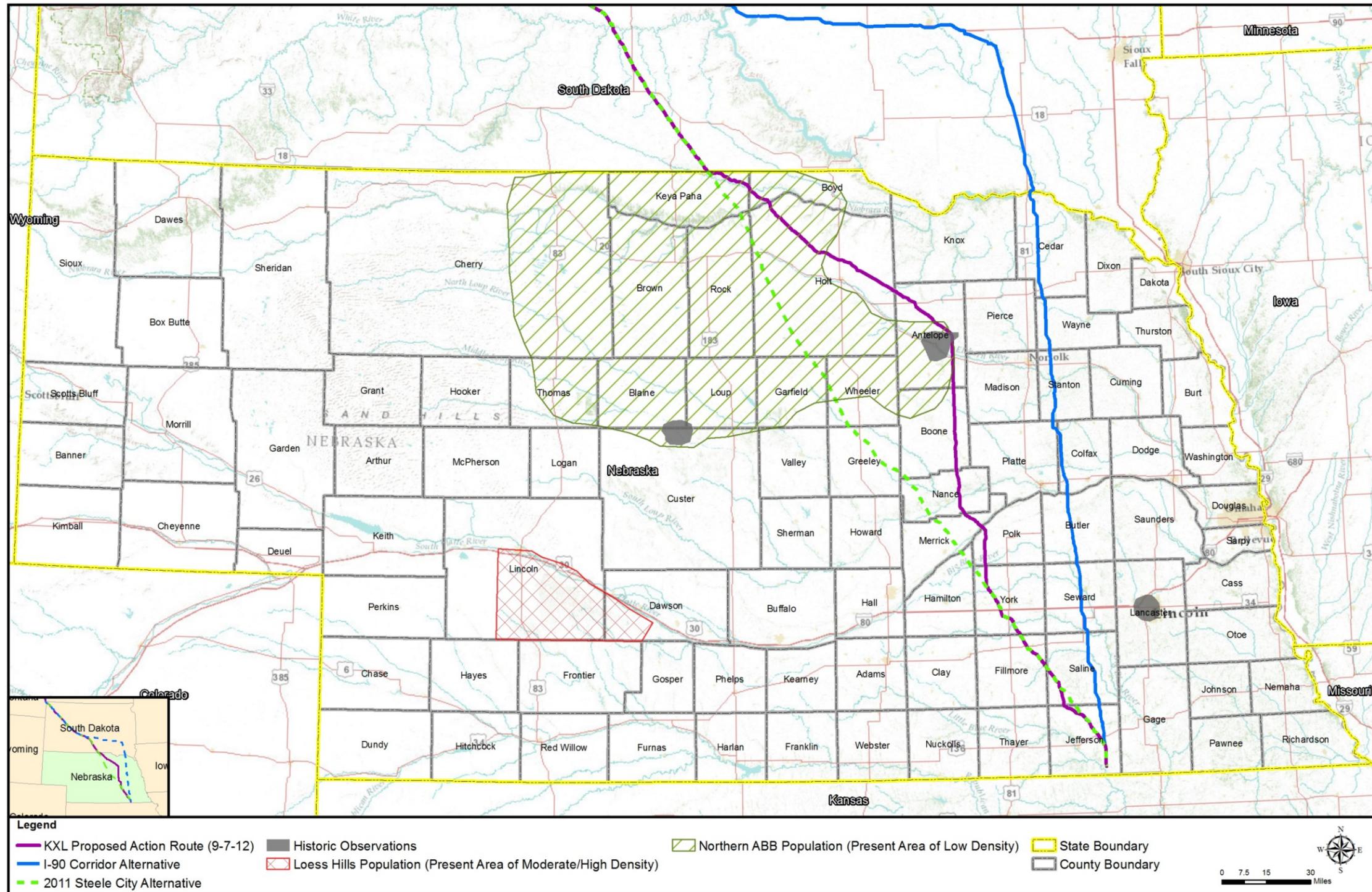
In northern and central Nebraska, the 2011 Steele City Alternative route would cross portions of the NDEQ-identified Sand Hills Region in Keya Paha, Rock, Holt, Garfield, Wheeler, Greeley, and Merrick counties. Most (95 percent) of the NDEQ-identified Sand Hills Region remains in a relatively natural state maintained as native grasslands for livestock grazing and contains a variety of native plant communities, with nearly 700 native plants and associated high biological diversity (Schneider et al. 2005). The rich flora and fauna supported by the NDEQ-identified Sand Hills Region is one of the few remaining examples of a functioning prairie ecosystem. Of note, the NDEQ-identified Sand Hills Region has a large concentration of the American burying beetle (*Nicrophorus americanus*), a federal- and Nebraska-endangered invertebrate, and the blowout penstemon (*Penstemon haydenii*), a federal- and Nebraska-endangered plant. These two species are briefly discussed below.

There are two primary populations of American burying beetles occurring in Nebraska—a southern and a northern population (Figure 5.2.1-3 below; USFWS 2008). In the south, the American burying beetle occurs in loess canyons, and in the north a large population occurs in the NDEQ-identified Sand Hills Region, concentrated in Holt, Garfield, and Rock counties. The 2011 Steele City Alternative route would cross through all three of these counties, where most of the northern population occurs.

Another species that is strongly associated with the NDEQ-identified Sand Hills Region is the blowout penstemon. Stubbendieck's 2008 unpublished study of annual monitoring for this species indicates that there are currently 32 blowout penstemon populations (10 native population sites and 22 introduced population sites), all of which occur in the NDEQ-identified Sand Hills Region (USFWS 2012). This plant is a pioneer species that grows in shifting sand in blowouts, which are round or conical eroded areas formed in the sand when prevailing northwesterly winds scoop out the sides of dunes where vegetative cover is removed or disturbed. However, based on a review of the known occurrences of this species, the blowout penstemon is not known to occur within the area that would be crossed by the 2011 Steele City Alternative route.

Potential Impacts

The impacts of the proposed Project on federal or state-listed endangered, threatened, proposed, or candidate species, Bureau of Land Management sensitive species, and species of conservation concern have been evaluated using a qualitative evaluation of the potential direct and indirect impacts to species and their habitats resulting from the Project's construction and operation activities. Candidate species are those petitioned species that are actively being considered for listing as endangered or threatened under the Endangered Species Act, as well as those species for which agencies have initiated an Endangered Species Act status review that have been announced in the Federal Register.



Source: USFWS 2008.

Figure 5.2.1-3 2007 Estimated American Burying Beetle Distribution in Nebraska

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The Department and USFWS have had informal consultations regarding nine federally endangered species, two threatened species, and two candidate species for federal protection (see Table 4.8-1) along the length of the proposed Project route. Of these species, the American burying beetle is the only federally listed species determined to be potentially adversely affected by the proposed Project. As discussed in Section 4.8, Threatened and Endangered Species, the proposed Project could result in indirect and/or short-term impacts to federal or state-listed endangered, threatened, proposed, or candidate species, Bureau of Land Management sensitive species, and species of conservation concern, including:

- Habitat loss, alteration, and fragmentation;
- Direct mortality during construction and operation;
- Indirect mortality because of stress or avoidance of feeding due to exposure to construction and operations noise, and from increased human activity;
- Reduced breeding success from exposure to construction and operations noise, and/or from increased human activity;
- Reduced survival or reproduction due to decreased abundance of food species or reduced cover;
- Loss of individuals and habitats due to exposure to toxic materials or crude oil releases (addressed in Section 4.13, Potential Releases); and
- Direct mortality due to collision with or electrocution by power lines associated pump stations.

The proposed Project would have direct, permanent, construction-related impacts and direct, long-term, operational impacts on the American burying beetle. American burying beetle surveys were conducted along the 2011 Steele City Alternative route and the proposed Project route. These survey results indicate that there is a higher density of American burying beetles along the 2011 Steele City Alternative route in Nebraska than along the proposed Project route in Nebraska. Thus, the 2011 Steele City Alternative would be expected to have greater impacts on this species.

In addition, the 2011 Steele City Alternative would cross through more grassland/pasture and less cultivated crops and developed land than the proposed Project (see Table 5.2-6). Grassland/pasture is more favorable habitat for protected species, and crops and developed land are generally unsuitable for protected species. As a result of crossing through a greater quantity of better quality habitat for protected species, the 2011 Steele City Alternative ROW would be expected to have greater potential impacts on protected species.

Surveys assumed that American burying beetles would likely occur in prime and good habitats and would not be expected to occur regularly in fair habitat, while marginal or poor habitats would be unsuitable for sustaining American burying beetles. Surveys for this species along the proposed Project route (see 2012 Biological Assessment in Appendix H of this Supplemental EIS for more information on these surveys) determined that the proposed Project route would cross approximately 50 miles (see Section 3.8.3.4) of habitat that supports low numbers of American burying beetle in Nebraska.

Surveys conducted in 2009 and 2010 along the 2011 Steele City Alternative route identified that there would be approximately 11.4 miles of fair/good habitat and 84 miles of prime habitat along the 2011 Steele City Alternative (Table 5.2-11).

Table 5.2-11 American Burying Beetle: Fair/Good and Prime Habitat along the Nebraska 2011 Steele City Alternative Route and Proposed Project Route

	Habitat Rating	
	Fair/Good	Prime
2011 Steele City Alternative Route	11.4 miles	84 miles
Proposed Project Route	50 miles	0 miles

Note: The impacts described in this table apply to both construction and operation.

Mitigation measures similar to those described for the proposed Project would be required to minimize potential impacts to American burying beetle, and all other protected species that may be impacted by the project construction and operation activities.

In summary, the 2011 Steele City Alternative would have greater impacts on the American burying beetle and other protected species habitat than the proposed Project. Neither route would be expected to impact any federally designated critical habitat.

5.2.1.9 Land Use, Recreation, and Visual Resources

Environmental Setting

The affected environment for land use, recreation, and visual resources for the 2011 Steele City Alternative is described in the Final EIS for the proposed Project. Table 5.2-12 summarizes the land ownership, and Table 5.2-13 summarizes land use that would be crossed by the 2011 Steele City Alternative route. Both tables also include similar information for the proposed Project (repeated from the Land Use Affected Environment discussion in Section 3.9; Land Use, Recreation, and Visual Resources).

Table 5.2-12 Land Use: Land Ownership Comparison of the 2011 Steele City Alternative and Proposed Project by ROW Length

Alternative	Existing Land Ownership Status (miles crossed)					
	Federal	State ^a	Local (Public) ^b	Private	Waterbody ^c	Total ^d
2011 Steele City Alternative	44.6	52.5	NA ^e	756.9	NA	854
Percent of Total	5.1%	6.1%	NA	88.8%	NA	100%
Proposed Project	46.4	60.9	2.3	763.6	1.8	875
Percent of Total	5.3%	7.0%	0.3%	87.2%	0.2%	100%
Difference ^f	1.7	8.4	2.3	6.4	1.8	21

Source: USGS 2011.

^a Includes state highway ROW. The Final EIS did not distinguish between state and local public land; this analysis assumes that both were combined in the “State” category.

^b May not include all county road ROW. The Final EIS did not report this information; local ownership is presumed to be incorporated into the “state” category (“n/a” indicates “not applicable”).

^c Includes waterbodies not located on a parcel under federal, state, or local ownership. The Final EIS did not report this information; waterbody crossings are assumed to be included in other categories.

^d Totals may not match due to rounding.

^e NA = not applicable.

^f Proposed Project minus 2011 Steele City Route Alternative. Total rounded to nearest mile. .

Table 5.2-13 Land Use: Comparison of the 2011 Steele City Alternative and Proposed Project by ROW Length

Alternative	Land Use Type (miles crossed)					Total ^a
	Agriculture	Developed	Forest	Rangeland	Water/Wetland	
2011 Steele City Alternative	264.4	10.3	6.5	554.7	18.1	854.0
Percent of Total	31.0%	1.1%	0.7%	65.1%	2.1%	100%
Proposed Project	344.6	10.2	6.5	505.5	8.2	875
Percent of Total	39.4%	1.2%	0.7%	57.8%	0.9%	100%
Difference ^b	80.2	-0.1	-0.2	-49.2	-9.4	21

Source: USGS 2006.

^a Totals may not match due to rounding.

^b Proposed Project minus 2011 Steele City Route Alternative. Total rounded to nearest mile.

The linear impacts described in this table apply to both construction and operation.

The 2011 Steele City Alternative route is slightly shorter than the proposed Project route, and would cross slightly less state-owned land; other land ownership is similar to the proposed Project. The 2011 Steele City Alternative route crosses less agricultural land and more rangeland than the proposed Project route.

The 2011 Steele City Alternative route would have 23 perennial river/stream crossings in Nebraska, compared to 31 for the proposed Project route. Otherwise, compared to the proposed Project, there is no substantial difference in the type and amount of recreational and special-use areas that would be crossed by the 2011 Steele City Alternative route. Similarly, there is little overall difference in the visual character of the landscape that would be crossed by the two routes.

Potential Impacts

The impacts of the 2011 Steele City Alternative are generally of the same type as the proposed Project, but differ slightly in intensity. Table 5.2-14 summarizes the acres of land ownership for construction and operation, and Table 5.2-15 summarizes the acres of land use for construction and operation that would be affected by the 2011 Steele City Alternative. Both tables also include similar information for the proposed Project (repeated from the Land Use impacts discussion in Section 4.9), for comparison. The 2011 Steele City Alternative would affect land ownership in approximately the same proportions (i.e., federal vs. private land), but would affect less land overall. The 2011 Steele City Alternative would affect approximately 2,100 fewer agricultural acres than the proposed Project during construction. The 2011 Steele City Alternative would permanently affect more rangeland and less agricultural land than the proposed Project. The 2011 Steele City Alternative effects on recreational and visual resources would largely be the same as for the proposed Project.

Table 5.2-14 Land Use: Land Ownership Comparison of the 2011 Steele City Alternative and Proposed Project by ROW Area

Alternative	Acres of Easement Required (Existing Ownership Type), Construction (Temporary) ^a				Total
	Federal	State ^b	Local ^b	Private	
2011 Steele City Alternative	523.8	649.0	NA	10,214.2	11,387
Percent of Total	4.6%	5.7%	NA	89.7%	100%
Proposed Project	595.0	723.4	105.0	10,243.6	11,667
Percent of Total	5.1%	6.2%	0.9%	87.8%	100%
Difference ^d	71.2	74.4	NA	-29.4	

Alternative	Acres of Easement Acquired (Existing Ownership Type), Operations (Permanent) ^a				Total
	Federal	State ^b	Local ^b	Private	
2011 Steele City Alternative	238.0	295.2	NA	4,642.8	5,176
Percent of Total	4.6%	5.7%	NA	89.7%	100%
Proposed Project	275.8	376.5	31.8	4,618.9	5,303
Percent of Total	5.2%	7.1%	0.6%	87.1%	100%
Difference ^d	37.8	81.3	n/a	(23.9)	127

Source: USGS 2011.

^a For the 2011 Steele City Alternative, construction acreages are cited from the Final EIS, while operations acreages are estimated based on the difference between construction ROW (110 feet) and operations ROW (50 feet).

^b The Final EIS did not call out locally owned public land. This Supplemental EIS assumes that local public land was incorporated into the State category.

^c NA = not applicable.

^d Proposed Project minus 2011 Steele City Route Alternative.

Table 5.2-15 Land Use: Comparison of the 2011 Steele City Alternative and Proposed Project by ROW Area

Alternative	Acres of Easement Required (Existing Ownership Type), Construction (Temporary) ^a					Total ^b
	Agriculture	Developed	Forest	Rangeland	Water/Wetlands	
2011 Steele City Alignment	3,416.2	136.6	79.7	7,526.8	227.7	11,387
Percent of Total	30.0%	1.2%	0.7%	66.1%	2.0%	100%
Proposed Project	4,480.1	525.0	70.0	6,521.8	70.1	11,667
Percent of Total	38.4%	4.5%	0.6%	55.9%	0.6%	100%
Difference ^c	1,063.9	388.4	(9.7)	(1,005.0)	(157.6)	280

Alternative	Acres of Easement Required (Existing Ownership Type), Operations (Permanent) ^a					Total ^b
	Agriculture	Developed	Forest	Rangeland	Water/Wetlands	
2011 Steele City Alignment	1,552.8	62.1	36.2	3,421.3	103.6	5,176
Percent of Total	30.0%	1.2%	0.7%	66.1%	2.0%	100%
Proposed Project	2,073.4	100.7	37.1	3,038.6	53.2	5,303
Percent of Total	39.1%	1.9%	0.7%	57.4%	1.0%	100%
Difference ^c	520.6	38.6	0.9	(382.7)	(50.4)	127

Source: USGS 2006.

^a For the 2011 Steele City Alignment, construction acreages are cited from the Final EIS, while operations acreages are calculated based on the difference between construction ROW (110 feet) and operations ROW (50 feet).

^b totals may not match due to rounding.

^c Proposed Project minus 2011 Steele City Route Alternative.

5.2.1.10 Socioeconomics

Environmental Setting

The 2011 Steele City Alternative route would follow the same route as the proposed Project except that Gregory County, South Dakota, and three counties in Nebraska (Boyd, Antelope, and Polk) would not be affected in the case of the Alternative route, while five other Nebraska counties would be affected (Rock, Garfield, Wheeler, Greeley, and Hamilton). Table 5.2-16 summarizes the key socioeconomic characteristics of the areas that would be affected by the 2011 Steele City Alternative and the proposed Project.

Table 5.2-16 Socioeconomics: Comparison of Selected Characteristics of Areas that would be affected by the 2011 Steele City Alternative and Proposed Project

Characteristic	Alternative		Difference ^b
	2011 Steele City Alternative	Proposed Project	
2010 Population ^a	265,163	267,569	2,406
2010 At-Place Employment ^a	176,035	171,826	(4,209)
Property Value (billions) ^a	\$30.5	\$30.7	\$0.2
Effective Property Tax Rate	1.8%	1.7%	(0.1%)
Road Crossings	720	840	120
Rail Crossings	14	19	5

^a Total for all counties crossed by each route.

^b Proposed Project minus 2011 Steele City Route Alternative.

Population and Socioeconomic Conditions

The affected populations along the route for the 2011 Steele City Alternative and proposed Project are very similar at 265,163 persons and 267,569 persons, respectively. There are 14 communities (i.e., cities and towns) within 2 miles of the 2011 Steele City Alternative route, while the proposed Project has 17 communities within 2 miles. Total employment in counties that would be affected by the 2011 Steele City Alternative is slightly higher than for counties that would be affected by the proposed Project.

Environmental Justice

The same environmental justice populations identified in Montana, South Dakota, and Kansas for the proposed Project could also be affected by the construction of the 2011 Steele City Alternative. Two additional environmental justice populations could be affected under the 2011 Steele City Alternative: a low-income population in Keya Paha County, Nebraska, and a minority population in York County, Nebraska (see Appendix O, Socioeconomics, for data).

Public Services

A total of 72 police/sheriff departments, 88 fire departments, and 24 medical facilities are located in the counties that would be crossed by the 2011 Steele City Alternative route. This compares to 67 police/sheriff departments, 86 fire departments, and 24 medical facilities for the proposed Project. The net difference in public service types is entirely in Nebraska (including a different set of medical facilities). Appendix O, Socioeconomics, includes a table listing these facilities.

Tax Revenues and Property Values

The importance of property tax revenue to local governments is the same under the 2011 Steele City Alternative as under the proposed Project. The local tax bases are similar in size, and effective tax rates fall within the same range among the counties in each state in the areas potentially affected by the 2011 Steele City Alternative and the proposed Project. Appendix O, Socioeconomics, includes a table with the 2010 data on local property taxes for potentially affected counties under the 2011 Steele City Alternative.

Traffic and Transportation

In the case of the 2011 Steele City Alternative, there would be approximately 720 road crossings and 14 rail crossings (Final EIS Table 3.10.3-1). This compares to 840 road crossings and 19 rail crossings under the proposed Project. Most of this difference is in the number of crossings of Category I roads (local roads).

Potential Impacts

Table 5.2-17 summarizes some of the key socioeconomic characteristics of the 2011 Steele City Alternative and the proposed Project. The impacts of the Alternative are generally of the same type as the proposed Project, but differ slightly in intensity. Those differences are discussed below.

Table 5.2-17 Socioeconomics: Comparison of Selected Impacts of the 2011 Steele City Alternative and Proposed Project

Characteristic	Alternative		
	2011 Steele City Alignment	Proposed Project	Difference^b
Construction Workforce (average annual employment)	3,900	3,900	(0)
Capital Cost (billions)	\$3.0	\$3.1	(\$0.1)
Construction Earnings (billions) ^a	\$1.98	\$2.05	(\$0.07)
Gross Domestic Product (billions)	\$3.29	\$3.4	(\$0.11)
Property Tax Revenue (millions)	\$34.1	\$34.5	(\$0.4)

^a Includes earnings (defined in Section 4.10.3.1, Local Economic Activity) for all industries in the United States as a result of the 2011 Steele City Alternative and proposed Project.

^b 2011 Steele City Route Alternative minus Proposed Project.

Population/Housing

Construction of the 2011 Steele City Alternative route would require slightly less construction workers for the 1-2 year construction period than what would be required for the proposed Project. This number is equivalent to approximately 1.5 percent of the entire population along the 2011 Steele City Alternative route. As in the case of the proposed Project, the workers would be distributed along the route, and would also work on a single pipeline spread for 4-8 months, lessening the effects that the population would have on local areas.

There are approximately 74 more hotel/motel rooms along the 2011 Steele City Alternative route than the proposed Project; however, compared to the number of construction workers (slightly fewer), the alternative's effects on regional housing are expected to be the same as for the proposed Project.

Local Economic Activity

Definitions of employment and earnings as well as a description of modeling techniques are described in Section 4.10.3.1, Local Economic Activity. The primary difference in the construction cost of the proposed Project and 2011 Steele City Alternative is the difference in length—the 2011 Steele City Alternative is approximately 20 miles shorter.

The 2011 Steele City Alternative does not include a construction camp in Nebraska. Beyond the cost implications of this difference, the 2011 Steele City Alternative also assumes that existing commercial lodging and accommodations (not construction camps) would house the construction workforce in Nebraska, whereas the proposed Project includes a construction camp in northern Nebraska for this purpose. Net employment (including indirect and induced employment in other parts of the nation) triggered by construction of the 2011 Steele City Alternative would be approximately 1,700 less than under the proposed Project, primarily due to the shorter pipeline length and the difference in worker accommodations.

Earnings in the United States would be about \$72 million lower under the 2011 Steele City Alternative, compared to the proposed Project, as a result of the fewer pipeline miles in the Alternative. This represents less than 4 percent of the total earnings for the Alternative.

Economic Indicators of National Interest

Definitions of Gross State Product (GSP) and Gross Domestic Product (GDP) as well as their relationship with earnings are described in Section 4.10.3.1, Local Economic Activity. Construction of the 2011 Steele City Alternative would contribute approximately \$3.29 billion to GDP, compared to approximately \$3.40 billion for the proposed Project. The GSP in Montana and South Dakota would be unchanged, while the GSP in Nebraska would be approximately \$11 million less under the 2011 Steele City Alternative. The differences in GDP and GSP are primarily due to the shorter pipeline length and the difference in worker accommodations in the 2011 Steele City Alternative.

Environmental Justice

The types of impacts to minority and low-income populations that could occur during construction and operations of the 2011 Steele City Alternative would be the same as those described for the proposed Project, which could include increased competition for medical or health services in underserved populations.

The environmental justice populations present along the 2011 Steele City Alternative in Keya Paha and York counties, Nebraska could potentially be affected by construction activity or by pipeline operations (see Environmental Setting above). One railroad siding and one contractor yard would be located in York County, Nebraska, where a minority population is found (exp Energy Services Inc. 2012). Also, a pipe yard has been proposed for Keya Paha County, Nebraska, which contains a low-income population (Keystone 2012b). These two counties contain Health Professional Shortage Areas (HPSA) and Medically Underserved Areas/Populations (MUA/P).

Because the exact locations of the railroad siding, contractor yard, and pipe yard sites have not yet been determined, the potential effect of those facilities on the environmental justice populations is unknown. These facilities, however, would all be temporary, lasting only a few months during construction, and, therefore, any potential effects on environmental justice

populations would be short term. Should the 2011 Steele City Alternative be recommended, the potential effects would be evaluated based on the then proposed locations during siting and design. Appendix O, Socioeconomics, provides information about the HPSAs and MUA/Ps in relation to areas with minority and/or low-income populations.⁴

Tax Revenues

During construction, total state sales and use and contractors' excise tax revenue would be approximately the same for the 2011 Steele City Alternative as for the proposed Project. Construction-based taxes from the 2011 Steele City Alternative would be slightly higher in South Dakota than for the proposed Project and slightly lower in Nebraska, with the differences estimated roughly in proportion to differences in pipeline mileage in each state.

Total property tax revenue would be about the same for the 2011 Steele City Alternative as for the proposed Project in all states except Nebraska where total property tax revenue would be slightly lower because of less pipeline mileage in the state. Only counties with Keystone XL facilities (pipeline, pump stations, etc.) would receive property taxes associated with the 2011 Steele City Alternative. On a per capita basis for all situs counties, total property tax revenue for the 2011 Steele City Alternative would be approximately \$128 versus \$129 for the proposed Project.

Property Values

Impacts to private property values during construction and operations under the 2011 Steele City Alternative would be similar to the proposed Project in character and in the low level of impact, as described in Section 4.10.3.1, Construction—Public Services, Tax Revenues, and Property Values, and Section 4.10.3.2 Operations—Public Services, Tax Revenues, and Property Values. However, the impacts would occur in different counties in Nebraska under the 2011 Steele City Alternative, as previously described in this section.

Traffic and Transportation

Impacts on traffic and transportation under the 2011 Steele City Alternative would be similar to, but less extensive than, those described for the proposed Project, due to the reduced number of road and railroad crossings, required work areas, and access points. As with the proposed Project, the 2011 Steele City Alternative would create only short-term traffic congestion and delays during construction, and no appreciable impacts on traffic and transportation during operations.

5.2.1.11 Cultural Resources

Environmental Setting

The 2011 Final EIS evaluated the environmental setting and impacts to cultural resources based on a 300-foot-wide survey area, or area of potential effects (APE), that included the construction ROW. This same APE was used to compare the shared segments of the 2011 Steele City Alternative and the proposed Project. For segments of the proposed Project outside of the route

⁴ Information for HPSAs and MUA/Ps is only available at the county level.

evaluated in the Final EIS, a 500-foot APE was used (based on Section 3.11, Cultural Resources). Table 5.2-18 summarizes existing cultural resources information for these two alignments.

Table 5.2-18 Cultural Resources: Comparison of Resources near the 2011 Steele City Alignment and Proposed Project

Cultural Resource Type	Alternative		Difference ^a
	2011 Steele City Alignment	Proposed Project	
Archaeological Sites	373	251	122
Historic Structures	120	147	-27
Historic Trails	5	5	0
Total	498	403	95
Eligible for National Register of Historic Places (NRHP)	69	45	24
Not Eligible for NRHP	267	205	62
NRHP Eligibility Undetermined	162	153	9

^a Proposed Project minus 2011 Steele City Route Alternative.

Of cultural resources within the APE for the 2011 Steele City Alignment, the Final EIS identified 498 cultural resources, including 373 archaeological sites, 120 historic structures, and five historic trails. Of these cultural resources, 69 are eligible for inclusion on the NRHP, 267 are not eligible, and 162 were unevaluated or pending eligibility determinations/concurrence at the time of the Final EIS. As of October 2012, 403 cultural resources have been identified during the cultural resources surveys within the proposed Project APE, including 251 archaeological sites, 147 historic structures, and five historic trails. Of the 403 cultural resources, 45 are eligible for inclusion on the NRHP, 205 are not eligible, and 153 are unevaluated or pending eligibility determinations/concurrence.

Potential Impacts

Avoidance is recommended for all eligible and unevaluated cultural resources sites, regardless of the route selected. By avoiding these sites, the 2011 Steele City Alternative and proposed Project would have no effect on these historic properties during construction or operations. The Department will continue to consult with state and federal agencies and Native American tribes about the significance of sites and work to avoid any adverse effects to the resources, following the protocols outlined in the Programmatic Agreement developed for the proposed Project.

5.2.1.12 Air Quality and Noise

Environmental Setting

The 2011 Steele City Alternative is the same as described for the proposed Project (see Section 3.12, Air Quality and Noise), except in northern Nebraska where the 2011 Steele City Alternative diverts from the proposed Project at approximate MP 602 near the border with South Dakota. These affected areas in Nebraska are rural and their major sources of air pollution and noise are from agricultural activities. Further, these affected areas are located in areas designated as attainment (i.e., areas with good air quality). The low population densities in these affected areas and the lack of industrial facilities are similar to those of the proposed Project, so the existing air quality and noise levels for this alternative are expected to be similar to those of the proposed Project.

Potential Impacts

Air Quality

Air emissions (criteria pollutants, hazardous air pollutants, and greenhouse gases [GHGs]) from construction of the 2011 Steele City Alternative would be similar but slightly less than that for the proposed Project. This is due to the 2011 Steele City Alternative's shorter pipeline length (854 miles) in comparison to that of the proposed Project (875 miles). During the construction phase, similar to the proposed Project, the 2011 Steele City Alternative would occur over a short term and temporary period, and, as such, is expected to have similar but slightly less (approximately 2 percent lower) air quality and GHG impacts during the construction phase (for the proposed Project, see Section 4.12.3, Potential Impacts).

During the operational phase, the 2011 Steele City Alternative would generate less than 1 ton per year of fugitive volatile organic compounds and less than 1 metric ton per year of fugitive methane emissions from approximately 57 intermediate mainline valves (IMLVs) along the pipeline route and from valves, pumps, flanges, and connectors at associated pump stations. These minimal fugitive emissions (direct emissions) would be essentially the same as those generated by the proposed Project, which would have approximately 55 IMLVs along the pipeline route and the same number of components (valves, pumps, flanges, and connectors) per pump station. Like the proposed Project, the 2011 Steele City Alternative would have 20 pump stations.

The 20 pump stations associated with the Alternative would be located in the same e-GRID (Emissions & Generation Resource Integrated Database)⁵ region as the proposed Project, and, as such, would generate the same amount of indirect GHG emissions from electricity consumption

⁵ E-GRID is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. These environmental characteristics include air emissions for nitrogen oxides, sulfur dioxide, carbon dioxide, methane, and nitrous oxide; emissions rates; net generation; resource mix; and many other attributes. The United States is grouped into multiple e-GRID regions based on the different energy mix (i.e., percent of coal, natural gas, fuel oil, hydropower, wind power, etc.) in different parts of the country. For example regions with a high percent of coal in its energy mix would have higher e-GRID emission factors when compared to regions with high percent of natural gas or hydropower. See the following for more information: http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2012V1_0_year09_SummaryTables.pdf.

(3.19 million metric tons of carbon dioxide equivalent). Air emissions associated with refueling construction equipment/vehicles and use of maintenance vehicles (approximately twice per year) and aircraft for aerial inspections (once every 2 weeks) throughout the operation phase would be negligible. Compared to the proposed Project, the 2011 Steele City Alternative would be expected to have similar air quality and GHG impacts during the operational phase (see Section 4.12.3, Potential Impacts).

Noise

The level of noise generated from construction of the 2011 Steele City Alternative would be comparable to that of the proposed Project because of the similar types of construction equipment and activities, including HDD and blasting. Like the proposed Project, the 2011 Steele City Alternative would generate high noise levels in its immediate vicinity (approximately 79 decibels on the A-weighted scale at 200 feet) over a short term and temporary period, and, as such, would be expected to have similar noise impacts during the construction phase (see Section 4.12.3, Potential Impacts).

During operations, the only source of noise from the 2011 Steele City Alternative would be the pump stations. The 2011 Steele City Alternative would have the same number of pump stations (20 pump stations) and pump numbers and sizes (three to five pumps per station; each pump rated 6,500 horsepower) as the proposed Project, so the magnitude and extent of pump station noise would be similar to those of the proposed Project. Like the proposed Project, the pump stations for this alternative would be located in rural areas with low population densities. Therefore, the impact of the pump station noise from this alternative would be comparable to that of the proposed Project during the operation phase (see Section 4.12.3, Potential Impacts).

5.2.1.13 Climate Change

Environmental Setting

The 2011 Steele City Alternative is in the same climate regions (Dry Temperate and Prairie) as the proposed Project since the pipeline route crosses the same states. Therefore, the historical climate trends (i.e., temperature changes in the affected states) for this alternative are essentially the same as described for the proposed Project (see Section 4.14.1.1, Historical Climate Trends).

Potential Impacts

The projected climate change impact on the 2011 Steele City Alternative is similar to that of the proposed Project because of the similarities in climate regions crossed by the two routes (see Section 4.14.1.2, Projected Climate Change Effects).

5.2.2 I-90 Corridor Alternative

The I-90 Corridor Alternative would follow the same route as the proposed Project route in Montana and northern South Dakota. At approximately MP 516 in South Dakota, the I-90 Corridor Alternative would turn east and follow interstate I-90 for approximately 144 miles to mile post 660. The I-90 Corridor Alternative would then intersect an existing corridor shared by the BNSF railroad line and State Highway 262 (BNSF/262). From this location, the I-90 Corridor Alternative would travel southeast away from I-90, parallel and adjacent to the BNSF/262 corridor for approximately 13 miles until intersecting with the existing Keystone

Pipeline ROW at mile post 673. The I-90 Corridor Alternative would then head south along the existing Keystone pipeline for approximately 254 miles to Steele City, Nebraska, for a total length of approximately 927 miles. For the purpose of this analysis, it is assumed that the I-90 Corridor Alternative would be co-located with the existing Keystone pipeline for approximately 254 miles and the new ROW would occupy 25 feet of the existing Keystone ROW (i.e., only 25 feet of additional permanent ROW required instead of typical 50 feet). Overall, the I-90 Corridor Alternative would be 927 miles long, approximately 52 miles longer than the proposed Project alignment.

5.2.2.1 *Geology*

Environmental Setting

Even where the corridors differ, the regional surficial and bedrock geology for the I-90 Corridor Alternative is essentially the same as the proposed Project, with Quaternary deposits on the surface and Tertiary and Late Cretaceous bedrock formations below. The predominant terrain associated with this alternative includes rolling to steep, irregular hills, and gently sloping valleys. Tertiary sedimentary formations of sandstones and conglomerates (sedimentary rocks that consist of at least thirty percent of its total mass in gravel-sized particles) are deeply covered by Quaternary clay rich sedimentary deposits (aeolian sand and loess).

Geologic features that would be crossed or within 1 mile of the I-90 Corridor Alternative include high risk landslide areas, fossil fuel and mineral resources, and potentially important fossil containing formations that can be near the surface. The extent of these features associated with this alternative is summarized in Table 5.2-19.

Table 5.2-19 Geology: Comparison of the I-90 Corridor Alternative to the Proposed Project Alternative

Resource Potentially Impacted/Risk	Proposed Project (all units in miles)	I-90 Corridor Alternative (all units in miles)
		Total
High Risk Landslide Areas	338.8	337.1
Fossil Fuel and Mineral Resources	24 oil and gas wells within 0.25 mile; 1 gravel pit within 0.5 mile; 5 aggregate mines within 1 mile of Proposed route	24 oil and gas wells within 0.25 mile, 1 gravel pit, and 2 aggregate mines within 1 mile of this alternative
Fossil Containing Formations (Paleontology)	~599 miles sporadically between MP 3.0 and 875	~659 miles

Potential Impacts

A summary of potential geologic impacts that would be associated with the I-90 Corridor Alternative as compared to the proposed Project is presented in Table 5.2-19. As with the proposed Project, the I-90 Corridor Alternative would not cross any known active faults with confirmed surface offsets. Based on the FEMA landscape hazard ranking system (LSHR) mapping, as described in Section 3.1.2.5, the I-90 Corridor Alternative would cross approximately 337.1 miles of areas where conditions with a high risks for landslides could be encountered, which is slightly less than for the proposed Project, which would cross approximately 338.8 miles of these areas with these high risks.

Landslides typically occur on steep terrain (slopes of 20% or greater) during conditions of partial or total soil saturation, or during seismic activity (Section 3.1.2.5 and 4.1.3.4). Given the low likelihood of a significant seismic event and relatively limited extent of steep slopes along the I-90 Corridor Alternative route, the potential for earthquake-induced landslide potential is low.

As described in Section 4.1.3.4, four miles of the terrain crossed by the proposed Project route contain steep slopes. Most of these steep sections are less than 0.1 mile in length and correspond to stream crossing locations. Based on a review of USGS topographic mapping, the terrain crossed by the I-90 Corridor Alternative where it diverges from the proposed Project is similar and the occurrence of steep slopes is anticipated to also be similar.

If the I-90 Corridor Alternative was recommended, planning and design surveys would identify areas of steep slopes. Where steep slopes could not be avoided, the construction and operation methods required by 49 CFR Parts 192 and 193 and additional soil erosion, sediment control, and slope stabilization measures identified in Section 4.1.3.4 would be implemented to minimize the risk of landslides associated with construction and operation on steep slopes.

Mineral resources identified include 24 oil or gas wells within 0.25 mile of the I-90 Corridor Alternative as well as one gravel pit, and two aggregate mines, within one mile of that Alternative route. The actual impacts to these resources would be negligible. There should not be any geology related environmental impacts associated with operations.

Valuable fossil-containing formations are classified as PFYC Class 4 (geologic units containing a high occurrence of significant fossils) or Class 5 (highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils, invertebrate or plant fossils, and that could be at risk of human-caused adverse impacts or natural degradation). As several formations along the I-90 Corridor Alternative route have fossil-containing sediments, it is likely that PFYC Class 4 or 5 paleontological specimens and fossil-bearing formations would be encountered along the route. Since PFYC Class 4 and 5 fossils occur sporadically throughout the formations, which may or may not contain surficial fossils, for the purpose of this assessment, the entire formation was noted and included in the total mileage of potential fossil occurrence. Based on a geologic and topographic desktop analysis, the I-90 Corridor Alternative crossed a total of approximately 659 miles of PFYC Class 4 or 5 formations compared to approximately 599 miles for the proposed Project. Both the proposed Project and the I-90 Corridor Alternative cross a similar number of miles ranked as Landscape Hazard Ranking System high risk landslide areas, in addition to having comparable impacts on fossil fuel and mineral resources in the vicinity of the routes.

The mitigation measures described for the proposed Project would also apply to the proposed I-90 Corridor Alternative. No additional mitigation measures would be required.

5.2.2.2 Soils

Environmental Setting

In southern South Dakota and northern Nebraska, the soils crossed by the I-90 Corridor Alternative are generally well-drained to moderately well-drained, and loamy or clayey, with some clays having shrink-swell potential that formed in till, moraines, or till plains. Soils in central to southern Nebraska that would be crossed by the I-90 Corridor Alternative generally

consist of deep loess deposits with some organic matter enrichment. South of the Platte River to the state line, the soils are largely silty loams with fine sands.

Sensitive soil types crossed by the I-90 Corridor Alternative include highly erodible soils, prime farmland soils, hydric soils, compaction prone soils, stony/rocky soils, soils over bedrock at or within 80 inches of the surface, and drought-prone soils. A summary of the sensitive soil types crossed by the I-90 Corridor Alternative is presented in Table 5.2-20. The linear impacts described in this section apply equally to both construction and operation.

Table 5.2-20 Soils: Comparison of the I-90 Corridor Alternative and Proposed Project

Resource Characteristics	Proposed Project (all units in miles)	I-90 Corridor Alternative (all units in miles)
Total Miles	875.0	927.0
Highly Erodible (wind)	66.2	36.4
Highly Erodible (water)	375.5	234.1
Prime Farmland ^a	349.2	214.3
Hydric Soils ^b	53.6	7.2
Compaction Prone	626.1	584.5
Stony/Rocky	73.7	79.4
Shallow with Bedrock ^c	5.3	12.5
Drought prone	127.9	98.8

^a Prime Farmland as defined by the Natural Resources Conservation Service are those areas that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these land uses.

^b Hydric Soils are soils that developed under sufficiently wet conditions to support the growth and regeneration of wetland vegetation.

^c Soils with bedrock at the surface and to a depth of 80 inches.

Potential Impacts

The types of potential impacts to soils for the I-90 Corridor Alternative are essentially the same as for the proposed Project (see Section 4.2, Soils) and include soil erosion, loss of topsoil, soil compaction, soil contamination, damage to existing tile drainage systems, and permanent increases in the proportion of large rocks in the topsoil. Table 5.2-20 compares potential impacts of the I-90 Corridor Alternative with the proposed Project for several sensitive soil characteristics. The I-90 Corridor Alternative would be approximately 52 miles longer than the proposed Project, which would result in approximately 677 acres of additional soil disturbance than the proposed Project. The I-90 Corridor Alternative, however, would cross 170 fewer miles of soils that are susceptible to wind or water erosion.

Mitigation measures to avoid or minimize soil impacts for this alternative would be similar to those described for the proposed Project. No additional mitigation measures would be required.

5.2.2.3 Water Resources

Groundwater

Environmental Setting

The I-90 Corridor Alternative route is situated in a similar regional hydrogeologic setting as the proposed Project area discussed in Section 3.3.2, Groundwater. In the western half of South Dakota, the hydrogeology along the I-90 Corridor Alternative route is similar to the hydrogeology that would be crossed by the proposed Project area. The eastern portion of the I-90 Corridor Alternative route in South Dakota and northeastern Nebraska has groundwater present in unconsolidated sand, gravel, and silt in valley-fill and sheet deposits of glacial outwash and recent alluvial sand and gravel deposits. In contrast to the proposed Project route, the I-90 Corridor Alternative route in eastern Nebraska is situated in areas of thick deposits of sandy sediment deposits with some clay (loess).

Although the NHPAQ is not present beneath the portion of the I-90 Corridor Alternative route that differs from the proposed Project in South Dakota, it is present beneath the I-90 Corridor Alternative in Nebraska. In addition, there are aquifers found along the I-90 corridor that are known to be important groundwater resources. The USGS Groundwater Atlas of the United States notes: “Unconsolidated deposits are widespread throughout [Montana, North Dakota, South Dakota, and Wyoming] and compose important aquifers either at the land surface or buried beneath low-permeability material. The aquifers are particularly widespread . . . in the subsurface, in buried glacial valleys, in eastern North Dakota, and South Dakota” (Whitehead 1996).

In addition, the I-90 Corridor Alternative would enter Nebraska in Cedar County, where heavily used shallow groundwater resources with high hydraulic conductivity are present in recent alluvium, including highly utilized alluvial aquifers in the Missouri River valley. Although these alluvial aquifers are not considered part of the NHPAQ, these aquifers are an important groundwater resource. Areas of shallow groundwater (between 0 feet and 50 feet) crossed by this alternative are presented in Table 5.2-21.

Table 5.2-21 Groundwater: Comparison of the I-90 Corridor Alternative and Proposed Pipeline

Resource Characteristics	Proposed Pipeline	I-90 Corridor Alternative
Total miles	875	927
Miles over the NHPAQ	261	158
Number of shallow and very shallow wells in alluvial aquifers in South Dakota	25-57 ^a	180 ^b

^a Twenty-three wells are known to be very shallow or shallow and 34 are likely to be very shallow or shallow.

^b Number is approximate.

Potential Impacts

Construction of the I-90 Corridor Alternative or the proposed Project would have negligible impacts to hydrogeologic resources. Potential impacts to groundwater resulting from a crude oil release associated with the I-90 Corridor Alternative would be similar to potential impacts associated with the proposed Project as discussed in Chapter 4, Environmental Consequences.

The I-90 Corridor Alternative route would have approximately 103 fewer miles of pipeline over the NHPAQ system (approximately 158 miles) as compared to the proposed Project. As stated above, although the NHPAQ is not present beneath the I-90 Corridor Alternative route in South Dakota, there are a significant number of shallow and very shallow wells situated in alluvial aquifers along the I-90 Corridor Alternative route. These shallow wells are located in aquifers that are known to be important groundwater resources.

Table 5.2-21 compares the impacts of the I-90 Corridor Alternative with the proposed Project route for several key characteristics. The impacts described in this section apply to both construction and operation.

Surface Water

Environmental Setting

Table 5.2-22 provides a summary of the surface water resources crossed by the I-90 Corridor Alternative. This I-90 Corridor Alternative would cross a total of 1,088 waterbodies within its 927 mile length.

Table 5.2-22 Surface Water: Comparison Between Water Resources in the I-90 Corridor Alternative and Proposed Project

Resource	I-90 Corridor Alternative	Proposed Project
Total Waterbody Crossings	1,088	1,073
Perennial Waterbody Crossings	61	56
Other Waterbody Crossings	1,027	1,017
Waterbodies with State Use Classifications	42	
Waterbodies with Impairments	24	19
Mapped Floodplains	87	33

Public drinking water is not withdrawn directly from the reservoir. However; protection of water quality in the watershed and in the lake is considered important for protection of local drinking water wells and municipal waters supplies downstream of the Fort Randall Dam.

One notable waterbody crossing in the I-90 Corridor Alternative would be Lake Francis Case, just south of the town of Chamberlain, South Dakota. This lake is a reservoir along the Missouri River formed by Fort Randall Dam located approximately 90 miles downstream of the potential crossing. The pipeline would remain parallel to the southern side of I-90 for the lake crossing. The lake is approximately 4,100 feet wide at this location. The Fort Randall Dam primary functions are flood control, hydroelectric power, navigation, fish and wildlife management, and recreation. The I-90 Corridor Alternative crossing of Lake Francis Case would be complex and site-specific studies would be required to validate the feasibility of crossing at this location. Based on a desktop review of the crossing conditions, the proposed crossing would approach the practical limits for horizontal directional drill methods of a 36-inch pipeline (approximately 6,000 feet). As a result, for the purposes of this evaluation, it is assumed that a wet-cut crossing method using barges and bottom dredging may be the needed to cross Lake Francis Case at this location.

Potential Impacts

Impacts to water resources would occur during construction and operation of the pipeline and are consistent with the types of impacts for the proposed Project, as presented in Sections 4.3.3.3, Operational-Related Impacts, and 4.3.3.4, Floodplains. Potential impacts on surface water resources during construction from the I-90 Corridor Alternative or the proposed Project would be similar and would include:

- Temporary increases in total suspended solid concentrations and increased sedimentation during stream crossings or at upland locations with soil erosion and transport to streams;
- Temporary to long-term changes in channel morphology and stability caused by channel and bank modifications;
- Temporary to long-term decrease in bank stability and resultant increase in total suspended solids concentrations from bank erosion as vegetation removed from banks during construction is re-establishing; and
- Temporary reduced flow in streams and potential other adverse effects during hydrostatic testing activities and stream crossing construction.

Construction impacts to surface water resources associated with hazardous liquids spills and leaks are discussed in Section 4.13, Potential Releases.

Reflecting its longer length, the I-90 Corridor Alternative would cross slightly more waterbodies and streams than the proposed Project (see Table 5.2-22), including a major crossing of Lake Francis Case. If a wet open cut crossing method was used for the crossing of Lake Francis Case, construction impacts would include temporary and localized increases in total suspended solid concentrations and increased sedimentation during stream crossings. Potential operational impacts would be similar to other waterbody crossings.

Temporary impacts to floodplains would also occur during construction of this alternative; however, these impacts would be mitigated by permit conditions that would require the floodplain to be restored to as close to previously existing contours as practical and the disturbed areas would be re-vegetated.

Potential operational impacts at surface water crossings include spills or damage to the pipeline caused by erosion and subsequent exposure. Impacts associated with potential crude oil releases from pipeline operation are addressed in Section 4.13, Potential Releases. Channel migration and streambed degradation could expose the pipeline. Mitigation measures, including accounting for each stream channel's vertical and lateral migration zone, as described in Section 4.3.3.4, Floodplains, and Section 4.3.4, Recommended Additional Mitigation, would be implemented to minimize the potential for exposing the pipeline.

5.2.2.4 Wetlands

Environmental Setting

The USEPA ecoregions (USEPA 2010) and the distribution of wetlands along the pipeline corridor are illustrated on Figure 5.2.1-2. The I-90 Corridor Alternative crosses a total of approximately 242 miles of the Prairie Pothole Region (USEPA 2010). The Prairie Pothole Region includes emergent wetlands, small lakes, and saline/alkaline wetlands that occur within a

landscape of glacial debris, rolling hills, depressions, and scars caused by glacial activity (U.S. Geological Survey [USGS] 2006, 1998). While no specific Prairie Pothole wetlands have been identified by the desktop survey, field surveys would be required to validate.

The I-90 Corridor Alternative would cross the Prairie Pothole Region and the Rainwater Basin Region, both of which support many sensitive wetlands (refer to Section 3.4.3.1, Sensitive Wetland Areas).

NRCS has identified a wetland easement within approximately 100 feet of the existing I-90 corridor at 395th Avenue in Davidson County, South Dakota, that is included in the NRCS Wetlands Reserve Program (WRP) (Section 30, Lots A and B) (NRCS Agreement 667409600C6G).

As currently drawn, the I-90 Corridor Alternative ROW could impact approximately 879 linear feet along the northern border of the WRP property easement. If this alternative was recommended for construction, site specific surveys would be conducted to verify the location of the I-90 Corridor Alternative ROW relative to the identified WRP easement boundaries. If impacts to this easement are identified, project modifications would be developed in cooperation with NRCS to avoid, or minimize and mitigate these impacts. This is also included in Table 5.2-28.

Potential Impacts

The I-90 Corridor Alternative would result in approximately 223 acres of temporary wetland impacts and approximately 101 acres of permanent wetland impacts, both of which are slightly less than the proposed Project (see Table 5.2-23). Approximately 20 percent more wetland impacts would occur within the operations ROW by the proposed Project route (120.4 acres) than by the I-90 Corridor Alternative route (100.9 acres).

Table 5.2-23 Wetlands: Comparison of Estimated ROW Wetland Impacts within the Proposed I-90 Corridor Alternative and proposed Project by Phase (Operations and Construction)

Wetland Type ^a	Proposed Project		I-90 Corridor Alternative	
	Construction (acres)	Operations (acres)	Construction (acres)	Operations (acres)
PEM	127.6	55.2	111.7	49.5
PSS	53.3	22.5	41.3	17.6
PFO	7.1	5.0	0.8	0.4
Riv-OW	74.2	37.8	69.6	33.4
Total	262.2	120.5	223.4	100.9

Sources: exp Energy Services Inc. 2012a, 2012b; USFWS 2012; Fry 2011; USGS 2011.

^a Cowardin et al. 1979; PEM = palustrine emergent; PSS = palustrine scrub-shrub; PFO = palustrine forested; Riv-OW = riverine-open water.

The I-90 Corridor alternative would cross approximately 104 miles more of sensitive wetland regions than the proposed project (see Table 5.2-24).

Table 5.2-24 Wetlands: Comparison of Wetlands Regions Crossed

Wetland Region	Proposed Project (Miles Crossed)	I-90 Corridor Alternative (Miles Crossed)
Prairie Pothole	127	242
Rainwater Basin	96	85
Sand Hills	0	0
Total	223	327

The mitigation measures described for the proposed Project in Section 4.4.3, Potential Impacts, and Section 4.4.4, Recommended Additional Mitigation, would also apply to the I-90 Corridor Alternative. No additional mitigation measures would be required.

5.2.2.5 Terrestrial Vegetation

Environmental Setting

The generalized vegetation cover and ecosystems that would be crossed by the I-90 Corridor Alternative are presented in Table 5.2-25. Vegetation communities of some conservation concern that would be crossed by the I-90 Corridor Alternative are shown in Table 5.2-26 and include forest communities, riparian forest, native grasslands, and sagebrush grasslands.

Table 5.2-25 Vegetation: Summary of Estimated Impacts on Vegetation Communities Crossed (Acres)^a

	Cultivated Crops	Grassland/ Pasture	Upland Forest	Open Water	Forested Wetlands^b	Emergent Herbaceous Wetlands^b	Shrub/Scrub	Developed Land	Total
Total Acres Construction									
I-90 Corridor Alternative	3,586	6,071	57	22	43	27	454	2,100	12,360
Proposed Project	3,873	6,983	38	15	63	29	452	214	11,667
Total Acres Operation^c									
I-90 Corridor Alternative	0	0	26	0	20	0	0	0	46
Proposed Project	0	0	17	0	29	0	0	0	46

Source: National Land Cover Database (Fry et al. 2011).

^a Data for both alternatives is based on disturbance within a 110-foot construction and the 50-foot operation ROW. Acreage does not include disturbance associated with any ancillary activities outside of the ROWs.

^b Wetland acreage based on National Land Cover Database and does not reflect the specific data provided in the Wetlands Section 5.2.1.4.

^c All non-forested areas would be restored to preconstruction conditions.

Table 5.2-26 Vegetation: Estimated Impacts on Vegetation Communities of Conservation Concern^a

	Forest Communities^b	Riparian Forest	Native Grasslands	Sagebrush Grasslands^d
	Acres Impacted	Acres Impacted	Acres Impacted	Acres Impacted
Total Construction				
I-90 Corridor Alternative	127.8	85.2	4,932.9	740.4
Proposed Project	141.4	85.2	4,679.9	740.4
Total Operation^e				
I-90 Corridor Alternative	55.6	39.1	0	0
Proposed Project	63.0	85.2	0	0

Source: USGS GAP Analysis (USGS 2011).

^a Data for both alternatives is based on disturbance within a 110-foot construction and the 50-foot operation ROW. Acreage does not include disturbance associated with any ancillary activities outside of the ROWs.

^b Forest communities occur intermittently throughout the route in the state of Nebraska.

^c Native Grasslands include mixed-grass and tallgrass prairie ecosystems as identified in the GAP Analysis (USGS 2011).

^d Sagebrush Steppe length and communities crossed based on Inter Mountain Basins Big Sagebrush Steppe Ecosystem layer (USGS 2011).

^e All non-forested areas would be restored to preconstruction conditions.

Potential Impacts

The I-90 Corridor Alternative and the proposed Project impacts are based on a 110 foot construction ROW created from the centerlines. These ROWs were subsequently analyzed using the 2011 National Land Cover Database (Fry et al. 2011). Table 5.2-25 provides a comparison of the miles crossed and the potential impacts to vegetation that would be associated with the I-90 Corridor Alternative during construction and operation and the proposed Project. Approximately 49 percent of the vegetation impacts from construction would be to grassland/pasture communities. In total, the I-90 Corridor Alternative is approximately 52 miles longer and would result in approximately 677 acres of increased construction impacts to vegetative communities.

The potential construction and operation impacts to the biologically unique landscapes and vegetation communities of conservation concern including native grasslands, Rainwater Basin, sagebrush grasslands, riparian habitats, and forest communities are presented in Table 5.2-26. With the exception of native grasslands, the I-90 Corridor and the proposed Project have very similar impacts to vegetation communities of conservation concern. The I-90 Corridor Alternative would cross approximately 17 more miles of native grassland than the proposed Project.

The mitigation measures described for the proposed Project would also apply to the proposed I-90 Corridor Alternative. No additional mitigation measures would be required.

5.2.2.6 *Wildlife*

Environmental Setting

The I-90 Corridor Alternative spans approximately 927 miles, and crosses areas with a diversity of wildlife including big game animals, small game animals and furbearers, waterfowl and game birds, and many other nongame animals⁶ (see Section 3.6, Wildlife) and their associated habitats (see Section 5.2.2.5, Terrestrial Vegetation). Some of these wildlife habitats include threatened and endangered species' habitats, which are discussed below in Section 5.2.2.8, Threatened and Endangered Species. As shown in Table 5.2-25, approximately 29 percent of habitat (3,586 acres) crossed by the I-90 Corridor Alternative has been converted to agricultural land with crops such as soybean, corn, and hay in various phases of production. Approximately 17 percent of habitat (2,100 acres) crossed by the I-90 Corridor Alternative has been converted to various developed land uses.

The big game, small game, and furbearer species; waterfowl and game birds; non-game animals and mammals; raptors and other migratory birds (regulated until the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act); and herpetiles (reptiles and amphibians) found along the I-90 Corridor Alternative are essentially the same as those found along the proposed Project corridor. Similar to the proposed Project, the I-90 Corridor Alternative falls entirely within the Prairie Avifaunal Biome (Rich et al. 2004). Many migratory birds use habitats crossed by the I-90 Corridor Alternative for nesting, migration, and overwintering. A complete list of the species found along both the I-90 Corridor Alternative and the proposed Project is presented in Table 3.6-1 to 3.6.7.

Waterfowl follow distinct, traditional migration corridors or flyways in their annual travels between breeding and wintering areas. The I-90 Corridor Alternative is within the Central Flyway (USFWS 2012). Bird orders and the number of species that may use the areas near the I-90 Corridor Alternative are the same as those that may use the proposed Project as provided in Table 3.6-4, with the addition of 14 more species, which include three ducks, the brown pelican (*Pelecanus occidentalis*), the red-shouldered hawk (*Buteo lineatus*), eight gulls, and the Caspian tern (*Hydroprogne caspia*) (Nebraska Ornithologists Union 2012).

The I-90 Corridor Alternative would cross through three IBAs, as defined by the National Audubon Society (Audubon 2012). The North Valley Grasslands IBA in Montana and the Rainwater Basin IBA in Nebraska would both be affected by the I-90 Corridor and the proposed Project and are described in Section 4.6, Wildlife. The Missouri National Recreational River IBA in Nebraska would only be affected by the I-90 Corridor Alternative. This IBA is a 59-mile-long section of the Missouri River stretching from Gavins Point Dam on the eastern edge of Lewis and Clark Lake to Ponca, Nebraska. Covering over 33,000 acres, this section with its wide, meandering channel, shifting sandbars, and secondary channels contains some of the last forested floodplain and floodplain wetland habitats on the river. The Nebraska side of the river ranges from nearly level floodplain to steep, tree-covered bluffs. Riverbanks vary from flat, sandy beaches to vertical faces 10 to 15 feet high. This landscape has backwater marshes, open

⁶ Common names of animals are used in this section. Scientific names following nomenclature in the NatureServe Explorer database (NatureServe 2009) for most animals discussed in this section are listed in Tables 3.6-2, 3.6-3, 3.6-4, 3.6-5, 3.6-6, and 3.6-7. Where animals discussed in this section are not included in these tables, common names are followed by the scientific name.

sandbars, and cottonwood forests that provide habitat for wildlife. This section of the Missouri River is remarkable for the number of least terns (*Sternula antillarum*) and piping plovers (*Charadrius melodus*) using the sandbars and river areas. According to biologists with the Army Corps of Engineers (USACE), 280 least tern nests were recorded in 2004, representing about half of all tern nests on the Missouri River. In this same year, over 160 piping plover nests were observed. Biologists also report many other species of waterbirds using the river section, such as snow and Canada geese, great blue heron (*Ardea herodias*) and belted kingfisher (*Megasceryle alcyon*), and there are as many as six bald eagle nests present (Audubon Nebraska 2012).

As with the proposed Project, the I-90 Corridor Alternative would also cross three bird conservation regions that are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues, as defined by the U.S. North American Bird Conservation Initiative (USNABCI 2012). These regions are Prairie Potholes (Region 11), which provides breeding and migratory habitat to over 200 species of birds; Badlands and Prairies (Region 17), which is habitat for some of the healthiest populations of high-priority dry-grassland birds; and Central Mixed Grass Prairie (Region 19), which acts as an important spring migration area (USNABCI 2012).

Potential Impacts

Construction of the I-90 Corridor Alternative would have direct and indirect, and temporary (short-term and long-term) and permanent impacts on wildlife resources. Potential wildlife impacts associated with the I-90 Corridor Alternative are essentially the same as for the proposed Project (see Section 4.6, Wildlife) and include fragmentation of wildlife habitat would result from the I-90 Corridor Alternative. The following are wildlife habitat fragmentation issues relevant for pipeline construction and operation:

- Reduction in patch size of remaining available habitats;
- Creation of edge effects;
- Creation of barriers to movement;
- Intrusion of invasive plants, animals, and nest parasites;
- Facilitation of predator movements;
- Habitat disturbance; and
- Intrusion of humans (Hinkle et al. 2002).

Additional impacts to wildlife includes direct mortality during construction and operation; indirect mortality due to stress from construction and operations; reduced breeding success from exposure from construction and operation activities; and reduced survival due to overall disruption of habitat and food sources. The I-90 Corridor Alternative would parallel approximately 411 miles of existing developed ROW (i.e., I-90 and the existing Keystone pipeline) so habitat fragmentation would be less for this alternative relative to the proposed Project (Table 5.2-27).

Table 5.2-27 Wildlife: Comparison of the Impacts Associated with the I-90 Corridor Alternative to the Proposed Project.

Resource	I-90 Corridor Alternative	Proposed Project
Big Game	Construction disturbance, habitat fragmentation, noise, human disturbance	Construction disturbance, habitat fragmentation, noise, human disturbance
Small Game and Furbearers	Habitat loss, direct mortality, human disturbance	Habitat loss, direct mortality, human disturbance
Waterfowl and Game Birds	Nesting, feeding, roosting disturbance	Nesting, feeding, roosting disturbance
Non-Game Mammals	Habitat fragmentation	Habitat fragmentation
Raptors and Other Migratory Birds	Nesting, feeding, roosting disturbance	Nesting, feeding, roosting disturbance
Herpetiles	Habitat loss, direct mortality, human disturbance	Habitat loss, direct mortality, human disturbance
Insects	Habitat loss, direct mortality, human disturbance	Habitat loss, direct mortality, human disturbance

Construction of the I-90 Corridor Alternative would result in disturbance of about 12,362 acres of various habitat types, including approximately 6,071 acres of grasslands and rangelands, 57 acres of upland forested habitat, and 70 acres of wetland habitats, including 43 acres of forested wetlands (see Table 5.2-24). Operational impacts would be limited to the permanent easement where maintenance activities would prevent the establishment of trees.

The I-90 Corridor Alternative would cross areas considered important habitats used by wildlife (see Table 5.2-28). Encompassing both public and private lands, these areas include wetland and conservation easements, IBAs, river valleys, and state wildlife areas. Wildlife effects due to the I-90 Corridor Alternative, when compared to the proposed Project, are anticipated to be less. Both of the routes avoid some of the most critical habitat, such as the NDEQ-identified Sand Hills Region. Where the I-90 Corridor Alternative would run parallel to the existing roadway (I-90) through much of South Dakota it is anticipated that long-term wildlife impacts would be minor in this area. Additionally, short-term impacts associated with construction in this area may not be as significant to wildlife since there is already ongoing traffic and noise and nearby development due to the roadway.

The mitigation measures described for the proposed Project would also apply to the proposed I-90 Corridor Alternative. No additional mitigation measures would be required.

Table 5.2-28 Comparison of Wildlife: Important Wildlife Habitats within or near the I-90 Corridor Alternative Area and the Proposed Project

Name	Ownership and Description	Miles in I-90 Corridor Alternative	Miles in Proposed Project
South Dakota			
Lake Andes Wetland Management District	USFWS	0.1	-
Cheyenne River Valley		-	~0.7
White River Valley		-	~0.2
Lake Francis Case	Department of Defense	~0.8	-
James River Valley		~1.0	-
State Wildlife Areas	South Dakota Game, Fish, and Parks	25.7	20.7
Missouri National Recreational River	National Park Service	~0.2	-
Conservation Reserve Program	Private	ND ^a	ND ^a
NRCS Wetlands Reserve Program	NRCS Agreement 667409600C6G	~0.2	-
Nebraska			
Missouri National Recreational River	National Park Service	2.0	-
Logan Creek Valley		<0.1	-
Elkhorn River Valley		~0.1	-
Shell Creek Valley		<0.1	-
Platte River Valley		~0.5	-
Keya Paya River Valley	Various	-	22.4
Niobrara River Valley	Various	-	5.7
Verdigris/Bazile	Various	-	11.4
Loup River Valley	Various	-	5.2
Rainwater Basin	Various	7.5	69.5
Big Blue River Valley		~0.2	-
Conservation Reserve Program	Private	ND ^a	ND ^a

Source: Schneider et al. 2012, National Audubon Society 2012, Keystone 2012.

^a ND = no data. Conservation Reserve Program data are unavailable at this time.

5.2.2.7 Fisheries

Environmental Setting

As a result of the relatively close proximity of the routes, in combination with the broad distributions of these species, the recreational and commercial fish species that occur along the I-90 Corridor Alternative route are essentially the same species that occur along the proposed Project route. These species are listed in Table 3.7-1 and are discussed in more detail in Section 3.7.2.1, Fisheries Resources. Correspondingly, spawning periods and habitats for the recreational and commercial fish species that occur along this alternative route are the same as for the proposed Project route.

Potential Impacts

The types of potential impacts to fisheries for the I-90 Corridor Alternative are essentially the same as for the proposed Project (see Section 4.7, Fisheries) and include increased sedimentation, increased total suspended solids, restriction, or delay of fish movement, water temperature alteration, bank alteration, and reduction of aquatic habitat. Table 5.2-29 provides a comparison of the number of perennial stream crossings with known or potential habitat for

fishes of recreational or commercial value and the anticipated crossing methods that would be used on these streams for both the I-90 Corridor Alternative and the proposed Project. The impacts described in this section apply equally to both construction and operation.

Table 5.2-29 Fisheries: Comparison of the I-90 Corridor Alternative and Proposed Project

Resource Characteristics	Proposed Project	I-90 Corridor Alternative
Perennial Stream Crossings	56	53
Open-cut Crossing Method ^a	43	41
HDD Crossing Method ^b	13	12

^a Open cut = One of the four open cut methods (non-flowing, flowing, dry flume, or dry dam-and-pump) would be used for these crossings.

^b The HDD method would be used to cross one intermittent waterbody, Bridger Creek (MP 433.6) that would be crossed by both the Proposed project route and the I-90 Alternative.

It is assumed that one of the open cut crossings on the I-90 Corridor alternative route would be the Lake Francis Case reservoir on the Missouri River. The pipeline would remain parallel to the southern side of I-90 for the lake crossing. The lake is approximately 4,100 feet wide at this location. On the western side of Lake Francis Case, it is assumed that the alternative route would be moved several hundred feet south of the I-90 highway corridor to identified piping plover habitat adjacent to I-90. Lake Francis Case supports large regional recreational fishery. Based on state surveys an estimated 189,985 fish were harvested from the lake in 2009 (Sorensen and Knecht 2010).

Short-term, localized fisheries impacts would result from construction of the I-90 Corridor Alternative and the proposed Project related to noise, increased turbidity, and silt dispersion. No long-term fisheries impacts would be associated with normal operation of this alternative or the proposed Project. An accidental release from the pipeline at a perennial stream crossing would have long-term adverse impacts relative to the size and duration of the release.

The mitigation measures described for the proposed Project would also apply to the proposed I-90 Corridor Alternative. No additional mitigation measures would be required.

5.2.2.8 Threatened and Endangered Species

Environmental Setting

In general, the threatened and endangered species that may occur along the I-90 Corridor Alternative would be similar those species potentially affected by the proposed Project. The I-90 Corridor Alternative would cross the Missouri River at two locations—once in South Dakota at Lake Francis Chase, and a second time along the South Dakota/Nebraska border, at the Missouri National Recreational River IBA. Piping plovers (*Charadrius melodus*) (federally threatened species) have been observed at Lake Francis Chase, but not nesting in recent times (USFWS 2002). Piping plovers and least terns (*Sternula antillarum*) (federally endangered species) are known to nest on the sandbars and river areas in the Missouri National Recreational River IBA, and this portion of the IBA is USFWS-designated critical habitat for the piping plover (USFWS 2002).

According to biologists with the USACE, 280 least tern nests were recorded in the Missouri National Recreational River IBA in 2004, representing about half of all tern nests on the Missouri River. In this same year, over 160 piping plover nests were observed. Biologists also report many other species of waterbirds using the river section, such as snow and Canada geese, great blue heron (*Ardea herodias*), belted kingfisher (*Megaceryle alcyon*), and there are as many as six bald eagle (*Haliaeetus leucocephalus*) nests present (Audubon Nebraska 2012). Other protected species that are known to occur in this portion of the Missouri River include the scaleshell mussel (*Leptodea leptodon*) and the pallid sturgeon (*Scaphirhynchus albus*).

The scaleshell mussel is a species that was not expected to occur in the proposed Project ROW, but could occur in the I-90 Corridor Alternative ROW, where the Missouri National Recreational River IBA is located. The scaleshell occurs in medium to large rivers with low to medium gradients. It primarily inhabits stable riffles and runs with gravel or mud substrate and moderate current velocity. The scaleshell requires good water quality, and is usually found where a diversity of other mussel species are concentrated. This species once occurred in 56 rivers in the Mississippi River Drainage, but has undergone a dramatic reduction in its range. Where the I-90 Corridor Alternative would cross the Missouri National Recreational River IBA, survey efforts for the scaleshell mussel have not consistently found this species, indicating that it is very rare in this reach of the Missouri River (USFWS 2010).

Potential Impacts

The I-90 Corridor Alternative would avoid the habitat of the American burying beetle (*Nicrophorus americanus*), a federal- and Nebraska-endangered invertebrate. Unless stated otherwise impacts described in this section apply to both construction and operation.

Species that could be potentially impacted under the proposed Project would also be potentially impacted under the I-90 Corridor Alternative. The following describes ways in which the proposed Project could impact species:

- Habitat loss, alteration, and fragmentation;
- Direct mortality during construction and operation;
- Indirect mortality because of stress or avoidance of feeding due to exposure to construction and operations noise, and from increased human activity;
- Reduced breeding success from exposure to construction and operations noise, and/or from increased human activity;
- Reduced survival or reproduction due to decreased abundance of food species or reduced cover;
- Loss of individuals and habitats due to exposure to toxic materials or crude oil releases (addressed in Section 4.13, Potential Releases); and
- Direct mortality due to collision with or electrocution by power lines associated pump stations.

As discussed in Section 4.8, Threatened and Endangered Species, the proposed Project would impact a number of species that are protected under federal or state law or are of concern by local, state, or federal agencies (hereafter referred to as *protected species*), but most of these

impacts would be indirect and short-term. Of the thirteen federally protected or candidate species, the American burying beetle was the only species determined to be potentially adversely affected by the proposed Project. However, because the I-90 Corridor Alternative would avoid the currently known range for this species, the I-90 Corridor Alternative would not be expected to have adverse effects on this species.

The major differences in vegetation communities that would be impacted by the I-90 Corridor Alternative compared to the proposed Project include fewer impacts to potential suitable habitat for protected species (approximately 508 miles of impacts compared to the proposed Project’s 569 miles of impacts), including grassland/pasture, wetlands, forest, and shrub/scrub, and more impacts to unsuitable habitat for protected species (approximately 419 miles of impacts compared to the proposed Project’s 307 miles of impacts), including developed land and cultivated crops (Table 5.2-30, below). More information on the potential impacts to terrestrial vegetation communities resulting from the I-90 Corridor Alternative are provided in Section 5.2.1.5, Terrestrial Vegetation.

Table 5.2-30 Threatened and Endangered Species: Comparison of Potential Protected Species Habitat Crossed (Miles) Under the I-90 Corridor Alternative and the Proposed Project in South Dakota and Nebraska

	Suitable Habitat (Miles)	Percent Suitable Habitat	Unsuitable Habitat (Miles)	Percent Unsuitable Habitat	Total Miles
I-90 Corridor Alternative	508	55%	419	45%	927
Proposed Project	569	65%	306	34%	875

In particular, the I-90 Corridor Alternative would run alongside I-90 for approximately 147 miles, and near highways, there is a greater percentage of non-native species and human disturbance, which is poor quality habitat for protected species. Therefore, although the I-90 Corridor Alternative is longer (927 mile-length compared to the proposed Project’s 875 mile-length), it would pass through less suitable habitat for protected species (see Table 5.2-30, above) and would be expected to have fewer adverse impacts on protected species.

The I-90 Corridor Alternative would cross through federally designated critical habitat for the piping plover along the Missouri River that borders South Dakota and Nebraska (USFWS 2002). It is unknown at this time whether or not HDD would be used at this crossing. HDD would significantly reduce the potential temporary impacts to piping plovers and other protected species present along this river crossing. In particular, as discussed in Section 5.2.2.5, Terrestrial Vegetation, protected species such as the interior least tern, great blue heron, and bald eagle may also be present along this stretch of the Missouri River.

Mitigation measures and consultations with USFWS similar to those described for the proposed Project would be required to minimize potential impacts to all protected species that may be impacted by the project construction and operation activities.

5.2.2.9 Land Use, Recreation, and Visual Resources

Environmental Setting

Table 5.2-31 summarizes the land ownership, and Table 5.2-32 summarizes and land use categories that would be crossed by the I-90 Corridor Alternative. Both tables also include similar information for the proposed Project (repeated from Section 3.9, Land Use), for comparison.

Table 5.2-31 Land Use: Land Ownership Comparison of the I-90 Corridor Alternative and Proposed Project by ROW Length

Alternative	Existing Land Ownership Status (miles crossed)					Total ^d
	Federal	State ^a	Local (Public) ^b	Private	Waterbody ^c	
I-90 Corridor Alternative	46.2	56.1	0.4	824.3	NA ^c	927
Percent of Total	4.9%	6.1%	<0.1%	88.9%	NA	100%
Proposed Project	46.4	60.9	2.3	763.6	1.8	875
Percent of Total	5.3%	7.0%	0.3%	87.3%	0.2%	100%
Difference ^f	0.2	4.8	1.9	-60.7	NA	-53.8

Source: USGS 2011.

^a Includes state highway ROW.

^b May not include all county road ROW.

^c For the Proposed Project, includes waterbodies not located on a parcel under federal, state, or local ownership. This information was not available for the I-90 Corridor Alternative, and waterbody crossings in this alternative are assumed to be included in other categories.

^d totals may not match due to rounding

^e NA = not applicable.

^f Proposed Project minus I-90 Corridor Alternative.

Table 5.2-32 Land Use: Comparison of the I-90 Corridor Alternative and Proposed Project by ROW Length

Alternative	Land Use Type (miles crossed)					Total ^b
	Agriculture	Developed	Forest	Rangeland	Water/Wetlands	
I-90 Corridor Alternative	270.6	148.9	4.3	496.2	7.0	927
Percent of Total	29.2%	16.1%	0.5%	53.5%	0.7%	100%
Proposed Project	344.6	10.2	6.5	505.5	8.2	875
Percent of Total	39.4%	1.1%	0.7%	57.8%	1.0%	100%
Difference ^a	74.0	-138.9	2.1	9.3	1.6	-51.9

Source: USGS 2006.

^a Proposed Project minus I-90 Corridor Alternative.

^b Totals may not match due to rounding.

The I-90 Corridor Alternative would be longer overall, and would cross more private land than the proposed Project and it would cross less agricultural land and more developed land than the proposed Project. Much of this additional developed land would be portions of the I-90 ROW and/or developed areas in and near cities and towns along I-90. The I-90 Corridor Alternative would cross the same recreation and special interest areas as the proposed Project. In South Dakota and Nebraska, crossings may occur at different locations, but the types of resources affected would generally be the same. In addition, the I-90 Corridor Alternative would also cross

the Lewis and Clark National Historic Trail in multiple locations in South Dakota and Nebraska (compared to twice for the proposed Project), as well as a portion of the Missouri National Recreational River (on the border between South Dakota and Nebraska), as part of the existing Keystone Pipeline corridor.

The existing visual landscape of the I-90 Corridor Alternative would be the same as the proposed Project from the Canadian border to south-central South Dakota. The land along the remaining portion is more heavily used for agriculture than for rangeland (as is the case for the proposed Project), and would pass closer to developed communities along I-90 (USGS 2006).

Potential Impacts

The impacts of the I-90 Corridor Alternative are generally of the same type as the proposed Project, but differ in intensity. Table 5.2-33 summarizes the acres of land ownership and Table 5.2-34 summarizes the acres of land use that would be affected by the I-90 Corridor Alternative. Both tables also include similar information for the proposed Project (repeated from the Land Use Impacts discussion in Section 4.9, Land Use of the Supplemental EIS), for comparison.

Table 5.2-33 Land Use: Land Ownership Comparison of the I-90 Corridor Alternative and Proposed Project by ROW Area

Alternative	Acres of Easement Required (Existing Ownership Type), Construction (Temporary) ^a				
	Federal	State ^c	Local ^d	Private	Total ^e
I-90 Corridor Alternative ^b	618.1	753.9	12.4	10,975.6	12,360
Percent of Total	5.0%	6.1%	<0.1%	88.8%	100%
Proposed Project	595.0	723.4	105.0	10,243.6	11,667
Percent of Total	5.1%	6.2%	0.9%	87.7%	100%
Difference ^f	(23.1)	(30.5)	92.6	(732.0)	(693)
Alternative	Acres of Easement Required (Existing Ownership Type), Operations (Permanent)				
	Federal	State ^c	Local ^d	Private	Total ^e
I-90 Corridor Alternative ^b	241.0	293.8	4.8	4,278.4	4,818
Percent of Total	5.0%	6.1%	<0.1%	88.8%	100%
Proposed Project	275.8	376.5	31.8	4,618.9	5,303
Percent of Total	5.2%	7.1%	0.6%	87.1%	100%
Difference ^f	34.8	82.7	27.0	340.5	485

Source: USGS 2011.

^a For the I-90 Corridor Alternative, construction acreages are cited from the Final EIS, while operations acreages are estimated based on the difference between construction ROW (110 feet) and operations ROW (50 feet).

^b The acreage cited here does not include portions of the existing Keystone corridor.

^c Includes state highway ROW.

^d May not include all county road ROW.

^e For the purpose of this screening it is assumed that this Alternative could be co-located with the existing Keystone Pipeline. The permanent Corridor (50 feet) ROW would occupy 25 feet of the existing Keystone Pipeline ROW.

^f Proposed Project minus I-90 Corridor Alternative.

Table 5.2-34 Land Use: Comparison of the I-90 Corridor Alternative and Proposed Project by ROW Area

Acres of Easement Required (Existing Land Use), Construction (Temporary) ^a						
Alternative	Agriculture	Developed	Forest	Rangeland	Water/Wetlands	Total ^a
I-90 Corridor Alternative ^b	3,586.6	2,105.7	56.6	6,519.3	91.8	12,360
Percent of Total	29.0%	17.1%	0.5%	52.7%	0.7%	100%
Proposed Project	4,480.1	525.0	70.0	6,521.8	70.1	11,667
Percent of Total	38.4%	4.5%	0.6%	55.9%	0.6%	100%
Difference ^c	893.5	-1,580.6	13.4	2.5	-21.7	-693.0
Acres of Permanent Easement Required (Existing Land Use), Operations (Permanent) ^a						
Alternative	Agriculture	Developed	Forest	Rangeland	Water/Wetlands	Total ^{a,d}
I-90 Corridor Alternative ^b	1,398.1	820.1	25.1	2,540.1	34.6	4,818
Percent of Total	29.0%	17.1%	0.5%	52.7%	0.7%	100%
Proposed Project	2,073.4	100.7	37.1	3,038.6	53.2	5,303
Percent of Total	39.1%	1.9%	0.7%	57.3%	1.0%	100%
Difference ^c	675.3	-719.4	11.0	498.5	18.6	484.0

Source: USGS 2006.

^a Totals for waterbodies are incorporated into other land use categories, and could not be segregated.

^b The acreage cited here does not include portions of the existing Keystone corridor.

^c Proposed Project minus I-90 Corridor Alternative.

^d For the purpose of this screening it is assumed that this Alternative could be co-located with the existing Keystone Pipeline. The permanent Corridor (50 feet) ROW would occupy 25 feet of the existing Keystone Pipeline ROW.

Compared to the proposed Project, the I-90 Corridor Alignment would affect more developed land (due to the alignment's proximity to I-90 itself, which is considered a developed land use), but less land in other categories. The I-90 Corridor Alternative's effects on recreational resources would largely be the same as for the proposed Project. Additional scenic byway and river crossings would, for the most part, occur close to existing highway or existing Keystone Pipeline crossings of those facilities (e.g., the Missouri Recreational River). There are no state requirements for visual resource management in South Dakota and Nebraska (the states where the two alignments differ); therefore, I-90 Corridor Alternative's impacts on visual resources would also be similar to the proposed Project.

5.2.2.10 Socioeconomics

Environmental Setting

The I-90 Corridor Alternative would intersect a total of 33 counties, while the proposed Project would intersect 31. Table 5.2-35 summarizes the key socioeconomic characteristics of the I-90 Corridor Alternative and the proposed Project.

Table 5.2-35 Socioeconomics: Comparison of States and Counties within the I-90 Corridor Alternative and the Project Area

Characteristic	Alternative		
	I-90 Corridor	Proposed Project	Difference ^b
2010 Population ^a	354,237	267,569	86,668
2010 At-Place Employment ^a	232,742	171,826	(60,916)
Property Value (billions) ^a	\$35.4	\$30.7	(\$4.7)
Effective Property Tax Rate	1.8%	1.7%	(0.1%)
Road Crossings	790	840	50
Rail Crossings	24	19	(5)

^a Total for all counties crossed by each alignment.

^b Proposed Project minus 2011 Steele City Route Alternative.

Population

The affected population along the pipeline corridor for the I-90 Corridor Alternative is substantially higher than for the proposed Project, due to the alternative's length. There are 38 communities within two miles of the I-90 Corridor Alternative, compared to 17 for the proposed Project.

Socioeconomic Conditions

The I-90 Corridor Alternative would intersect counties with substantially higher existing employment in South Dakota and Nebraska. In part, this is because the I-90 Corridor Alternative includes five more urban counties: McCook (part of the Sioux Falls metro area), Davison and Hanson (part of the Mitchell micro area), Yankton (a one-county micro area), and Seward, part of the Lincoln metro area.⁷

Environmental Justice

Compared to the proposed Project, the I-90 Corridor Alternative route contains minority populations in an additional 28 block groups in South Dakota and Nebraska. However, some potentially affected minority and low-income populations under the proposed Project would not be affected under I-90 Corridor Alternative.

Public Services

A total of 73 police/sheriff departments, 111 fire departments, and 38 medical facilities are located in counties crossed by the I-90 Corridor Alternative. This compares to 67 police/sheriff departments, 86 fire departments, and 24 medical facilities for the proposed Project. Appendix O, Socioeconomics, includes a table listing these facilities.

⁷ Metropolitan and micropolitan statistical areas are geographic entities defined by the Office of Management and Budget for use by federal statistical agencies in collecting, tabulating, and publishing federal statistics. A metro area contains a core urban area of 50,000 or more population, and a micro area contains an urban core of at least 10,000 (but less than 50,000) population. A metro or micro area may contain one or more counties, one or more of which contain the urban core.

Tax Revenues and Property Values

The importance of property tax revenue to local governments is the same under the I-90 Corridor Alternative as under the proposed Project. The I-90 Corridor Alternative includes more *situs* counties in South Dakota and different counties in Nebraska. As a result, total property value in counties affected by the I-90 Corridor is somewhat larger than for the proposed Project, while effective tax rates fall within the same range among the affected counties, as compared to the proposed Project. Appendix O, Socioeconomics, includes a table with the 2010 data on local property taxes for potentially affected counties under the I-90 Corridor Alternative.

Traffic and Transportation

Under the I-90 Corridor Alternative, there would be approximately 790 road crossings and 24 rail crossings. This compares to 840 road crossings and 19 rail crossings under the proposed Project. Compared to the proposed Project, the I-90 Corridor Alternative would cross the same number of roads and railroads in Montana, more roads (257 versus 220) in South Dakota, and fewer roads (235 versus 323) in Nebraska. Most of this difference is in the number of Category I roads (local). The I-90 Corridor Alternative would cross more railroads in South Dakota (9 versus 2) and fewer in Nebraska (10 versus 12) compared to the proposed Project.

Potential Impacts

Table 5.2-36 summarizes some of the key socioeconomic characteristics of the 2011 Steele City Alternative and the proposed Project. The impacts of the alternative are generally of the same type as the proposed Project, but differ slightly in intensity. Those differences are discussed below.

Table 5.2-36 Socioeconomics: Comparison of Selected Socioeconomic Impacts of the I-90 Corridor Alternative and Proposed Project

Characteristic	Alternative		
	I-90 Corridor Alternative	Proposed Project	Difference ^b
Construction Workforce (average annual employment)	4,100	3,900	200
Capital Cost (billions)	\$3.0	\$3.1	\$0.1
Construction Earnings (billions) ^a	\$2.10	\$2.05	\$0.05
GDP (billions)	\$3.47	\$3.40	\$0.07
Property Tax Revenue (millions)	\$38.4	\$34.5	\$3.9

^a Includes earnings (defined in Section 4.10.3.1, Local Economic Activity) for all industries in the United States as a result of the 2011 Steele City Alternative and proposed Project.

^b I-90 Corridor Alternative minus Proposed Project.

Population/Housing

Construction of the I-90 Corridor Alternative route would require 5,000-6,000 construction workers for the 1-2 year construction period, the same as for the proposed Project. This number is equivalent to approximately 1.5 percent of the entire population along the I-90 Corridor Alternative route. The workers would be distributed along the alternative route, and would also work on a single pipeline spread for 4-8 months, lessening the effects that the population would have on local areas.

Workers in Montana and northern South Dakota would be housed in construction camps, the same as under the proposed Project. Workers in Nebraska would be housed in existing hotel/motel rooms along the I-90 corridor. There are about 1,665 more hotel rooms along the alternative route than along the proposed Project route (10,956 versus 9,283), and the overall hotel/motel capacity is sufficient to accommodate this workforce.

Local Economic Activity

Definitions of employment and earnings as well as a description of modeling techniques are described in Section 4.10.3.1, Local Economic Activity. The primary difference in the construction cost of the proposed Project and the I-90 Corridor Alternative is the difference in length—the I-90 Corridor Alternative is approximately 45 miles longer. In addition, the I-90 Corridor Alternative does not include a construction camp in Nebraska, and includes one fewer camp in South Dakota. Because the alternative route is longer than the proposed Project, one additional pump station would be required. Net employment (including indirect and induced employment in other parts of the nation) triggered by construction of the I-90 Corridor Alternative would be approximately 900 more than under the proposed Project.

Impacts triggered by construction activities would shift from Nebraska to South Dakota in the I-90 Corridor Alternative, due in part to the location of pipeline facilities and accommodations. In addition, Nebraska has a much larger and more diverse economy than South Dakota; thus the multiplier effects play a more important role in economic impacts

Overall, earnings in the United States would be about \$48 million higher under the I-90 Corridor Alternative, compared to the proposed Project, primarily as a result of the increased pipeline miles in the alternative. This represents approximately 2 percent of total earnings for the Alternative.

Economic Indicators of National Interest

Definitions of GSP and GDP as well as their relationship with earnings are described in Section 4.10.3.1, Local Economic Activity. Construction of the I-90 Corridor Alternative would contribute approximately \$3.47 billion to GDP, compared to approximately \$3.40 billion for the proposed Project.

Environmental Justice

The types of impacts to minority and low-income populations that could occur during construction and operations of the I-90 Corridor Alternative would be the same as described for the proposed Project, which could include increased competition for medical or health services in underserved populations. Under the I-90 Corridor Alternative, 36 block groups and five census tracts with environmental justice populations could potentially be affected by construction activity or by pipeline operations. All geographic areas with minority and/or low-income populations are in counties that are or contain HPSAs and/or MUA/Ps.

Because the exact location of the construction sites, such as contractor yards and pipe storage yards, have not yet been determined, the potential effect of those facilities on the environmental justice populations is unknown. These construction facilities, however, would all be temporary, lasting only a few months during construction, and, therefore, any potential effects on environmental justice populations would be short term. Should the I-90 Corridor Alternative be

recommended, the potential effects would be evaluated based on the then proposed locations during facility siting and design. Appendix O, Socioeconomics, provides information about the HPSAs and MUA/Ps in relation to areas with minority and/or low-income populations⁸.

Tax Revenues

During construction, total state sales and use and contractors' excise tax revenue would be higher by about \$10 million for the I-90 Corridor Alternative than for the proposed Project. Construction-based taxes from the I-90 Corridor Alternative would be about 30 percent higher in South Dakota than for the proposed Project and about 25 percent lower in Nebraska, with the differences estimated roughly in proportion to differences in the pipeline mileage in each state.

Overall, the I-90 Corridor Alternative would generate more property tax revenue than the proposed Project. However, the I-90 Corridor Alternative would generate less property tax revenue than the proposed Project on a per capita basis (\$108 per capita for all pipeline situs counties for the alternative compared to \$129 for the proposed Project). Only counties with Keystone XL facilities (pipeline, pump stations, etc.) would receive property taxes associated with the I-90 Corridor Alternative.

Property Values

Impacts to private property values during construction and operation of the I-90 Corridor Alternative would be similar to the proposed Project in character and in the low level of impact, but would occur in different counties under the I-90 Corridor Alternative, as described for property taxes in the preceding paragraphs.

Traffic and Transportation

Impacts on traffic and transportation under the I-90 Corridor Alternative would be similar to those described for the proposed Project. The I-90 Corridor Alternative would cross fewer roads than the proposed Project, but its greater length could require additional work areas and access points. As with the proposed Project, the I-90 Corridor Alternative would create only short-term traffic congestion and delays during construction, and no appreciable impacts on traffic and transportation during operations.

5.2.2.11 Cultural Resources

Environmental Setting

Cultural resources surveys have catalogued the existing cultural resources along the I-90 Corridor Alternative from the Canadian border to central South Dakota. No such surveys have been conducted for the remainder of the I-90 Corridor Alternative. In general terms, the cultural resource potential of developed transportation corridors, existing pipeline corridors, and other heavily disturbed areas is normally lower than in undisturbed areas.

⁸ Information for HPSAs and MUA/Ps is only available at the county level.

Much of the I-90 Corridor Alternative follows an existing developed highway ROW (I-90) or an existing pipeline corridor (the Keystone Corridor). Accordingly, the potential for intact buried resources along the southern segment of the I-90 Corridor Alternative would be lower, based on the anticipated prevalence of previously disturbed areas within the existing ROW.

Potential Impacts

The I-90 Corridor Alternative's impacts on cultural resources between the Canadian border and central South Dakota—the segment that the alternative shares with the proposed Project—would be the same as for the proposed Project. Because the remaining segment of the I-90 Corridor Alternative follows developed infrastructure corridors, the potential for the existence of intact cultural resources may be lower for this alternative than for the proposed Project. If the I-90 Corridor Alternative was recommended, a complete evaluation of the APE for archaeological sites and historic structures would be required. To the extent this evaluation would identify any archaeological sites or historic structures along the I-90 Corridor Alternative route, avoidance would be recommended for any eligible and unevaluated sites, to the extent practicable. By avoiding these sites, the I-90 Corridor Alternative would have no effect on historic properties. The Department will continue to consult with state and federal agencies and Native American tribes about the significance of sites and work to avoid any adverse effects to the resources, following the protocols outlined in the Programmatic Agreement developed for the proposed Project.

5.2.2.12 Air Quality and Noise

Environmental Setting

The portions of the I-90 Corridor Alternative that differ from the proposed Project in South Dakota and Nebraska are rural and their major sources of air pollution and noise are from agricultural activities. Further, these affected areas are located in areas designated as attainment (i.e., areas with good air quality). The low population densities in these affected areas and the lack of industrial facilities are similar to those of the proposed Project, so the existing air quality and noise levels for this alternative are expected to be similar to the proposed Project.

Potential Impacts

Air Quality

Air emissions (criteria pollutants, hazardous air pollutants, and GHGs) from construction of the I-90 Corridor Alternative would be similar but slightly more than that for the proposed Project. This is due to this alternative's longer pipeline length (927 miles) in comparison to the proposed Project (875 miles). Like the proposed Project, this alternative would occur over a short term and temporary period, and, as such, is expected to have a similar but slightly more air quality and GHG impacts (approximately 5 percent increase in emissions) during the construction phase (see Section 4.12.3, Potential Impacts).

During the operational phase, the I-90 Corridor Alternative would generate less than 1 ton per year of fugitive volatile organic compounds and less than 1 metric ton per year of fugitive methane emissions from approximately 70 IMLVs along the pipeline route and from valves, pumps, flanges, and connectors at associated pump stations. These minimal fugitive emissions

(direct emissions) would be similar to those generated by the proposed Project, which has approximately 55 intermediate IMLVs along the pipeline route and the same number of components (valves, pumps, flanges, and connectors) per pump station. Unlike the proposed Project which has 20 pump stations, this alternative has 21 pump stations. The 21 pump stations associated with this alternative would be located in the same e-GRID region as the proposed Project, but would generate slightly higher amount of indirect GHG emissions from electricity consumption due to the slight increase in the number of pump stations (3.35 million metric tons of carbon dioxide equivalent; 5 percent higher than proposed Project). Air emissions associated with refueling construction equipment/vehicles and use of maintenance vehicles (approximately twice per year) and aircraft for aerial inspections (once every two weeks) throughout the operation phase would be negligible. Compared to the proposed Project, this alternative is expected to have similar but slightly higher air quality and GHG impacts during the operational phase (see Section 4.12.3, Potential Impacts).

Noise

The level of noise generated from construction of this alternative would be comparable to the proposed Project because of the similar types of construction equipment and activities, including HDD and blasting. Like the proposed Project, this alternative would generate high noise levels in its immediate vicinity (approximately 79 decibels on the A-weighted scale at 200 feet) over a short term and temporary period, and, as such, is expected to have a similar noise impacts during the construction phase (see Section 4.12.3, Potential Impacts).

During operations, the only source of noise from this alternative would be the pump stations. This alternative has one pump station more than the proposed Project (21 vs. 20 pump stations). Like the proposed Project, each pump station under this alternative has the same number of pump size (3 to 5 pumps per station; each pump rated 6,500 horsepower), so the magnitude of pump station noise from this alternative would be similar to the proposed Project. However, the extent of pump station noise would be greater for this alternative due to the additional pump station. Like the proposed Project, the pump stations for this alternative would be located in rural areas with low population densities. Therefore, the impact of the pump station noise from this alternative would be comparable to the proposed Project during the operation phase (see Section 4.12.3, Potential Impacts).

5.2.2.13 Climate Change

Environmental Setting

The I-90 Corridor Alternative is primarily in the same climate regions (Dry Temperate and Prairie) as the proposed Project since the pipeline route crosses the same states. Therefore, the historical climate trends (i.e., temperature changes in the affected states) for this alternative are essentially the same as described for the proposed Project (see Section 4.14.1.1, Historical Climate Trends).

Potential Impacts

The projected construction and operation climate change impact on this alternative is similar to that of the proposed Project because of the similarities in climate regions (see Section 4.14.1.2, Projected Climate Change Effects).

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