

5.2 ROUTE ALTERNATIVES

The U.S. Department of State (the Department) considered eight route alternatives, including TransCanada Keystone Pipeline, LP's (Keystone's) proposed Project route. By screening and evaluating these alternatives described in Section 2.2.5.1, Screening of Major Route Alternatives, the Department identified two route alternatives to evaluate and compare with Keystone's proposed Project route:

- Keystone XL 2011 Steele City 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 2.2.5, Major Pipeline Route Alternatives. The proposed Project and the alternatives are shown on Figure 5.2-1. 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 among 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 (e.g., access roads, pump stations, and construction camps) were similar among the two route alternatives and the proposed Project route because the exact number and locations of these facilities are not known for the I-90 Corridor Alternative; therefore, 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. Because 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 subsections for each of the alternatives include a description of the entire route alternative impacts; furthermore, the subsections focus primarily on the differences among the route alternatives and the proposed Project. Both of these major route alternatives would require a similar number of aboveground facilities, including the same two pumping stations for

the Keystone Cushing Extension in Kansas. As part of the proposed Project, three connected actions¹ were identified as integral to the proposed Project:

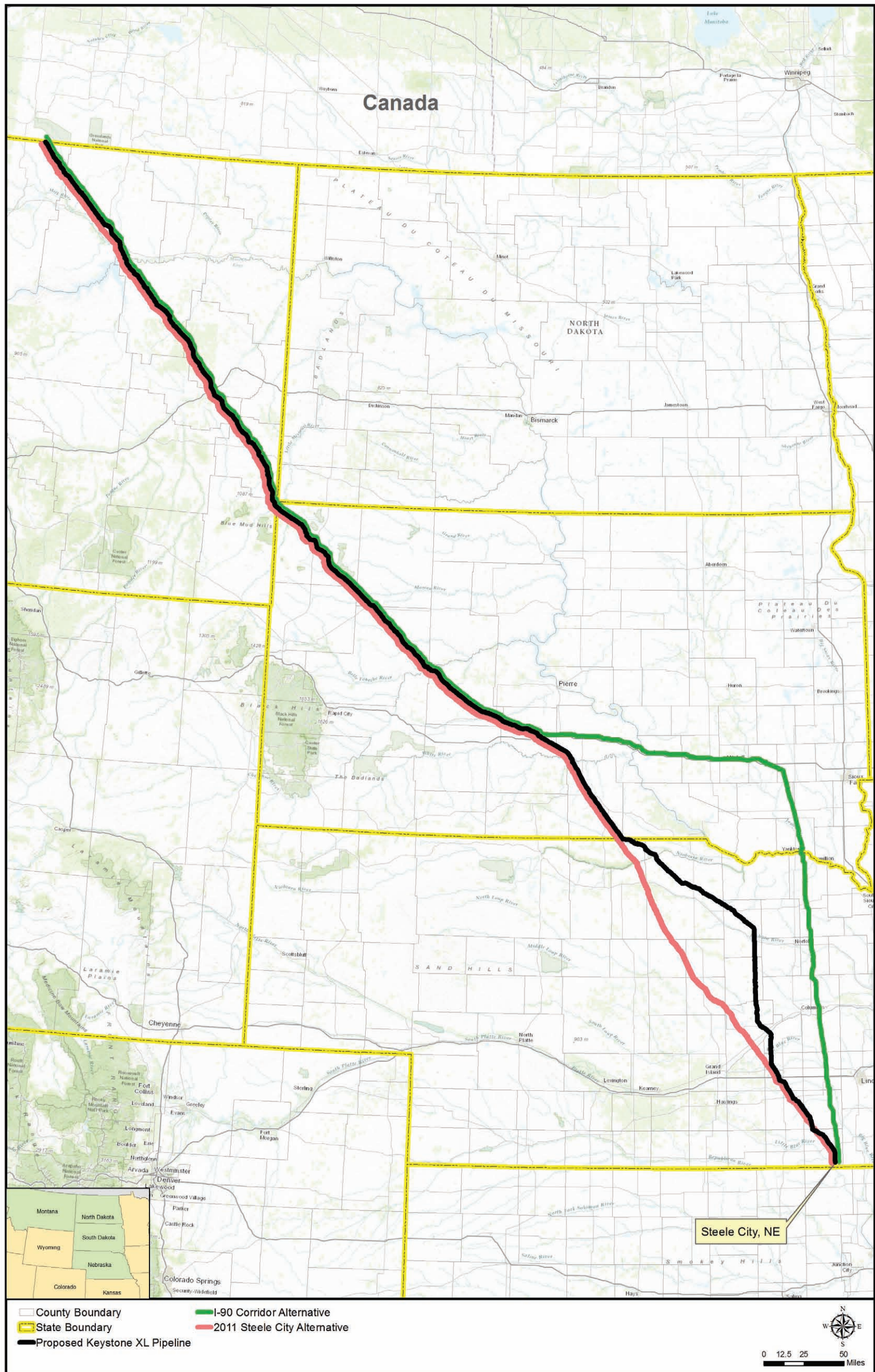
- The Bakken Marketlink Project;
- The Big Bend to Witten 230-kilovolt (kV) Transmission Line; and
- Electrical Distribution Lines and Substations.

The Bakken Marketlink Project would be identical for 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 2.1.12-3). Because 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. Chapter 4, Environmental Consequences, provides 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 (see Figure 2.1.12-4). 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 for each resource area (see Chapter 3, Affected Environment, and Chapter 4, Environmental Consequences), and they are not further evaluated in this section.

¹ Connected actions are those that 1) automatically trigger other actions which may require environmental impact statements, 2) cannot or will not proceed unless other actions are taken previously or simultaneously, 3) are interdependent parts of a larger action and depend on the larger action for their justification.



Source: Esri 2013

Figure 5.2-1 Proposed Project and Major Route Alternatives

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5.2.1 Route Alternatives Impacts Summary and Comparison to Proposed Project

This section summarizes the impacts of the two route alternatives. For more detail, refer to Sections 5.2.2, 2011 Steele City Alternative Detailed Impact Assessment, and 5.2.3, I-90 Corridor Alternative Detailed Impact Assessment. A direct comparison of alternatives is provided in Section 5.3, Comparison of Alternatives. These routes are largely unchanged from the 2011 Final EIS in Montana and South Dakota; therefore, this analysis places emphasis on how the alternatives may affect the proposed route in Nebraska as compared to the proposed Project.

5.2.1.1 2011 Steele City Alternative Impacts Summary

The 2011 Steele City Alternative would affect similar geologic resources as the proposed Project. However, it would affect fewer miles of high-risk landslide areas and fewer miles of fossil bearing formations.

In the United States, this alternative would affect approximately 854 miles and approximately 11,387 acres during construction and 5,176 acres for permanent operation of the proposed pipeline. The approximate affected acreage includes the 110-foot-wide construction ROW and ancillary facilities (e.g., access roads, pump stations, and construction camps). Unlike the proposed route, the 2011 Steele City Alternative would not avoid the Nebraska Department of Environmental Quality (NDEQ)-identified Sands Hills Region. However, as soil types vary from clayey to sandy across both the proposed route and the 2011 Steele City Alternative, both alternatives would cross some soils exhibiting characteristics similar to soils found in the NDEQ-identified Sand Hills Region. Soils along both alternative routes exhibit a variety of characteristics, including: highly erodible, prime farmland, hydric, compaction-prone, stony/rock, shallow-bedrock, and drought-prone. The soil characteristics that would have the highest amount of affected acreage include compaction-prone, highly erodible, and prime farmland.

The 2011 Steele City Alternative would cross approximately 598 miles of principal aquifers within the United States. As previously mentioned, one key difference in potential impacts to surface water resources between this alternative and the proposed Project is that the alternative route would traverse 89 miles of the NDEQ-identified Sand Hills Region in Nebraska. Other water impacts would be similar to the proposed Project route, which is, however, longer and would cross 129 more waterbodies than this alternative.

This alternative would affect more than twice as many wetlands as the proposed Project during operations (approximately 248 acres versus approximately 121 acres) and twice as much land during construction. The Steele City Alternative would cross 293 miles of sensitive wetland regions. In addition, this alternative would affect more emergent and scrub-shrub wetlands than the proposed Project.

Slightly less vegetation overall would be permanently affected within the permanent pipeline ROW by this alternative compared to the proposed Project. Much of the vegetation that would be affected under this alternative would be cultivated, cropped, and grassland/pasture land. Much of the grassland would be native and sagebrush vegetation. This alternative would affect about the same amount of vegetation of conservation concern as the proposed Project.

Generally, the 2011 Steele City Alternative would affect the same species of wildlife as the proposed Project route, with the addition of two species: the American dipper (*Cinctus mexicanus*) and the olive-sided flycatcher (*Contopus cooperi*) (Nebraska Ornithologist Unions 2012). This alternative would cross three bird conservation regions that the proposed Project route would not. Impacts to the species within these regions, however, would be similar to those affected by the proposed Project. Surveys conducted for the proposed Project indicate a higher density of American burying beetles (*Nicrophorus americanus*) along the 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. A plant species of concern in the region is the blowout penstemon (*Penstemon haydenii*), although it is not known to occur within the area that would be crossed by this route.

This alternative would cross many of the same rivers and waterbodies as the proposed Project route. Therefore, this alternative would affect the same species of fish as the proposed Project and would be subject to the same mitigation measures. Land use impacts would be similar to those of the proposed Project, although this alternative would affect more private lands while crossing fewer agricultural lands and would permanently affect more rangeland and less agricultural land than the proposed Project. Overall, recreational and visual resources impacts would be largely the same as the proposed Project.

This alternative would traverse most of the same counties as the proposed Project, causing similar socioeconomic impacts, including workforce requirements for construction and operations. 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 described for the proposed Project, which could include increased competition for medical or health services in underserved populations. This alternative would affect more archaeological sites and historic trails than the proposed Project, as well as more sites eligible for the listing on the National Register of Historic Places (NRHP).

Construction of this alternative would have similar but slightly lower air quality impacts than the proposed Project. Fugitive emissions from intermediate mainline valves (IMLVs) would be essentially the same as for the proposed Project. In addition, climate change effects would be essentially the same as the proposed Project given that it would be built and operated in the same climate region.

5.2.1.2 I-90 Corridor Alternative Impacts Summary

The I-90 Corridor Alternative would cross 76 more miles of fossil bearing formations than the proposed Project, and would have the potential to affect more paleontological resources. This alternative would be approximately 52 miles longer than the proposed Project. However, as shown in Table 5.2-2, the I-90 Corridor Alternative would cross 350 fewer miles of soils that are susceptible to wind or water erosion, and affect fewer acres of prime farmland.

The I-90 Corridor Alternative route would cross approximately 145 miles of the Northern High Plains Aquifer (NHPAQ) system, compared to 294 miles for the proposed Project; however, this route would traverse alluvial aquifers that serve as important groundwater resources. This route would also cross a large reservoir in South Dakota. Construction of the pipeline along this route might pose a significant engineering challenge.

The I-90 Corridor Route Alternative would cause 223 acres of temporary impacts and 101 acres of permanent impacts to wetlands. This is less than the proposed Project, which has 262 acres and approximately 121 acres, respectively.

This alternative would permanently affect slightly less vegetation within the permanent pipeline ROW overall compared to the proposed Project. Much of the vegetation that would be affected is cultivated, cropped, and grassland/pasture land. Much of the grassland is native and sagebrush vegetation. Construction of the I-90 Corridor Alternative would affect approximately 2,106 acres of developed land compared to the proposed Project's approximately 210 acres.

Because this route would be co-located within the existing pipeline corridor, it would cause less habitat fragmentation than the proposed Project. Unlike the proposed Project, this route alternative would avoid the habitat of the American burying beetle, a federal- and Nebraska-endangered invertebrate. Therefore, this alternative would not be expected to cause adverse impacts to the American burying beetle. Other threatened and endangered species, such as the piping plover (*Charadrius melodus*) and least tern (*Sternula antillarum*), could be potentially affected under both the proposed Project and the I-90 Corridor Alternative. Compared to the proposed Project, this alternative would affect 14 additional species of wildlife. In addition, it would cross several important bird areas, a national grassland, and the Missouri National Recreational River.

The I-90 Corridor Alternative would cross many of the same rivers and waterbodies as the proposed Project route. Therefore, this alternative would generally affect the same species of fish as the proposed Project and would be subject to the same mitigation measures. Land use impacts of the I-90 Corridor Alternative are generally of the same type as the proposed Project; however, more private lands would be affected by this route. In addition, fewer agricultural lands would be affected by this alternative.

Through Montana and the western portion of South Dakota, the I-90 Corridor Alternative would traverse the same counties as the proposed Project. Socioeconomic impacts would be similar, although more worker time would be needed to build the pipeline along this route due to its greater length. Earnings in the United States would be about \$48 million higher under this alternative. 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.

No cultural site surveys have been conducted for this alternative. Much of the land within the corridor has been disturbed, thereby decreasing the possibility of intact archaeological resources.

Construction of the I-90 Corridor Alternative would have similar types but slightly higher levels of air quality impacts as the proposed Project given its increased length and number of IMLVs. The I-90 Corridor Alternative would have the same climate change effects as the proposed Project given that it would be built and operated in the same climate region.

5.2.2 2011 Steele City Alternative Detailed Impact Assessment

Overall, the 2011 Steele City Alternative is 854 miles long from Milepost (MP) 0 at the Canadian border to its terminus at Steele City, Nebraska. The 2011 Steele City Alternative is approximately 21 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 includes the resource-specific impacts for the entire 854-mile alignment. The analysis places an emphasis on where this alternative differs from the proposed Project in Nebraska between MP 602 and MP 796 of the proposed Project route to highlight impact differences.

The 2011 Steele City Alternative would cross the NDEQ-identified Sand Hills Region and the northern High Plains region, which are subdivisions of the Great Plains province (an ecological sub-region of the United States). 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.

5.2.2.1 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 Steele 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 Wellhead Protection Area (WHPA), and the Western WHPA. In those areas, there are more areas of shallow bedrock for the 2011 Steele City Alternative route (4.6 miles in Nebraska) compared to the proposed Project (0.3 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 30 percent of their total mass in gravel-sized particles) are deeply covered by Quaternary clay-rich sedimentary deposits (aeolian² sand and loess³). Although the 2011 Steele City Alternative is approximately 21 miles shorter than the proposed Project, there are approximately 53 more miles of fossil-containing formations, but an equal number of oil and gas wells within a quarter 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 known active faults with confirmed surface offsets. Based on the Federal Emergency Management Agency landscape hazard ranking system mapping, as described in Section 3.1.2.5, Geologic Hazards, the 2011

² Aeolian is the process by which wind-blown sand is moved and deposited.

³ Loess is the deposited windblown materials, including both silt and sand.

Steele City Alternative would cross approximately 324 miles of areas where, as described below, there could be a high risk of landslides if steep slopes were encountered. This is slightly less than for the proposed Project, which would cross approximately 339 miles of areas where steep slopes could present a high risk of 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 the 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) | ~588 miles occurring sporadically between MP 3 and 846 | ~641 occurring sporadically between MP 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 (see 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 considered low.

As described in Section 3.1.2.5, Geologic Hazards, 4 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 U.S. Geological Survey (USGS) topographic mapping, the terrain that would be crossed by the 2011 Steele City Alternative where it diverges from the proposed Project is similar, and the occurrence of steep slopes is anticipated also to be similar. If the 2011 Steele City Alternative were to be 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 Code of Federal Regulations Parts 192 and 193, 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 a quarter mile of the 2011 Steele City Alternative and the proposed Project route would be the same (i.e., 24); impacts to fossil fuel and mineral resources would still be limited for the 2011 Steele City Alternative. In Nebraska, there would be 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, the entire formation was noted and included in the total mileage of potential fossil occurrence for the purpose of this assessment. 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 as well as a similar number of miles ranked as high-risk landslide areas; in addition, there would be 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 (588 miles) than by the 2011 Steele City Alternative (641 miles).

The mitigation measures described for the proposed Project would also apply to the 2011 Steele City Alternative.

5.2.2.2 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 6 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 Steele City Alternative route generally consist of deep loess deposits that are susceptible to erosion. Soils in Hamilton County and extending south to the state line that would be crossed by the 2011 Steele City Alternative route contain thick, dark, and 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 likely be identified during operational monitoring and stabilized.

Table 5.2-2 Soils: Comparison of the 2011 Steele City Alternative and the Proposed Project

| Resource Characteristics | Proposed Project (all units in miles) | 2011 Steele City Alternative (all units in miles) |
|---------------------------------|--|--|
| Total Miles | 875 | 854 |
| Highly Erodible (wind) | 72.5 | 115.9 |
| Highly Erodible (water) | 548.4 | 298.8 |
| Prime Farmland ^a | 348.8 | 273.7 |
| Hydric Soils ^b | 54.3 | 28.5 |
| Compaction Prone | 382.5 | 603.9 |
| Stony/Rocky | 53.9 | 51.8 |
| Shallow with Bedrock | 5.3 | 5.5 |
| Drought Prone | 130.4 | 160.3 |

^a Prime Farmland as defined by the Natural Resources Conservation Service (NRCS) 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 alternative route is 21 miles shorter, 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 89 miles of which are located in the NDEQ-identified Sand Hills Region) compared with approximately 73 miles for the proposed Project route (which does not cross the NDEQ-identified Sand Hills Region).

5.2.2.3 *Water Resources*

Groundwater

Environmental Setting

The 2011 Steele City Alternative route would cross approximately 247 miles of the NHPAQ within Nebraska, compared to 274 miles for the proposed Project. Both would cross an additional 20 miles of the NHPAQ in South Dakota (making a total of 294 miles for the proposed Project). The alternative route would pass through an area immediately upgradient of the WHPA for the town of Clarks, Nebraska, and through a portion of the WHPA for the town of Western, Nebraska. The NHPAQ is at or near the surface through much of the 89-mile portion of the NDEQ-identified Sand Hills Region that would be crossed by this alternative route. The proposed Project route would pass downgradient of the Clarks WHPA, and several miles upgradient of the Western WHPA. 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 (2,398 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 Western WHPA, and the proposed Project route would not.

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 (i.e., 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 (aeolian sand and loess) (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 would be 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; 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, as appropriate.

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, 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 by 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 three fewer perennial stream crossings than the proposed Project. In addition, the 2011 Steele City Alternative route would cross 35 fewer mapped floodplains than the proposed Project route.

Table 5.2-3 Surface Water: Comparison of the 2011 Steele City Alternative and the Proposed Project

| Resources | Proposed Project | 2011 Steele City Alternative |
|--|-------------------------|-------------------------------------|
| Waterbody Crossings | 1,073 | 944 |
| Perennial Waterbody Crossings | 56 | 53 |
| Other Waterbody Crossings | 1,017 | 777 |
| Waterbodies with State Use Classifications | 65 | 89 |
| Waterbodies with Impairments Crossed | 19 | 19 |
| Mapped Floodplains Crossed | 90 | 55 |
| Nebraska Summary by Resource | Proposed Project | 2011 Steele 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 | 39 |

Source: Montana Department of Environmental Quality 2012; NDEQ 2012; South Dakota Department of Environment and Natural Resources 2012; USGS 2012

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.

Temporary impacts to floodplains would occur during construction of both the proposed Project and 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 to be re-vegetated.

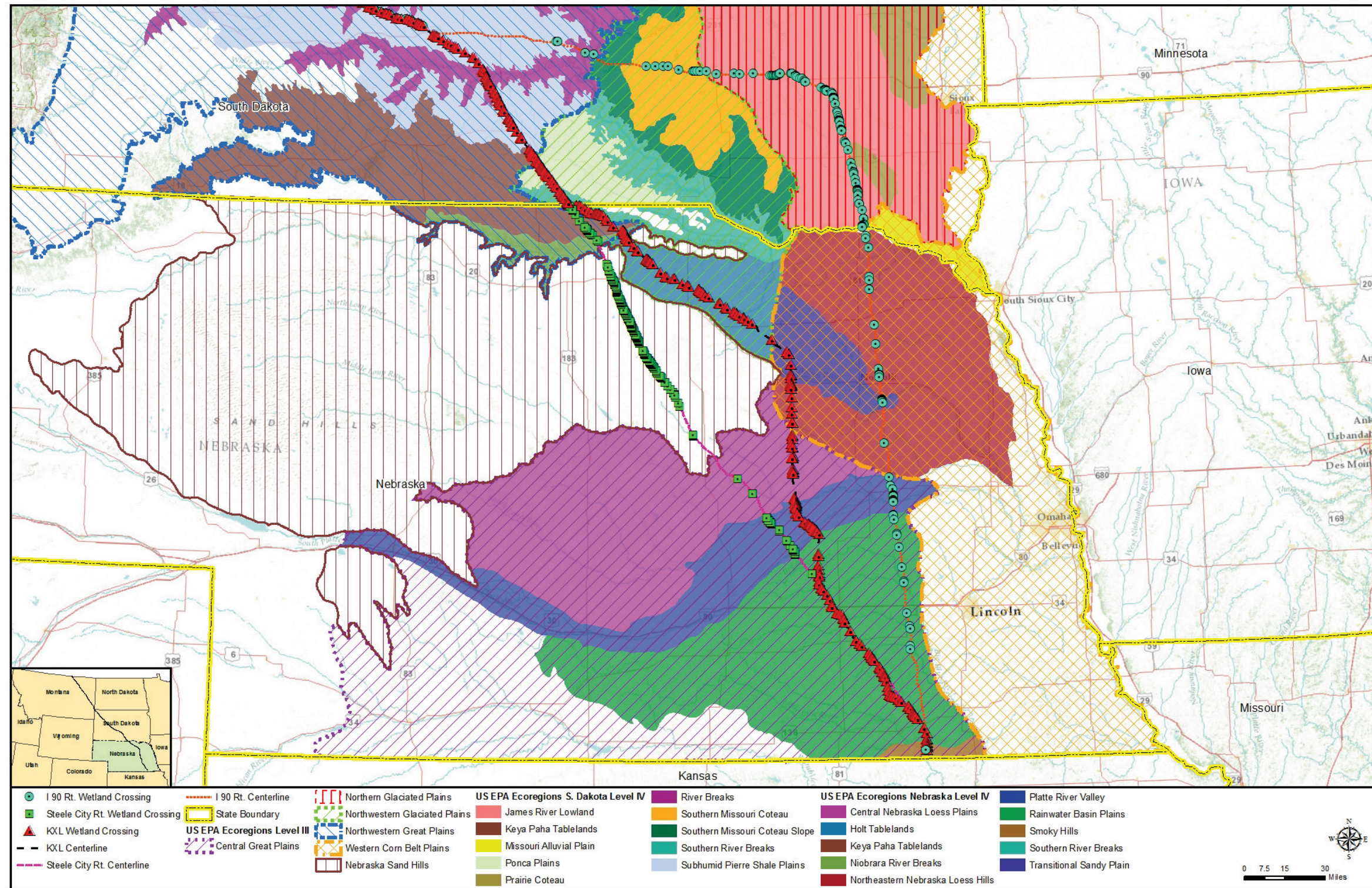
Similarly for both the proposed Project and this alternative, potential operational impacts at surface water crossings would include spills or damage to the pipeline caused by erosion and subsequent exposure. Impacts associated with potential crude oil releases from pipeline operation are addressed in 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, Additional Mitigation, would be implemented to minimize the potential for exposing the pipeline.

5.2.2.4 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 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 5.2.2-1. 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 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 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; see Section 3.4.3.1, Sensitive Wetland Areas, for additional details. Protected wetlands (i.e., wetland easements) would occur along both routes; see Section 3.4.3.2, Protected Wetlands, for details regarding wetland easements that would occur along the proposed Project route.



Source: exp Energy Services Inc. 2012b; U.S. Fish and Wildlife Service (USFWS) 2012a; Fry et al. 2011; USGS 2011a; USEPA 2011; Esri 2013

Figure 5.2.2-1 Major Route Alternatives and the Proposed Project Route, USEPA Ecoregions, and Wetland Distribution

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Potential Impacts

Section 4.4.2, Impact Assessment Methodology, discusses the methodologies used to determine the potential impacts related to the 2011 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, 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 potential hazardous liquid spills and leaks during the construction and operational phases.

Estimates of wetland acreages that would be affected by the 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 2011 Steele City Alternative and the 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 | 4.9 | 4.4 | 1.9 |
| Riv-OW | 74.2 | 37.8 | 72.3 | 35.0 |
| Total | 262.2 | 120.4 | 544.1 | 247.4 |

Sources: exp Energy Services Inc. 2012a and 2012b; USFWS 2012a; Fry et al. 2011; USGS 2011a

^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 (248 acres) than by the proposed Project route (121 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 palustrine scrub-shrub, palustrine forested, and riverine-open water wetlands are similar for both routes; however, over three times as many palustrine 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 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 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 Wetland Impacts, and Section 4.4.4, Additional Mitigation, would also apply to the 2011 Steele City Alternative.

5.2.2.5 *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). The vegetation is predominantly composed 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. Specific to Nebraska, the landscapes include: Northwestern Glaciated Plains (9 percent); Northwestern Great Plains (36 percent); Nebraska Sand Hills (7 percent); and Central Great Plains (11 percent).

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 Alternative are based on literature review and consultation with regional scientists. The proposed Project route has been evaluated in this Final 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 (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, grassland/pasture, areas of upland forest, woody wetlands, and developed lands than the proposed Project. Conversely, the proposed Project would impact less open water and emergent herbaceous wetlands.

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

| | Cultivated Crops | Grassland/Pasture | Upland Forest | Open Water | Woody Wetlands ^b | Emergent Herbaceous Wetlands ^b | Shrub/Scrub | Developed Land | Barren Land ^c | Total ^d |
|-------------------------------------|------------------|-------------------|---------------|------------|-----------------------------|---|-------------|----------------|--------------------------|--------------------|
| Totals Construction | | | | | | | | | | |
| 2011 Steele City Alternative | 2,786 | 7,801 | 32 | 15 | 63 | 57 | 461 | 173 | NA | 11,387 |
| Proposed Project | 3,866 | 6,942 | 35 | 8 | 50 | 29 | 453 | 210 | 5 | 11,599 |
| Totals Operation^e | | | | | | | | | | |
| 2011 Steele City Alternative | 0 | 0 | 14 | 0 | 29 | 0 | 0 | 0 | NA | 43 |
| Proposed Project | 1,762 | 3,170 | 19 | 8 | 29 | 14 | 207 | 97 | 3 | 5,309 |

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

^a Data for both the 2011 Steele City Alternative and the proposed Project 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 (e.g., access roads, pump stations, and construction camps) outside of the ROWs.

^b Wetland acreage is based on the National Land Cover Database for comparison and does not reflect the specific data provided in the Section 5.2.2.4, Wetlands.

^c NA = Not Applicable; Acreage for Barren Land was not specifically identified for the 2011 Steele City Alternative

^d Totals may not match due to rounding.

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

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), due to its passing through the NDEQ-identified Sand Hills Region. In contrast, the proposed Project would avoid the environmentally sensitive NDEQ-identified Sand Hills Region.

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

| | Forest Communities^b | Riparian Forest | Native Grasslands^c | Sagebrush Grasslands^d |
|-------------------------------------|---------------------------------------|------------------------|--------------------------------------|---|
| | Acres Impacted | Acres Impacted | Acres Impacted | 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 Operations^e | | | | |
| 2011 Steele City Alternative | 63.0 | 40.6 | 0 | 0 |
| Proposed Project | 63.0 | 85.2 | 0 | 0 |

Source: USGS GAP Analysis (USGS 2011a)

^a Data for both the 2011 Steel City Alternative and the proposed Project 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 2011a).

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

^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 or longer for the seed mixtures to become established, 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 and prairie grasses may take decades to re-establish, also based on whether restored areas are located within or outside of the maintained ROW.

The mitigation measures described for the proposed Project would also apply to the 2011 Steele City Alternative.

5.2.2.6 *Wildlife*

Environmental Setting

The 2011 Steele City Alternative route and the proposed Project route would cross areas with diverse wildlife including big game animals, small and medium game animals, waterfowl and game birds, and many nongame animals⁴ (see Section 3.6, Wildlife) and their associated habitats (see Section 5.2.2.5, Terrestrial Vegetation). Some of these wildlife habitats discussed include those for threatened and endangered species, which are discussed below in Section 5.2.2.8. As

⁴ 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, 3.6-7, and 3.6-8. Where animals discussed in this section are not included in these tables, common names are followed by the scientific name.

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 the habitat (3,866 acres) that would be crossed by the proposed Project has been converted to agricultural land.

In general, the same big game species; small and medium game species; waterfowl and game birds; non-game animals; raptors and other migratory birds (regulated under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act) 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 of two more species for the 2011 Steele City Alternative route: the American dipper and the olive-sided flycatcher (Nebraska Ornithologist Unions 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, 3.6-7, and 3.6-8.

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 2000). 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 2000).

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 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 to 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 from routine maintenance activities would be limited to the permanent easement; these impacts would include preventing the establishment of trees.

Table 5.2-8 Wildlife: Comparison of Types of Wildlife Impacts for the 2011 Steele City Alternative and the 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 (U.S. Fish and Wildlife Service [USFWS] 2012b). 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 woody wetlands and 57 acres of emergent herbaceous wetlands (see Table 5.2-6). Construction of the proposed Project would result in disturbance of about 11,599 acres of various habitat types, including approximately 6,942 acres of grasslands and rangelands, 35 acres of upland forested habitat, and 79 acres of wetland habitats, including 50 acres of woody wetlands and 29 acres of emergent herbaceous wetlands. Therefore, the 2011 Steele City Alternative would impact less (approximately 212 acres) of these vegetation types 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 in Nebraska Crossed by the 2011 Steele City Alternative and the Proposed Project

| 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. 2011, 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

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 in part by avoiding the NDEQ-identified Sand Hills Region.

5.2.2.7 Fisheries

Environmental Setting

Fisheries information was derived primarily from fishery distribution maps available on agency websites and 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. These creeks and rivers contain known or potential habitat for fish of recreational and/or commercial value. The proposed Project would have 56 perennial stream crossings, including several streams in Nebraska which are rated as Class B Coldwater (see Section 3.7, Fisheries, Table 3.7-3). These may support cold water fish populations that may be maintained through year-round stocking, which 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. 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 regarding 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 the 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 One of the four open-cut methods (non-flowing, flowing, dry flume, or dry dam-and-pump) would be used for these crossings.

^b HDD = horizontal directional drill; The HDD method would also be used to cross one intermittent waterbody, Bridger Creek (MP 434); Bridger Creek would be crossed by both the proposed Project route and the 2011 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 drill (HDD) method would be used at 12 of the 48 perennial stream crossings for the 2011 Steele City Alternative, and at 13 of the 56 perennial stream crossings for the proposed Project. In addition, the HDD method would be used to cross one intermittent waterbody, Bridger Creek (MP 434), which would be crossed by both the proposed Project route and the 2011 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 composed 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 2011 Steele City Alternative. No additional mitigation measures would be required.

5.2.2.8 *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. Also of note is that the NDEQ-identified Sand Hills Region has a large concentration of the American burying beetle (a federal- and Nebraska-endangered invertebrate) and the blowout penstemon (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 (see Figure 5.2.2-2 below; USFWS 2008). In the south, the American burying beetle occurs in loess canyons. 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 2012c). 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 threatened, endangered, proposed and candidate species, Bureau of Land Management sensitive species, state threatened and endangered 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 proposed 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 has been announced in the Federal Register.

The Department and USFWS have had formal consultations regarding nine federally endangered species, two threatened species, one proposed 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 that has been determined to be potentially adversely affected by the proposed Project. As discussed in Section 4.8, Threatened and Endangered Species and Species of Conservation Concern, the proposed Project could result

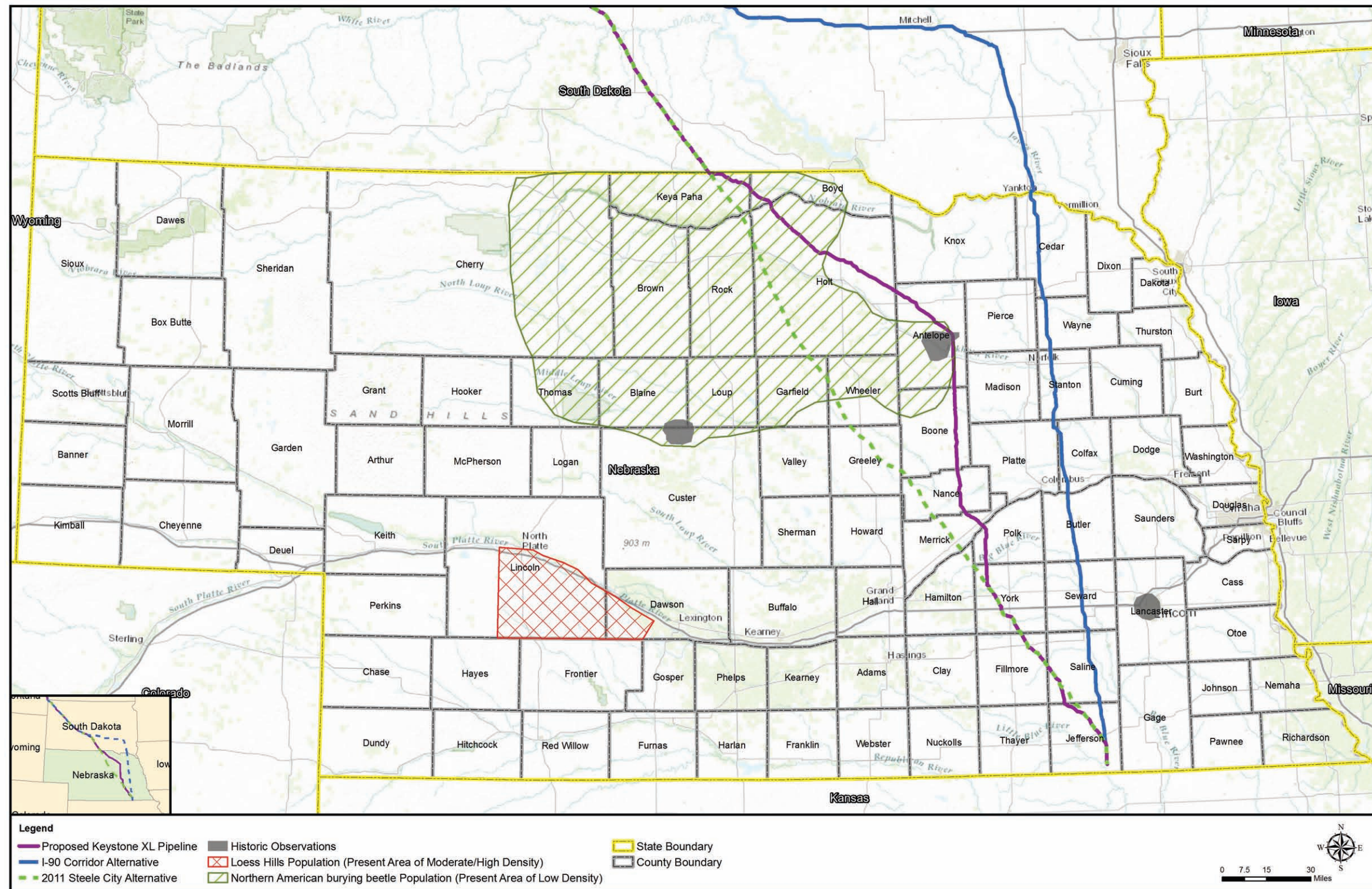
in indirect and/or short-term impacts to federal threatened, endangered, proposed and candidate species, Bureau of Land Management sensitive species, state threatened and endangered species, and species of conservation concern, including:

- 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 as well as 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 with pump stations.

The proposed Project would have direct and permanent construction-related impacts as well as direct and 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 a 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 Appendix H, 2012 Biological Assessment, 2013 USFWS Biological Opinion, and Associated Documents, for more information on these surveys) determined that the proposed Project route would cross approximately 47 miles (see Section 3.8.3.4, Federally Protected Invertebrates) of habitat where American burying beetles may occur in Nebraska.



Source: USFWS 2008; Esri 2013

Figure 5.2.2-2 2007 Estimated American Burying Beetle Distribution in Nebraska

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Surveys conducted in 2009 and 2010 along the 2011 Steele City Alternative route identified that there would be approximately 11 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 | 16 miles | 23 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 the American burying beetle as well as all other protected species that may be impacted by the proposed 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.

5.2.2.9 Land Use, Recreation, and Visual Resources

Environmental Setting

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 | Total ^c |
| 2011 Steele City Alternative | 44.6 | 52.5 | NA ^d | 756.9 | 854 |
| Percent of Total | 5.1% | 6.1% | NA | 88.8% | 100% |
| Proposed Project | 44.8 | 60.1 | 0.5 | 770.3 | 875 |
| Percent of Total | 5.1% | 6.9% | <0.1% | 88.0% | 100% |
| Difference (miles) ^e | 0.2 | 7.6 | 0.5 | 13.4 | 21 |

Source: USGS 2011b

^a Does not include 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 Does not include county road ROW. The Final EIS did not report this information; local ownership is presumed to be incorporated into the state category.

^c Totals may not match due to rounding.

^d NA = not applicable

^e Proposed Project minus 2011 Steele City Alternative; total rounded to nearest tenth of a 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 | Barren | |
| 2011 Steele City Alternative | 264.4 | 10.3 | 6.5 | 554.7 | 18.1 | NA ^b | 854 |
| Percent of Total | 31.0% | 1.1% | 0.7% | 65.1% | 2.1% | NA | 100% |
| Proposed Project | 290.9 | 15.8 | 3.0 | 557.0 | 8.4 | 0.5 | 875 |
| Percent of Total | 33.2% | 1.8% | 0.3% | 63.6% | 1.0% | <0.1% | 100% |
| Difference (miles) ^c | 26.5 | 5.5 | -3.5 | 2.3 | -9.7 | 0.5 | 21. |

Source: USGS 2006a

^a Totals may not match due to rounding.

^b NA = not applicable; Acreage for Barren Land was not specifically identified for the 2011 Steele City Alternative

^c Proposed Project minus 2011 Steele City Alternative; total rounded to nearest tenth of a mile.

Note: 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 but more water/wetland than the proposed Project route.

The 2011 Steele City Alternative route would have 27 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 versus private land), but would affect less land overall. The 2011 Steele City Alternative would affect approximately 1,559 fewer agricultural acres and 2,168 fewer rangeland acres than the proposed Project during construction. The 2011 Steele City Alternative would permanently affect less rangeland and 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

| Acres of Easement Required (Existing Ownership Type), Construction (Temporary)^a | | | | | |
|---|----------------|--------------------------|--------------------------|----------------|--------------------------|
| Alternative | Federal | State^b | Local^b | Private | Total^c |
| 2011 Steele City Alternative | 524 | 649 | NA ^d | 10,214 | 11,387 |
| Percent of Total | 4.6% | 5.7% | NA | 89.7% | 100% |
| Proposed Project | 597 | 801 | 6 | 10,195 | 11,599 |
| Percent of Total | 5.1% | 6.9% | <0.1% | 87.9% | 100% |
| Difference ^d | 73 | 152 | 6 | (19) | 212 |
| Acres of Easement Acquired (Existing Ownership Type), Operations (Permanent)^a | | | | | |
| Alternative | Federal | State^b | Local^b | Private | Total^c |
| 2011 Steele City Alternative | 238 | 295 | NA | 4,643 | 5,176 |
| Percent of Total | 4.6% | 5.7% | NA | 89.7% | 100% |
| Proposed Project | 272 | 358 | 3 | 4,676 | 5,309 |
| Percent of Total | 5.1% | 6.7% | <0.1% | 88.1% | 100% |
| Difference ^e | 34 | 63 | 3 | 33 | 133 |

Source: USGS 2011b

^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 Final Supplemental EIS assumes that local public land was incorporated into the State category.

^c Totals may not match due to rounding.

^d NA = not applicable

^e Proposed Project minus 2011 Steele City Alternative.

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

| Acres of Easement Required (Existing Ownership Type), Construction (Temporary) ^a | | | | | | | |
|---|-------------|-----------|--------|-----------|--------------------|-----------------|--------------------|
| Alternative | Agriculture | Developed | Forest | Rangeland | Water/ Wetlands | Barren | Total ^b |
| 2011 Steele City Alignment | 3,416 | 137 | 80 | 7,527 | 228 | NA ^d | 11,387 |
| Percent of Total | 30.0% | 1.2% | 0.7% | 66.1% | 2.0% | NA | 100% |
| Proposed Project | 3,866 | 210 | 35 | 7,395 | 87 | 5 | 11,599 |
| Percent of Total | 33.3% | 1.8% | 0.3% | 63.8% | 0.8% | <0.1 | 100% |
| Difference ^c | 450 | 73 | (45) | (132) | (141) | 5 | 212 |
| Acres of Easement Required (Existing Ownership Type), Operations (Permanent) ^a | | | | | | | |
| Alternative | Agriculture | Developed | Forest | Rangeland | Water/ Wetlands | Barren | Total ^b |
| 2011 Steele City Alignment | 1,553 | 62 | 36 | 3,421 | 104 | NA | 5,176 |
| Percent of Total | 30.0% | 1.2% | 0.7% | 66.1% | 2.0% | NA | 100% |
| Proposed Project | 1,762 | 97 | 19 | 3,377 | 51 | 3 | 5,309 |
| Percent of Total | 33.2% | 1.8% | 0.4% | 63.6% | 1.0% | <0.1% | 100% |
| Difference ^c | 209 | 35 | (17) | (44) | (53) | 3 | 133 |

Source: USGS 2006a

^a For the 2011 Steele City Alternative, 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 Alternative

^d NA = not applicable; Acreage for Barren Land was not specifically identified for the 2011 Steele City Alternative

5.2.2.10 Socioeconomics

Environmental Setting

The 2011 Steele City Alternative route would follow the same route as the proposed Project except that 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 | 263,298 | 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 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 263,298 persons, respectively. There are 16 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 (Table 5.2-16). 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 | | Difference ^b |
|---|----------------------------|------------------|-------------------------|
| | 2011 Steele City Alignment | Proposed Project | |
| 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) | \$53.7 | \$55.6 | (\$1.9) |

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

^b 2011 Steele City Alternative minus proposed Project.

Population/Housing

Construction of the 2011 Steele City Alternative route would require slightly fewer construction workers for the 1 to 2 year construction period than what would be required for the proposed Project. The number of construction workers 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 to 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 the Local Economic Activity subsection of Section 4.10.3.1, Construction. The primary difference in the construction cost of the proposed Project and the 2011 Steele City Alternative is that the alternative is approximately 21 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.

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 the Local Economic Activity subsection of Section 4.10.3.1, Construction. 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. 2012a). Also, a pipe yard had been proposed for Keya Paha County, Nebraska, which contains a low-income population (exp Energy Services 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.⁵

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 for the alternative because of less pipeline mileage in the state. Only counties with Keystone XL facilities (pipeline, pump stations, etc.) would receive property taxes. On a per capita basis for all *situs*⁶ counties, total property tax revenue for the 2011 Steele City Alternative would be approximately \$203 versus \$211 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 the Public Services, Tax Revenues, and Property Values subsections of Section 4.10.3.1, Construction, and Section 4.10.3.2, Operations. 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.

5.2.2.11 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 evaluated in the Final EIS, a 500-foot APE was used (based on Section 3.11, Cultural

⁵ Information for HPSAs and MUA/Ps is only available at the county level.

⁶ The term *situs* means localities actually containing proposed Project facilities within their legal boundaries.

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 the Proposed Project

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

^a Proposed Project minus 2011 Steele City Alternative.

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 December 2013, 397 cultural resources have been identified during the cultural resources surveys within the proposed Project APE, including 265 archaeological sites and 132 historic structures. Of the 397 cultural resources, 44 are eligible for inclusion on the NRHP, 3 are protected as cemeteries, 26 are potentially eligible, 271 are not eligible, 25 have not been evaluated, and 28 are awaiting NRHP eligibility determinations.

Potential Impacts

Avoidance is recommended for all eligible and unevaluated cultural resources properties, regardless of the route selected. By avoiding these properties, the 2011 Steele City Alternative and proposed Project would have no effect on these historic properties during construction or operations. The Department would continue to consult with state and federal agencies and Indian tribes about the significance of properties 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 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 approximately 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 in 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) in the United States. During the construction phase, similar to the proposed Project, the 2011 Steele City Alternative would occur over a limited time 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 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 2011 Steele City Alternative would be located in the same eGRID (Emissions & Generation Resource Integrated Database)⁷ region as the proposed Project, and, as such, would generate a similar amount of indirect GHG emissions from electricity consumption (1.44 million metric tons of carbon dioxide equivalent).^{8, 9} Air emissions associated with refueling construction equipment/vehicles and use of maintenance vehicles (approximately twice per year) and aircraft for aerial inspections (at least once every 2 weeks) throughout the operation phase would not represent a significant increase over existing vehicular and aircraft emissions. 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), including the indirect lifecycle GHG emissions, because the

⁷ The eGRID database 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 eGRID 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 eGRID emission factors when compared to regions with high percent of natural gas or hydropower. See the following reference for more information: USEPA 2013.

⁸ This calculated GHG emissions value assumes that the pumps along the pipeline alignment operate at their full horsepower (hp) capacity (i.e., 6,500 hp). This is a conservative assessment because in reality very few pumps would reach their motor hp. If it was assumed that the pumps would operate on average at 90 percent of their design condition loading, and the variable speed drive would operate the pump at partial load on average 85 percent, an operating hp of 3,569 would be obtained. The GHG emissions for this alternative with the pumps operating at this hp would be 792,392 MTCO₂e (55 percent of the GHG emissions noted in the text).

⁹ These calculated emissions apply to the extent of the route from the Canadian border to Steele City, whereas in sections 5.1 and 5.3, the GHG emissions have been calculated for the entire route from the point of crude oil extraction in Canada to the Gulf Coast, so as to allow an appropriate comparison between alternatives.

same volume of WCSB crude oil would be transported (see Section 4.14.3, Incremental Indirect Lifecycle Greenhouse Gas Emissions).

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 primary source of noise for both the proposed Project and 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 [hp]) 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).

5.2.2.13 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 the Historical Climate Trends subsection of Section 4.14.5, Climate Change Impacts on the Proposed Project).

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 the Projected Climate Change Effects subsection of Section 4.14.5, Climate Change Impacts on the Proposed Project).

5.2.3 I-90 Corridor Alternative Detailed Impact Assessment

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 route would turn east and follow interstate I-90 for approximately 144 miles to MP 660. The I-90 Corridor Alternative would then intersect an existing ROW corridor shared by the BNSF Railway Company (BNSF) railroad line and State Highway 262 (BNSF/262). From this location, the route would travel southeast away from I-90, parallel and adjacent to the BNSF/262 corridor for approximately 13 miles until it intersects 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 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 the typical 50 feet). Overall, the I-90 Corridor Alternative would be 927 miles long, approximately 52 miles longer than the proposed Project alignment.

5.2.3.1 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 gravel-sized particles for at least 30 percent of its total mass) 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 could 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 and the Proposed Project

| 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) | ~588 miles sporadically between MP 3 and MP 846 | ~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 Federal Emergency Management Agency landscape hazard ranking system mapping, as described in Section 3.1.2.5, Geologic Hazards, the I-90 Corridor Alternative would cross approximately 337 miles of areas where conditions with a high risks of landslides could be encountered, which is slightly less than for the proposed Project, which would cross approximately 339 miles of these areas with these high risks.

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

As described in Section 3.1.2.5, Geologic Hazards, 4 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 were to be 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 Code of Federal Regulations Parts 192 and 193, as well as 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 landslides associated with construction and operation on steep slopes.

Mineral resources identified include 24 oil or gas wells within .25 mile of the I-90 Corridor Alternative, as well as one gravel pit and two aggregate mines within 1 mile of that Alternative route. These resources are similar to those of the proposed Project, and the actual impacts to these resources would be negligible. There would 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, 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 588 miles for the proposed Project. Both the proposed Project and the I-90 Corridor Alternative cross a similar number of miles ranked as high-risk landslide areas by the landscape hazard ranking system, 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 I-90 Corridor Alternative.

5.2.3.2 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 the Proposed Project

| Resource Characteristics | Proposed Project (all units in miles) | I-90 Corridor Alternative (all units in miles) |
|-----------------------------------|--|---|
| Total Miles | 875 | 927 |
| Highly Erodible (wind) | 72.5 | 36.4 |
| Highly Erodible (water) | 548.4 | 234.1 |
| Prime Farmland ^a | 348.8 | 214.3 |
| Hydric Soils ^b | 54.3 | 7.2 |
| Compaction Prone | 382.5 | 584.5 |
| Stony/Rocky | 53.9 | 79.4 |
| Shallow with Bedrock ^c | 5.3 | 12.5 |
| Drought Prone | 130.4 | 98.8 |

^a Prime Farmland as defined by the NRCS 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. However, the I-90 Corridor Alternative would cross 350 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.

5.2.3.3 *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).

The amount of the NHPAQ crossed by the I-90 Corridor Alternative route is less than that crossed by the proposed Project in both South Dakota and Nebraska. However, 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 (i.e., the ease with which a fluid flows through a soil) are present in recent alluvium, including highly utilized alluvial aquifers in the Missouri River valley. These alluvial aquifers are considered part of the NHPAQ and are an important groundwater resource.

Potential Impacts

Construction and operation of the I-90 Corridor Alternative would result in similar impacts to those associated with the proposed Project, including potential impacts to groundwater resulting from a crude oil release, as discussed in each resource section in Chapter 4, Environmental Consequences.

The I-90 Corridor Alternative route would have approximately 145 miles of pipeline over the NHPAQ system versus 294 miles for the proposed Project. However, as stated above, the I-90 Corridor Alternative would cross additional aquifers that serve as important groundwater resources.

Surface Water

Environmental Setting

Table 5.2-21 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 5.2-21 Surface Water: Comparison of Water Resources in the I-90 Corridor Alternative and the 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 | 65 |
| Waterbodies with Impairments | 24 | 19 |
| Mapped Floodplains | 87 | 90 |

One notable waterbody crossing in the I-90 Corridor Alternative would be the Lake Francis Case reservoir, just south of the town of Chamberlain, South Dakota. This lake is a reservoir along the Missouri River formed by the 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 the Lake Francis Case reservoir 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 (approximately 6,000 feet) would approach the practical limits for HDD methods of a 36-inch pipeline. 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 the Lake Francis Case reservoir at this location.

Public drinking water is not withdrawn directly from the Lake Francis Case 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.

Potential Impacts

Impacts to surface 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 greater length, the I-90 Corridor Alternative would cross slightly more waterbodies and streams than the proposed Project (see Table 5.2-21), 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 both the proposed Project and this alternative; however, these impacts would likely 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 to be re-vegetated.

Similarly for both the proposed Project and this alternative, potential operational impacts at surface water crossings would 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, Additional Mitigation, would be implemented to minimize the potential for exposing the pipeline.

5.2.3.4 Wetlands

Environmental Setting

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). The USEPA ecoregions (USEPA 2010) and the distribution of wetlands along the pipeline corridor are illustrated on Figure 5.2.2-1. The I-90 Corridor Alternative would cross 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 (USGS 2006b, 1998). While no specific Prairie Pothole wetlands have been identified by the desktop survey, field surveys would be required to validate this finding.

Natural Resources Conservation Service (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 were to be 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, proposed Project modifications would be developed in cooperation with NRCS to avoid, or minimize and mitigate these impacts.

Potential Impacts

The I-90 Corridor Alternative would result in approximately 223 acres of temporary impacts and approximately 101 acres of permanent impacts to wetlands, both of which are slightly less than the proposed Project (see Table 5.2-22). Approximately 20 percent more wetland acreage would be potentially impacted within the operations ROW by the proposed Project route (approximately 120 acres) than by the I-90 Corridor Alternative route (approximately 101 acres).

Table 5.2-22 Wetlands: Comparison of Estimated ROW Wetland Impacts within the I-90 Corridor Alternative and the 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 | 4.9 | 0.8 | 0.4 |
| Riv-OW | 74.2 | 37.8 | 69.6 | 33.4 |
| Total | 262.2 | 120.4 | 223.4 | 100.9 |

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

^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 5.2-23).

Table 5.2-23 Wetlands: Comparison of Wetlands Regions Crossed by the I-90 Corridor Alternative and the Proposed Project

| 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 Wetland Impacts, and Section 4.4.4, Additional Mitigation, would also apply to the I-90 Corridor Alternative.

5.2.3.5 Terrestrial Vegetation

Environmental Setting

The generalized vegetation cover and ecosystems that would be crossed by the I-90 Corridor Alternative are presented in Table 5.2-24. Vegetation communities of some conservation concern that would be crossed by the I-90 Corridor Alternative are shown in Table 5.2-25 and include forest communities, riparian forest, native grasslands, and sagebrush grasslands.

Table 5.2-24 Vegetation: Summary of Estimated Impacts on Vegetation Communities Crossed (Acres)^a by the I-90 Corridor Alternative and the Proposed Project

| | Cultivated Crops | Grassland/Pasture | Upland Forest | Open Water | Woody Wetlands ^b | Emergent Herbaceous Wetlands ^b | Shrub/Scrub | Developed Land | Barren Land ^c | Total ^d |
|--|------------------|-------------------|---------------|------------|-----------------------------|---|-------------|----------------|--------------------------|--------------------|
| Total Acres Construction | | | | | | | | | | |
| I-90 Corridor Alternative | 3,586 | 6,071 | 57 | 22 | 43 | 27 | 454 | 2,100 | NA | 12,360 |
| Proposed Project | 3,866 | 6,942 | 35 | 8 | 50 | 29 | 453 | 210 | 5 | 11,599 |
| Total Acres Operation^e | | | | | | | | | | |
| I-90 Corridor Alternative | 0 | 0 | 26 | 0 | 20 | 0 | 0 | 0 | NA | 46 |
| Proposed Project | 1,762 | 3,170 | 19 | 8 | 29 | 14 | 207 | 97 | 3 | 5,309 |

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

^a Data for the I-90 Corridor Alternative and the proposed Project are based on disturbance within a 110-foot construction and the 50-foot operation ROW. Acreage does not include disturbance associated with any ancillary activities (e.g., access roads, pump stations, and construction camps) outside of the ROWs.

^b Wetland acreage is based on the National Land Cover Database and does not reflect the specific data provided in the Section 5.2.2.4, Wetlands.

^c NA = Not Applicable; Acreage for Barren Land was not specifically identified for the I-90 Corridor Alternative

^d Totals may not match due to rounding.

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

Table 5.2-25 Vegetation: Estimated Impacts on Vegetation Communities of Conservation Concern^a Crossed by the I-90 Corridor Alternative and the Proposed Project

| | Forest Communities ^b | Riparian Forest | Native Grasslands ^c | 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 2011a)

^a Data for both the I-90 Corridor Alternative and the proposed Project are based on disturbance within a 110-foot construction and the 50-foot operation ROW. Acreage does not include disturbance associated with any ancillary activities (e.g., access roads, pump stations, and construction camps) 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 2011a).

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

^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 5.2-24 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; however, the proposed Project would result in approximately 761 less acres of construction impacts to vegetative communities than the I-90 Corridor Alternative.

The potential construction and operation impacts to vegetation communities of conservation concern including native grasslands, sagebrush grasslands, riparian habitats, and forest communities are presented in Table 5.2-25. With the exception of native grasslands, the I-90 Corridor Alternative and the proposed Project have very similar impacts to vegetation communities of conservation concern. The I-90 Corridor Alternative would cross approximately 253 more acres of native grassland than the proposed Project.

The mitigation measures described for the proposed Project would also apply to the I-90 Corridor Alternative.

5.2.3.6 *Wildlife*

Environmental Setting

The I-90 Corridor Alternative spans approximately 927 miles in the United States and crosses areas with a diversity of wildlife including big game animals, small and medium game animals, waterfowl and game birds, and many nongame animals¹⁰ (see Section 3.6, Wildlife) and their associated habitats (see Section 5.2.3.5, Terrestrial Vegetation). Some of these wildlife habitats include those of threatened and endangered species, which are discussed below in Section 5.2.3.8, Threatened and Endangered Species. As shown in Table 5.2-24, 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 and medium 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 3.6-2 to 3.6-8.

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 2012b). 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 (National Audubon Society 2012), compared to one IBA for the proposed Project. The North Valley Grasslands IBA in Montana and the Rainwater Basin IBA in Nebraska would both be affected by the I-90 Corridor Alternative 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

¹⁰ 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, 3.6-7, and 3.6-8. Where animals discussed in this section are not included in these tables, common names are followed by the scientific name.

vertical faces 10 to 15 feet high. This landscape has backwater marshes, open sandbars, and cottonwood forests that provide habitat for wildlife. This section of the Missouri River is remarkable for the number of least terns and piping plovers using the sandbars and river areas. According to biologists with the U.S. Army Corps of Engineers, 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 (*Megaceryle alcyon*), and there are as many as six bald eagle (*Haliaeetus leucocephalus*) 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 USNABI (2000). These regions are Prairie Pothole (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 2000).

Potential Impacts

Construction of the I-90 Corridor Alternative would have direct and indirect, and temporary 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 that 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 5.2-26).

Table 5.2-26 Wildlife: Comparison of the Impacts Associated with the I-90 Corridor Alternative and 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 Habitat loss, direct mortality, human disturbance | Nesting, feeding, roosting disturbance Habitat loss, direct mortality, human 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 12,360 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 woody 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 5.2-27). 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. 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 proximity of I-90.

The mitigation measures described for the proposed Project would also apply to the I-90 Corridor Alternative.

Table 5.2-27 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 |
| Hosford Conservation Easement | Private | ND ^a | ND ^a |

Source: Schneider et al. 2011, National Audubon Society 2012, Keystone 2012, Nebraska Land Trust 2013

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

5.2.3.7 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 5.2-28 provides a comparison of the number of perennial stream crossings with known or potential habitat for fish species 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 5.2-28 Fisheries: Comparison of the I-90 Corridor Alternative and the 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 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 434), which 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 avoid 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 noise, increased turbidity, and silt dispersion from construction of the I-90 Corridor Alternative and the proposed Project. 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 could have long-term adverse impacts depending on the size and duration of the release.

The mitigation measures described for the proposed Project would also apply to the I-90 Corridor Alternative.

5.2.3.8 *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 to 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 the Lake Francis Case reservoir and a second time along the South Dakota/Nebraska border at the Missouri National Recreational River IBA. Piping plovers (a federally threatened species) have been observed at the Lake Francis Case reservoir, but nesting has not been observed in recent times (USFWS 2002). Piping plovers and least terns (federally endangered species) are known to nest on the sandbars and river areas in the Missouri National Recreational River IBA; this portion of the IBA is USFWS-designated critical habitat for the piping plover (USFWS 2002).

According to biologists with the U.S. Army Corps of Engineers, 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, belted kingfisher, and there are as many as six bald eagle 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 is 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, 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 and Species of Conservation Concern, 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 14 federally protected, proposed, 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 306 miles of impacts), including developed land and cultivated crops (see Table 5.2-29). More information on the potential impacts to terrestrial vegetation communities resulting from the I-90 Corridor Alternative are provided in Section 5.2.3.5, Terrestrial Vegetation.

Table 5.2-29 Threatened and Endangered Species: Comparison of Potential Protected Species Habitats Crossed (Miles) by 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. Near highways, there is a greater percentage of non-native species and human disturbance, which results in 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 5.2-29, above) and would be expected to have fewer adverse impacts on protected species.

Unlike the proposed Project, the I-90 Corridor Alternative would cross through federally designated critical habitat for the piping plover along the Missouri River where it forms the border between 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 5.2.3.5, 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 proposed Project construction and operation activities.

5.2.3.9 Land Use, Recreation, and Visual Resources

Environmental Setting

Table 5.2-30 summarizes the land ownership and Table 5.2-31 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, Recreation, and Visual Resources), for comparison.

Table 5.2-30 Land Use: Land Ownership Comparison of the I-90 Corridor Alternative and the Proposed Project by ROW Length

| Alternative | Existing Land Ownership Status (miles crossed) | | | | |
|---------------------------|--|--------------------|-----------------------------|---------|--------------------|
| | Federal | State ^a | Local (Public) ^b | Private | Total ^c |
| I-90 Corridor Alternative | 46.2 | 56.1 | 0.4 | 824.3 | 927 |
| Percent of Total | 4.9% | 6.1% | <0.1% | 88.9% | 100% |
| Proposed Project | 44.8 | 60.1 | 0.5 | 770.3 | 875 |
| Percent of Total | 5.1% | 6.9% | <0.1% | 88.0% | 100% |
| Difference ^d | -1.4 | 4.0 | 0.1 | -54.0 | -52 |

Source: USGS 2011b

^a Does not include state highway ROW.

^b Does not include county road ROW.

^c Totals may not match due to rounding.

^d Proposed Project minus I-90 Corridor Alternative

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

| Alternative | Land Use Type (miles crossed) | | | | | | Total ^b |
|---------------------------|-------------------------------|-----------|--------|-----------|--------------------|-----------------|--------------------|
| | Agriculture | Developed | Forest | Rangeland | Water/ Wetlands | Barren | |
| I-90 Corridor Alternative | 270.6 | 148.9 | 4.3 | 496.2 | 7.0 | NA ^c | 927 |
| Percent of Total | 29.2% | 16.1% | 0.5% | 53.5% | 0.7% | NA | 100% |
| Proposed Project | 290.9 | 15.8 | 3.0 | 557.0 | 8.4 | 0.5 | 875 |
| Percent of Total | 33.2% | 1.8% | 0.3% | 63.6% | 1.0% | <0.1% | 100% |
| Difference ^a | 20.3 | -133.1 | -1.3 | 60.8 | 1.4 | 0.5 | -52 |

Source: USGS 2006a

^a Proposed Project minus I-90 Corridor Alternative

^b Totals may not match due to rounding.

^c NA = not applicable

The I-90 Corridor Alternative would be longer overall and would cross more private land, 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 recreational 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 2006a).

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 5.2-32 summarizes the acres of land ownership and Table 5.2-33 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, Visual Resources, and Recreation), for comparison.

Table 5.2-32 Land Use: Land Ownership Comparison of the I-90 Corridor Alternative and the 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 | 754 | 12 | 10,976 | 12,360 |
| Percent of Total | 5.0% | 6.1% | <0.1% | 88.8% | 100% |
| Proposed Project | 597 | 801 | 6 | 10,195 | 11,599 |
| Percent of Total | 5.1% | 6.9% | <0.1% | 87.9% | 100% |
| Difference ^f | (21) | 47 | (6) | (781) | (761) |
| Alternative | Acres of Easement Required (Existing Ownership Type), Operations (Permanent) | | | | |
| | Federal | State ^c | Local ^d | Private | Total ^e |
| I-90 Corridor Alternative ^b | 241 | 294 | 5 | 4,278 | 4,818 |
| Percent of Total | 5.0% | 6.1% | <0.1% | 88.8% | 100% |
| Proposed Project | 272 | 358 | 3 | 4,676 | 5,309 |
| Percent of Total | 5.1% | 6.7% | <0.1% | 88.1% | 100% |
| Difference ^f | 31 | 64 | (2) | 398 | 491 |

Source: USGS 2011b

^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 Does not include state highway ROW.

^d Does not include 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 5.2-33 Land Use: Comparison of the I-90 Corridor Alternative and Proposed Project by ROW Area

| Acres of Easement Required (Existing Land Use), Construction (Temporary) | | | | | | | |
|--|-------------|-----------|--------|-----------|--------------------|-----------------|----------------------|
| Alternative | Agriculture | Developed | Forest | Rangeland | Water/ Wetlands | Barren | Total ^a |
| I-90 Corridor Alternative ^b | 3,587 | 2,106 | 57 | 6,519 | 92 | NA ^c | 12,360 |
| Percent of Total | 29.0% | 17.1% | 0.5% | 52.7% | 0.7% | NA | 100% |
| Proposed Project | 3,866 | 210 | 35 | 7,395 | 87 | 5 | 11,599 |
| Percent of Total | 33.3% | 1.8% | 0.3% | 63.8% | 0.8% | <0.1 | 100% |
| Difference ^d | 279 | (1,896) | (22) | 876 | (5) | 5 | (761) |
| Acres of Permanent Easement Required (Existing Land Use), Operations (Permanent) | | | | | | | |
| Alternative | Agriculture | Developed | Forest | Rangeland | Water/ Wetlands | Barren | Total ^{a,e} |
| I-90 Corridor Alternative ^b | 1,398 | 820 | 25 | 2,540 | 35 | NA | 4,818 |
| Percent of Total | 29.0% | 17.1% | 0.5% | 52.7% | 0.7% | NA | 100% |
| Proposed Project | 1,762 | 97 | 19 | 3,377 | 51 | 3 | 5,309 |
| Percent of Total | 33.2% | 1.8% | 0.4% | 63.6% | 1.0% | <0.1% | 100% |
| Difference ^d | 364 | (723) | (6) | 837 | 16 | 3 | 491 |

Source: USGS 2006a

^a Totals may not match due to rounding.

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

^c NA = Not Applicable; Acreage for Barren Land was not specifically identified for the I-90 Corridor Alternative

^d Proposed Project minus I-90 Corridor Alternative

^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.

Compared to the proposed Project, the I-90 Corridor Alternative 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.

5.2.3.10 Socioeconomics

Environmental Setting

The I-90 Corridor Alternative would intersect a total of 33 counties, while the proposed Project would intersect 30. Table 5.2-34 summarizes the key socioeconomic characteristics of the I-90 Corridor Alternative and the proposed Project.

Table 5.2-34 Socioeconomics: Comparison of States and Counties within the I-90 Corridor Alternative and the Proposed Project Area

| Characteristic | Alternative | | |
|--|---------------|------------------|-------------------------|
| | I-90 Corridor | Proposed Project | Difference ^b |
| 2010 Population ^a | 354,237 | 263,298 | 90,939 |
| 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 I-90 Corridor Alternative

Population and Socioeconomic Conditions

The affected population along the pipeline corridor for the I-90 Corridor Alternative is substantially higher than for the proposed Project due to its route through more populous counties. There are 37 communities within 2 miles of the I-90 Corridor Alternative, compared to 17 for the proposed Project.

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.¹¹

Environmental Justice

Compared to the proposed Project, the I-90 Corridor Alternative route contains minority populations in an additional 31 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.

¹¹ 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.

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.

Tax Revenues and Property Values

The importance of property tax revenue to local governments is similar 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 (see Table 5.2-34). 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 5.2-35 summarizes some of the key socioeconomic characteristics of the I-90 Corridor 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 5.2-35 Socioeconomics: Comparison of Selected Socioeconomic Impacts of the I-90 Corridor Alternative and the 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) | \$59.3 | \$55.6 | \$3.7 |

^a Includes earnings (defined in the Local Economic activity subsection of Section 4.10.3.1, Construction) for all industries in the United States as a result of the I-90 Corridor 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 to 6,000 construction workers for the 1 to 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 to 8 months, lessening the effects that the temporary population influx 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 1,673 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 the Local Economic Activity subsection of Section 4.10.3.1, Construction. 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 52 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 the Local Economic Activity subsection of Section 4.10.3.1, Construction. 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, 39 block groups and six 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 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 populations.¹²

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 (\$167 per capita for all pipeline *situs* counties for the alternative compared to \$211 for the proposed Project). Only counties with Keystone XL facilities (pipeline, pump stations, etc.) would receive property taxes.

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.

¹² Information for HPSAs and MUA/Ps is only available at the county level.

5.2.3.11 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.

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 were to be recommended, a complete evaluation of the APE for archaeological sites and historic structures would be required. Should this evaluation 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. Assuming any such sites were avoided, the I-90 Corridor Alternative would have no effect on historic properties. The Department would continue to consult with state and federal agencies and Indian 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.

5.2.3.12 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 to but slightly higher than that for the proposed Project. This is due to this alternative's greater pipeline length (927 miles) in comparison to the proposed Project (875 miles). Like the proposed Project, construction of this alternative would occur over a short term period and, as such, is expected to have similar but slightly more air quality and GHG impacts (approximately 5 to 6 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 metric 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 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 eGRID 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 (1.53 million metric tons of carbon dioxide equivalent; 6 percent higher than the proposed Project).^{13,14} Air emissions associated with refueling construction equipment/vehicles and use of maintenance vehicles (approximately twice per year) and aircraft for aerial inspections (at least once every 2 weeks) throughout the operation phase would not represent a significant increase over current vehicular and aircraft emissions. 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). The indirect lifecycle GHG emissions are expected to be the same because the same volume of WCSB crude oil would be transported (see Section 4.14.3, Incremental Indirect Lifecycle Greenhouse Gas Emissions).

¹³ This calculated GHG emissions value assumes that the pumps along the pipeline alignment operate at their full hp capacity, i.e., 6,500 hp. This is a conservative assessment because in reality very few pumps would reach their motor hp. If it was assumed that the pumps would operate on average at 90 percent of their design condition loading, and the variable speed drive would operate the pump at partial load on average 85 percent, an operating hp of 3,569 would be obtained. The GHG emissions for this alternative with the pumps operating at this hp would be 840,762 MTCO₂e (55 percent of the GHG emissions noted in the text).

¹⁴ These calculated emissions apply to the extent of the route from the Canadian border to Steele City, whereas in sections 5.1 and 5.3, the GHG emissions have been calculated for the entire route from the point of crude oil extraction in Canada to the Gulf Coast, so as to allow an appropriate comparison between alternatives.

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 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 versus 20 pump stations). Each pump station under this alternative has the same number and size of pumps as the proposed Project (three to five pumps per station; each pump rated 6,500 hp), 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).

5.2.3.13 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 the Historical Climate Trends subsection of Section 4.14.5, Climate Change Impacts on the Proposed Project).

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 the Project Climate Change Effects subsection of Section 4.14.5, Climate Change Impacts on the Proposed Project).

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